



HILLARDIA PV (PTY) LTD

HILLARDIA PV

Transportation Study

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EXECUTIVE SUMMARY

Objective

Hillardia PV (Pty) Ltd proposes constructing and operating the Hillardia PV Facility and associated grid infrastructure ±10km north of Lichtenburg in the North West Province. The proposed facilities will have a contracted generating capacity of up to 120MW. The overall objective is to generate electricity through renewable energy technology, capturing solar energy to feed into the national grid.

The proposed Hillardia PV Facility forms part of cluster development with two additional developments adjacent to this facility as separate EIA applications: - Verbena PV and Euphorbia PV. Although this report only focuses on the Hillardia PV Facility, all three developments are considered for this study as they share a common access point from the R505.

The main objective of the 'Transportation Study' is to determine the impact/s of the proposed development on the immediate and greater area concerning transportation. The assessment will comprise a site assessment and include preliminary transportation-related matters arising during the construction phase, through the operation & maintenance phase, up to and including the decommissioning phase of the development. The assessment of these phases will take into account the transportation of normal and abnormal vehicles, which are made up of, among other things; - PV components, construction materials, equipment, construction workers and employees.

Key Findings

We don't foresee any major risks concerning the proposed development and therefore include our recommendations in the report to take note of before and during the detailed design and construction stages. It should, however, be noted that several recommendations were highlighted and therefore stated as important.

The development is located in close proximity to an existing road network. Several existing access points are located along Road R50505 (R505), and to accommodate the adjusted land use, the chosen access position obtains the recommended sight distances of 250m. Approval and a wayleave application will be required from the South African National Roads Agency Limited (SANRAL) before work commences.

The construction phase for this development will typically generate the highest number of additional vehicles. However, it will be temporary, and impacts are considered nominal.

Several mitigation measures are proposed to accommodate the development and reduce the impact on the surrounding road network.

Recommendation

Concerning this report, associated assessment and the findings made within, it is SiVEST's opinion that the Hillardia PV and associated grid infrastructure will have a nominal impact on the existing traffic network. The project is therefore deemed acceptable from a transport perspective, provided the recommendations and mitigation measures in this report are implemented. Hence, Environmental Authorisations (EAs) should be granted for the EIA applications from a transport perspective.

DECLARATION BY SPECIALIST

I, MERCHANDT LE MAITRE, declare that –

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

Signature of Specialist:



Name of Company: SiVEST SA (PTY) Ltd

Date: 18th July 2022

NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) AND ENVIRONMENTAL IMPACT REGULATIONS, 2014 (AS AMENDED) - REQUIREMENTS FOR SPECIALIST REPORTS (APPENDIX 6)

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Refer to Section 4 and Appendix A
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Refer above
c) an indication of the scope of, and the purpose for which, the report was prepared;	Refer to Section 3
(cA) an indication of the quality and age of base data used for the specialist report;	Refer to Section 7.2
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Refer to Section 9 Refer to Section 10
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Refer to Section 3
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Refer to Section 3
f) details of an assessment of the specifically 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;	Refer to Section 11
g) an identification of any areas to be avoided, including buffers;	N/A
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Refer to Figure 10:1
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Refer to Section 5
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, (including identified alternatives on the environment) or activities;	Refer to Section 7 Refer to Section 12
k) any mitigation measures for inclusion in the EMPr;	Refer to Section 9
l) any conditions for inclusion in the environmental authorisation;	Refer to Section 9
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Refer to Section 9
n) a reasoned opinion- i. (as to) whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance,	Refer to Section 12

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;	N/A
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
q) any other information requested by the competent authority.	N/A
2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A

HILLARDIA PV (PTY) LTD

HILLARDIA PV FACILITY

TRANSPORTATION STUDY

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1. INTRODUCTION

SiVEST Civil Engineering Division was appointed by Hillardia PV (Pty) Ltd. (hereafter referred to as "Hillardia PV") to complete a Transportation Study for the proposed 120MW Hillardia PV Facility and associated grid infrastructure (hereafter referred to as the "proposed facility / facilities") situated ± 10 km north-west of Lichtenburg in the North West Province, Ditsobotla Local Municipality and greater Ngaka Modiri Molema District Municipality.

The proposed facility and associated grid infrastructure north of Vryburg & Klerksdorp will not be located within Renewable Energy Development Zones (REDZ). However, the development is located between the 'Future Vryburg REDZ' and 'Existing Klerksdorp REDZ'.

The proposed Hillardia PV Facility forms part of cluster development with two additional developments adjacent to this facility as separate EIA applications: - Verbena PV and Euphorbia PV. Although this report only focuses on the Hillardia PV Facility, all three developments are considered for this study as they share a common access point from the R505.

2. PV FACILITY COMPONENTS

The PV facility will consist of the following:

2.1 Solar Farm Components

The proposed Hillardia PV will comprise photovoltaic (PV) panels with a maximum total energy generation capacity of up to 120MW. The electricity generated by the proposed PV development will be fed into the national grid via a 132kV overhead power line. In summary, the proposed Hillardia PV will include the following components:

- PV panels (number of will be determined in the design phase), connected in series to form a 'string' of panels. Several strings are connected in parallel to form an 'array of modules / panels', each type between 4MW and 7MW, with a maximum export capacity of 120MW. However, the final number of panels and layout of the PV will depend on the outcome of the Specialist Studies conducted during the EIA process.
- Mounting structures that are either fixed, north-facing at a defined angle or single-axis tracking modules rotating in an east-west direction will be considered. (Will be determined at the design stage)
- Electrical transformers (690/11V to 33kV) adjacent to each inverter station (typical footprint of up to approximately 3m x 2.5m) step up the voltage to between 11kV and 33kV.
- One (1) new 11-33kV / 132kV on-site substation including associated equipment and infrastructure.
- A single inverter station is connected to several 'solar arrays' placed within the internal 'Right of Way' servitude.
- The inverter station will be connected to the proposed substation via medium voltage (33kV) cables. Cables will be buried underground along access roads wherever technically feasible.
- An overhead line servitude of 22m wide for the 33kV line and 31m wide for the 132kV line.
- Internal roads up to approximately 5m wide will provide access to each PV panel and inverter station. Existing site roads will be used wherever possible, although new site roads will be constructed where necessary.
- One (1) construction laydown area of up to approximately ± 3.0 ha. It should be noted that no construction camps will be required to house workers overnight as all workers will be accommodated in the nearby town.

- Operation and Maintenance (O&M) buildings, including offices, a guard house, operational control centre, O&M area / warehouse / workshop, canteen, visitor centre, and ablution facilities to be located on the site identified as Auxiliary Buildings. This site area is approximately ±1.0 ha.
- A new 2.0m high electric fence around the site perimeter will be erected.
- Water will either be sourced from existing boreholes within the application site or trucked in, should the boreholes within the application site be limited.

2.2 Grid Connection Components

The proposed grid connection infrastructure to serve the Hillardia PV will include the following components:

- One (1) new 33/132kV onsite substation, situated on a site occupying an area of up to approximately 1ha. The Hillardia PV facility substation (as well as the Verbena PV and Euphorbia PV facility substations) will be located directly adjacent to the Houthaalboomen North collector switching station in the south-eastern corner of Portion 4 of the Farm Houthaalboomen 31.
- The Houthaalboomen North collector substation/ switching station will facilitate the connection of the cluster facility substations to the Watershed Main Transmission Substation (MTS) via a single or double circuit 132 kV overhead powerline. The connection infrastructure associated with this grid solution (i.e. between the collector switching station and the MTS) will be assessed as part of a separate Environmental Application.

3. OBJECTIVES AND SCOPE OF WORK

The main objective of the 'Transportation Study' is to determine the impact/s of the proposed development on the immediate and greater area concerning transportation. The assessment will comprise a site assessment and include preliminary transportation-related matters arising during the construction phase, through the operation & maintenance phase, up to and including the decommissioning phase of the development. The assessment of these phases will take into account the transportation of normal and abnormal vehicles, which are made up of, among other things; - PV components, construction materials, equipment, construction workers and employees.

The scope of work consists of the following:

- a) A site investigation was completed on the 30th March 2022.
- b) Consultations with the relevant authorities and / or stakeholders include collecting traffic data and information.
- c) Desktop analysis of traffic data and information from the various authorities and / or stakeholders. The analysis includes the evaluation of the road network's capacity (if required).
- d) Evaluate the impact of the proposed development on the existing road network / traffic volumes and populate a suitable 'Impact Rating System'.
- e) Determine specific traffic needs during the different phases of implementation.
- f) Conclude & propose possible mitigation measures.
- g) Identify the position and suitability of the preferred access road alternatives.
- h) Confirm the required clearances for the necessary equipment to be transported from the point of delivery to the various sites.

- i) Confirm freight and transport requirements during construction, operation and maintenance period.
- j) Propose origins and destinations of equipment.
- k) Determine Abnormal load requirements (if any).
- l) Seasonal impacts do not affect the assessment.

3.1 Legal Requirement & Guidelines

Key legal requirements and guidelines for the proposed facilities are as follows:

- o Government Notice 509 (GN509), as published in Government Gazette 40229 of 2016 and refers to the National Water Act, 1998 (Act No. 36 of 1998)
- o National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA)
- o National Water Act, 1998 (Act No 36 of 1998) (NWA)
- o Road Safety Act (Act No 93 of 1996)
- o National Road Traffic Regulations, 2000

4. SPECIALIST CREDENTIALS

Merchandt Le Maitre from SiVEST Consulting Engineers compiled this Transportation Study. He has a B Tech (Baccalaureus Technologiae) in Civil Engineering with over 17 years of experience, with 12 years in renewable energy. His extensive experience in the different facets of Civil Engineering means he can advise clients in the renewable energy sector in; geotechnical engineering, topographical studies, stormwater management, water demand, transportation studies, access / layout designs and glint & glare assessments. A full Curriculum Vitae is included in 'Appendix A.'

Table 4.1 Specialist Credentials & Experience

Company	SiVEST (Pty) Ltd
Contact Details	merchandtm@sivest.co.za
Qualifications	B Tech (Baccalaureus Technologiae) in Civil Engineering
Professional Registrations & Memberships	<ul style="list-style-type: none"> • Pr. Tech Eng – Engineering Council of South Africa • MSAICE – Member of South African Institute of Civil Engineers • SAWEA – South African Wind Energy Association
Expertise to carry out the Transportation Study	<ul style="list-style-type: none"> • Tooverberg WEF • Umsobomvu PV • Droogfontein 3 PV • Mierdam PV • Dwarsrug PV • Platsjambok West PV • Platsjambok East PV • Loeriesfontein 3 PV • Koeris BESS • Koup 1 & 2 WEF • Beaufort West WEF

5. ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations are to be noted:

- The analysis is based on the information provided at the time by Hillardia and its representatives.
- Digital Terrain Model: 25m DEM from NGI (2014) & 2m DEM from GeoSmart (2016:3222DA)
- Access for Hillardia PV is obtained through Euphorbia PV
- Technical Specifications for the Facility:

Table 5.1 Technical Specification for Hillardia PV Facility

Technical Component	Dimensions
PV Tracking System	Fixed axis tracking has been used for these simulations as it has the most significant impact on the surrounding road network
Height of PV Panels	≤ 5.5 m
Area of PV Array	±183 ha
Number of Panels and Inverters	To be determined at the detailed design phase
Area of Inverter / Transformer stations / substations /	The inverter / transformer stations will be located within the area of the PV array, while the main HV transformers will be located within the substation complex
Voltage of Substation Complex	11kV/132kV - 33kV/132kV
Area of Substation Complex	≤ 3 ha
Height of Substation Complex	≤ 25m
The area occupied by laydown areas (Permanent and Construction)	Temporary Laydown Area: ± 5 ha (per facility) Permanent Laydown Area: Less than ± 1 ha will remain in place for operations (per facility)
The area occupied by Buildings	≤ 1 ha for a site office and O&M buildings
Length of Access Road	≤ 7 km
Width of Access Road	Up to 8m
Length of Internal Roads	≤ 20km
Width of Internal Roads	Up to 8m
Construction Period	±12 months

- Traffic Station Data / Counts and trip generation calculations are for one direction only and do not include return trips unless indicated.
- This assessment is limited to the impact of the development traffic on the network, not on the wider impacts known as background traffic. Such impacts can only be addressed in a detailed Traffic Impact Study, which considers actual traffic counts undertaken during peak periods.
- The information provided in this report is an informed estimate. However, construction-related traffic may vary and be different from the information provided during construction phases because of supplier delivery schedule changes.

- Some of the figures provided are indicative as many of the components are still at the design stage and will only be confirmed closer to the construction time.

6. PROJECT DESCRIPTION

6.1 Locality

Hillardia PV facility and associated infrastructure are located ± 10 km northwest of Lichtenburg in the North West Province. The facility is near the R505 regional road (R50505) between Lichtenburg and Bakerville (Refer to **Figure 6:2**) in the Ditsobotla Local Municipality and greater Ngaka Modiri Molema District Municipality as indicated in **Figure 6:1**.

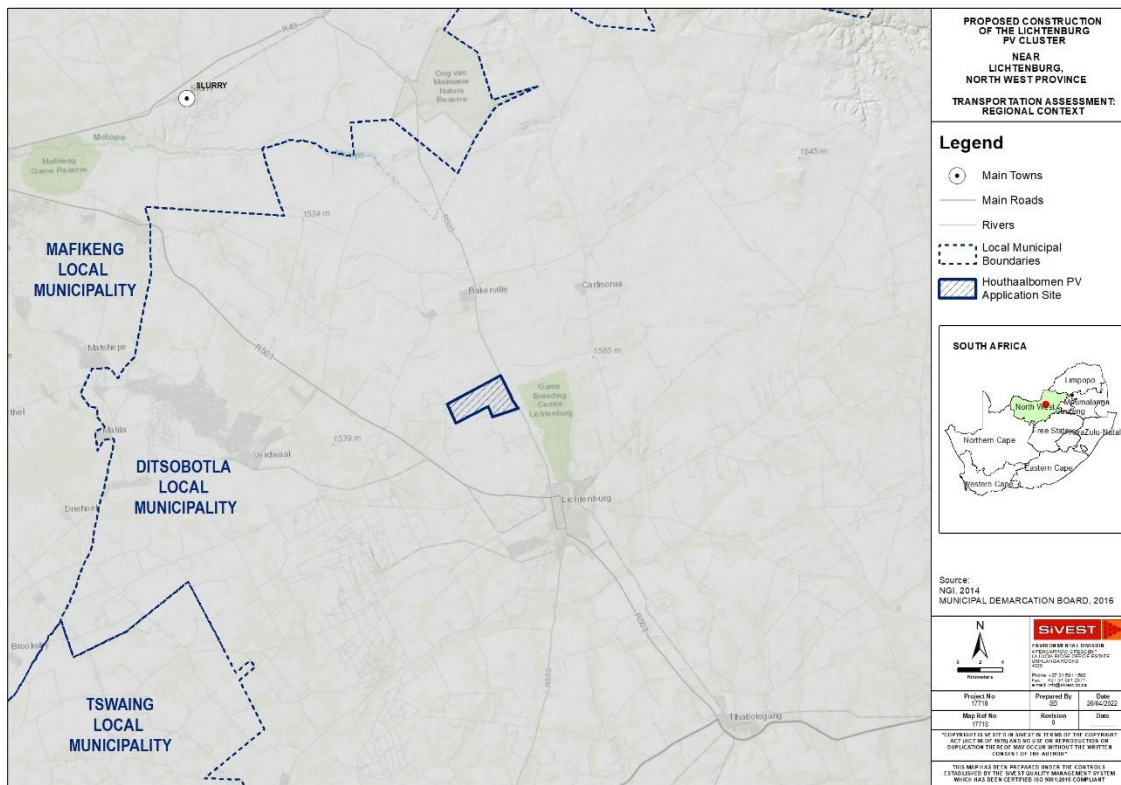


Figure 6:1 Hillardia PV - Regional Context

The PV facility will be located on the following properties (Refer to **Figure 6:2**):

- Portion 2 of the Farm Houthaalboomen No. 31-IP
- Portion 3 of the Farm Houthaalboomen No. 31-IP
- Portion 4 of the Farm Houthaalboomen No. 31-IP

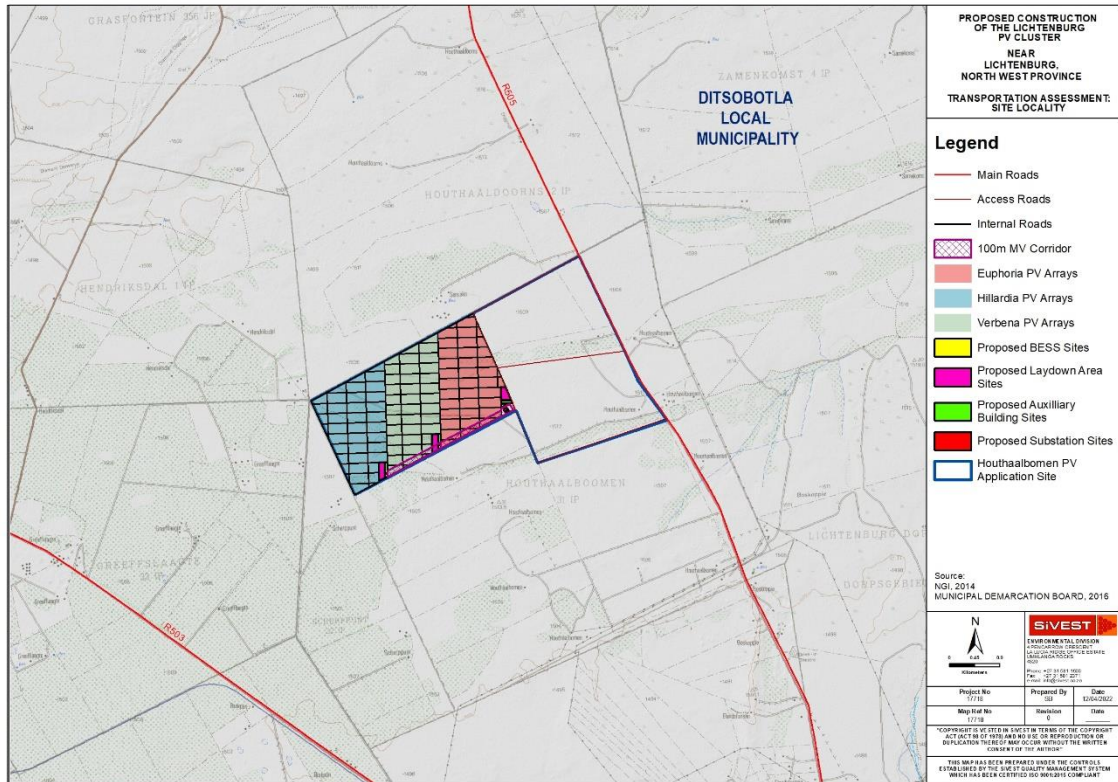


Figure 6:2 Hillardia PV - Site Locality

7. TRANSPORTATION

The Hillardia PV development does not have direct access from the surrounding road network; however, the development is near national and provincial roads where access can be obtained.

Road R50505 is located 2.2km east of the development and is currently being managed by the South African National Roads Agency Limited (SANRAL). The intention is to register a new Right of Way (ROW) servitude over the portions of land between the development and Road R50505 where direct access can be obtained. The intention is to use an existing farm access position and complete minor upgrades to accommodate the intended vehicles from the adjusted land use. Alternatively, construct a new farm access to accommodate the intended vehicle from the adjusted land use.

The site, respective access points and internal layouts will be discussed in more detail in the sections below.

7.1 Existing Road Network

The existing road network surrounding the proposed development is well established and provides a high degree of mobility and access. The mobility roads join the major centres and towns with each other, while access roads provide access roads to serve smaller nodes and individual properties.

The existing road networks in the North West Province are predominantly mobility roads; in most cases, the arterials and collector roads are surfaced. The surfaced roads are generally in a fair condition with many of the roads requiring remedial action in the short and medium term.

Roads impacting this development have been indicated in **Figure 7:1** and summarized in **Table 7.1** below.

Table 7.1 Summary of Existing Road Network

Route	Surface	RCAM Class	Section	Jurisdiction
R50505 (R505)	Asphalt	R3	Lichtenburg – Ottoshoop	SANRAL
DR2435	Gravel	R5	R50505	NWDPWR
DR2095	Gravel	R4	Bakerville	NWDPWR
DR2379	Gravel	R4	Klipkuil	NWDPWR
P28/4 (R503)	Asphalt	R4	Lichtenburg - Mahikeng	NWDPWR

* NWDPWR – North West Department Public Work & Roads

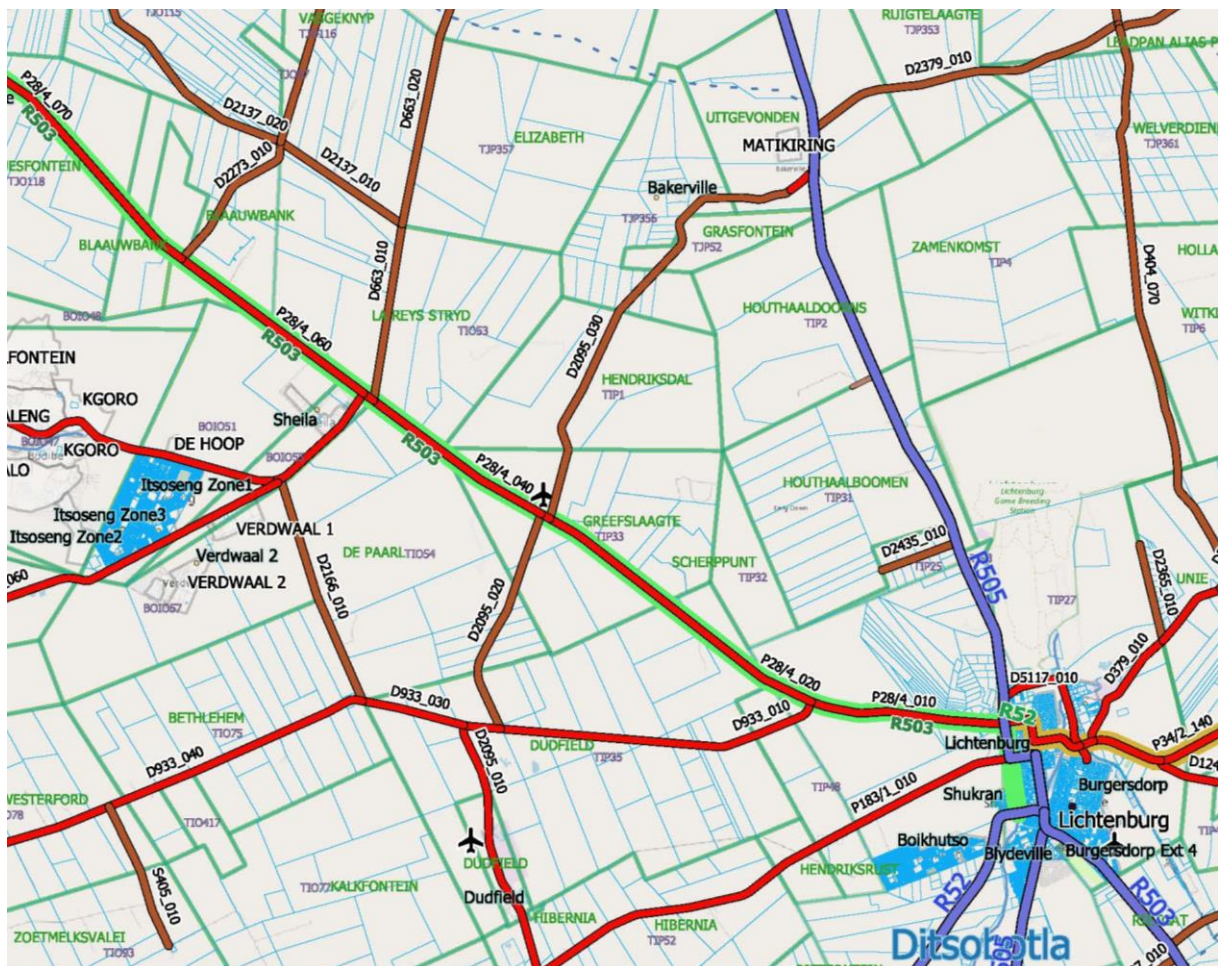


Figure 7:1 Existing Road Network (North West Department of Public Works & Roads – RAMS)

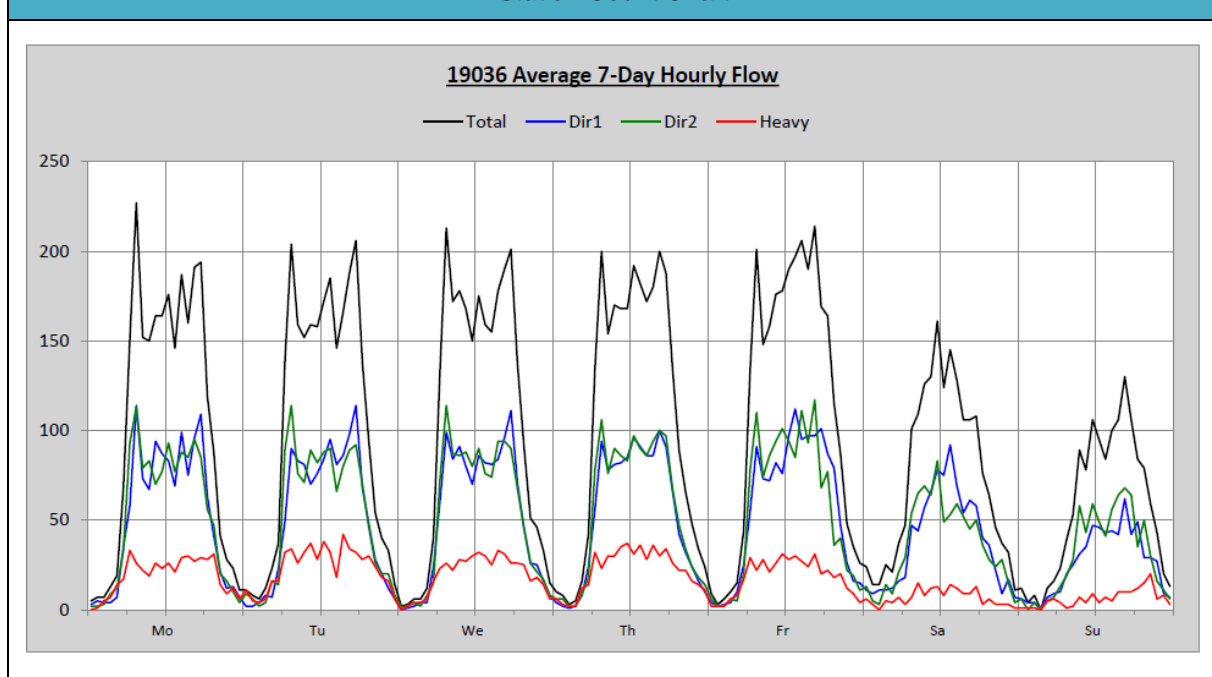
7.2 Existing Traffic Conditions

Existing traffic data for Road R50505 was obtained from the SANRAL. The data was limited and only contained one station close to Lichtenburg for ±10 days in November 2018.

Table 7.2 Traffic Data / Counts

	Light Vehicles	Heavy Vehicles	Total Vehicles	Directional Split (North : South)
R50506N				
Km 4.36				
Station No: Temporary				
Date: 2018/10/30 – 2018/11/09				
Morning 7:00-8:00	186	27	213	46.5 : 53.5
Afternoon 16:00-17:00	181	32	213	55.2 : 44.8
Average Annual Daily Trips	1983	298	2281	49.5 : 50.5

Station Count Chart



Based on the table above, it can be concluded that the existing peak traffic on this section of road is in the morning (AM) and afternoon (PM). We, therefore, recommend the transportation of labour and the delivery of material and abnormal loads be completed in the off-peak periods, where possible.

7.3 Additional Traffic Generation

The construction phase typically generates the highest number of trips for the proposed facility. Construction will typically involve access roads, foundations, frames, PV panels, electrical cables / transformers / switch gears / substations and the delivery of these materials / equipment / abnormal loads on the public road network.

It is assumed that no staff or labour will reside on the construction site, other than security, and therefore all will reside in the town Lichtenburg or nearby towns.

7.3.1 Construction Phase

Calculations and our experience from previous PV developments confirm the construction phase will generate the greatest additional traffic to the surrounding road network. The impact will be on the surrounding road network, increasing dust generation, noise and road maintenance.

The civil construction period for PV developments typically takes place between months 2 – 8 on a development of this size. This development of ±195 ha PV panels will generate a total of ±38 additional vehicle trips per day for this period on the surrounding road network. Of these vehicle trips, ±23 vehicle trips will occur at the peak of the construction phase transporting staff and labour. Typically, these trips will be in the morning between 6:00 – 7:00 and the afternoons between 17:00 – 18:00. These trips will coincide before the 'morning' and after the 'afternoon' peak periods.

The remaining ±15 vehicle trips will mostly occur during the 'weekday midday' period to deliver construction material. Of these ±15 vehicle trips, less than one will be abnormal loads (discussed further in **Section 7.3.1.1**). Assuming a 9hr workday, the ±15 vehicles during the 'weekday midday' period will equate to ±2 vehicle trips / hour.

In terms of *TMH16 - South African Traffic Impact and Site Traffic Assessment Manual*, this development generates less than 50 peak hour trips, and hence a 'Traffic Impact Assessment' will not be required. The resultant impact of this development on the surrounding road network during the construction period is therefore seen as minimal.

The specific traffic needs for this phase of the development.

- Reduction in vehicle speed
- Reduction in dust generation
- Adequate law enforcement
- Appropriate, timely and high-quality maintenance of roads
- Implementation of pedestrian safety initiatives
- Regular maintenance of farm fences and access cattle grids
- Continuous engagement with the North West Department of Public Works & Roads (NWDPWR) & SANRAL.

7.3.1.1 Abnormal Loads

Abnormal loads are described as loads that, for all practical purposes, cannot be transported on a vehicle or vehicle without exceeding the limitations described in the 'National Road Traffic Regulations (2000)'.

These vehicles exceed the limitations as a result of one of the following.

- Dimension Abnormality
 - Length
 - Width
 - Height
 - Overhangs
 - Load Projections
 - Wheelbase

- Mass Abnormality

The transportation of abnormal loads from their origin to the proposed facility has been assumed to be primarily from Gauteng and the Port of Durban. Therefore, for this assessment, it has been assumed all equipment such as electrical transformers, switch gear etc. and site establishment equipment in the form of construction equipment and offices from Gauteng.

Examples of the office transportation methods (**Figure 7:2**) and construction equipment (**Figure 7:3**) are included below.

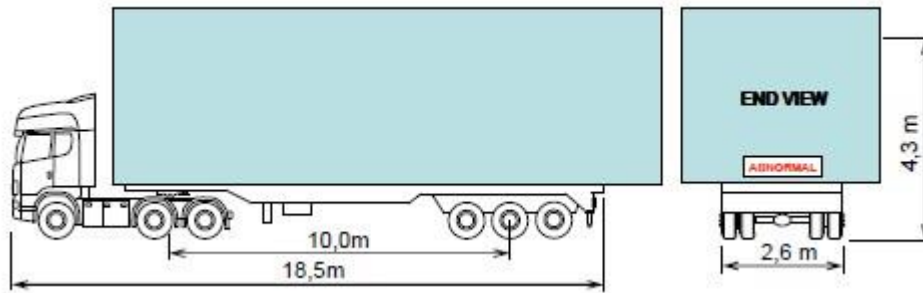


Figure 7:2 Abnormal Load on Legal Combination

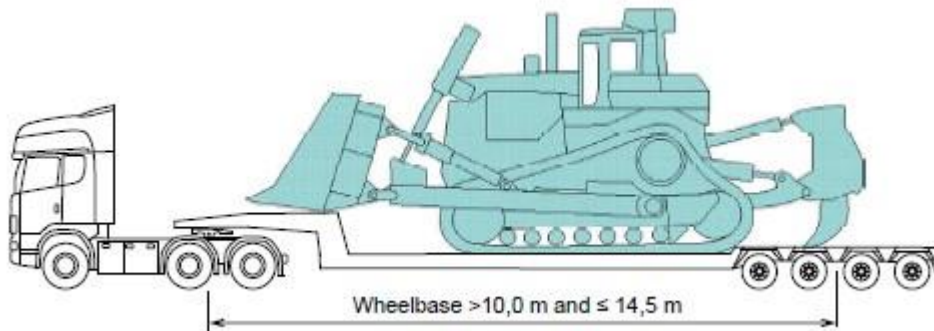


Figure 7:3 Abnormal Load on Long Wheelbase Trailer

The geometric clearance requirements associated with transporting these abnormal loads are shown in **Table 7.3** below. However, we note that the figures above and the table below are indicative as many of the components are still at the design stage and will only be confirmed closer to the construction time.

Table 7.3 Abnormal Load Dimensions

Abnormal Load Dimensions			
Transported Load	Typical Dimensions		
	Length (m)	Width (m)	Height (m)
Transformers & Switch Gear	27	4.5	4.5
Construction Equipment	13	4.0	4.5

* Please note the values above are estimates based on data currently available

We recommend that a more comprehensive route analysis be completed before construction to better understand the works required and the potential risks.

7.3.2 Operation & Maintenance Phase (O&M)

The Hillardia PV has been designed with a 20 – 25 year lifespan and could be increased if financially viable. The O&M during the 20 – 25 year period will typically be in the form of a small general maintenance team during the O&M period. Any maintenance required, including a new transformer or switch gear, will be classified as an abnormal load, and the traffic generated by this will be negligible in the greater scheme of the development. The most significant contributor of traffic in this phase will therefore only comprise employees commuting to and from the site.

We assume a maximum number of ± 50 employees will be employed during the project's 20 – 25 year life span. Therefore, the assumption is that the employees will commute together; hence, a total of ± 20 additional trips will be added to the existing road network during the morning and afternoon. In addition to the staff, commuting will be the collection of waste and sanitation. These are assumed to generate an additional ± 2 vehicles / week onto the existing road network; therefore, the sum of this phase will have a low to negligible impact.

The specific traffic needs for this phase of the development.

- Reduction in vehicle speed.
- Reduction in dust generated.
- Adequate law enforcement.
- Appropriate, timely and high-quality maintenance of gravel roads.
- Implementation of pedestrian safety initiatives.
- Regular maintenance of farm fences and access cattle grids; and
- Continuous engagement with the North West Department of Public Works & Roads (NWDPWR) and SANRAL.

7.3.3 Decommissioning Phase

Decommissioning of the Hillardia PV will generate considerably fewer trips than the construction phase. It is estimated that the decommissioning phase will generate an additional ± 10 vehicles / day over a period of 12 – 14 months. The material removed will be transported back to Gauteng for recycling. The impact of this phase will therefore be low.

The specific traffic needs for this phase of the development.

- Reduction in vehicle speed.
- Reduction in dust generated.
- Adequate law enforcement.
- Appropriate, timely and high-quality maintenance of gravel roads;
- Implementation of pedestrian safety initiatives.
- Regular maintenance of farm fences and access cattle grids; and
- Continuous engagement with the North West Department of Public Works & Roads (NWDPWR) and SANRAL.

7.4 Hillardia PV – External Access & Road Upgrades

The Hillardia PV facility will be located on three farms; PTN 2, 3 & 4 of the Farm Houthaalboomen No. 31. With three (3) possible access points emanating from Road R50505, namely: Access 1, 2 & 3 as indicated in **Figure 7:5** below.

The access points for the proposed development are:

- **Access Alternative 1:**
 - New Access
 - Chainage Km 12.99
 - Location:
 - 26°03'38.69" S
 - 26°07'04.86" E
 - This road alternative is ±5.9 km long and aligned as follows:
 - From the R50505, this route follows the northern boundary of Portion 25 of Farm Houthaalboomen in a westerly direction for ±2.4 km. This portion of the route will be new; and
 - Continues in a southerly direction along the eastern boundary of Portions 3 and 4 of Farm Houthaalboomen 31 for 1.0 km.

- **Access Alternative 2:**
 - Existing Access
 - Chainage Km 11.49
 - Location:
 - 26°04'19.02" S
 - 26°07'29.81" E
 - This road alternative is ±6.1 km long and aligned as follows:
 - From the R50505, this route follows an existing farm road that dissects Portion 25 of Farm Houthaalboomen in a westerly direction for ±2.1 km; and
 - Continues along an existing gravel road in a northerly direction along the eastern boundary of Portions 5 and 6 of Farm Houthaalboomen 31 for ±1.87 km.

- **Access Alternative 3:**
 - Existing Access
 - Chainage Km 14.79
 - Location:
 - 26°02'43.39" S
 - 26°06'37.34" E
 - This road alternative is ±6.7 km long and aligned as follows:
 - From the R50505, this route follows an existing farm road on the southern border of Remaining Extent and Portion 3 of Farm Houthaalboomen 2 in a westerly direction for ±2.1 km; and
 - Continues along an existing gravel road in a southerly direction along the eastern boundary of Portions 3 and 4 of Farm Houthaalboomen 31 for ±1.9 km.



Figure 7:6 Existing Road R50505 @ Km 14.79 – South Approaching (Access 3)



Figure 7:7 Existing Road R50505 @ Km 14.79 – North Approaching (Access 3)



Figure 7:8 Proposed Access 3 from Road R50505 @ Km 14.79



Figure 7:9 Existing Road R50505 @ Km 12.99 – South Approaching (Access 1)



Figure 7:10 Existing Road R50505 @ Km 12.99 – North Approaching (Access 1)



Figure 7:11 Proposed Access Alternative 1 from Road R50505 @ Km 12.99



Figure 7:12 Existing Road R50505 @ Km 11.49 – South Approaching (Access 2)



Figure 7:13 Existing Road R50505 @ Km 11.49 – North Approaching (Access 2)



Figure 7:14 Proposed Access Alternative 2 from Road R50505 @ Km 11.49

Upgrades to all the proposed access points will be required, and approval will need to be obtained from SANRAL. The respective internal roads from each access to the proposed development will also require upgrades to accommodate the proposed adjusted land use. All three access alternatives have sufficient sign distances on both approaches.

Table 7.4 Hillardia PV - Access Road Alternatives Summary

Access Alternative	Status	Access Upgrades on Road R50505	Access Road Upgrades
Alternative 1	New Access	Full Upgrade	Full ±3.22 km
Alternative 2	Existing Farm Access	Minor Upgrades	Minor ±3.41 km
Alternative 3	Existing Farm Access	Minor Upgrades	Minor ±3.97 km

All three access alternatives on Road R50505 can be considered for this development based on the above. However, the preferred option from a project programming and cost perspective is Alternative 2 & 3.

Most of the additional traffic generated from the Hillardia PV Facility and associated grid infrastructure can be accommodated on the existing road network and include both normal and abnormal vehicles.

7.5 Design Considerations

Based on our recent discussions with the NWDPWR and SANRAL, new Land Use applications must be sent to both departments for approval with the proposed new / upgraded access position. As part of the application, the expected traffic during construction and the O&M phase, available sight distances including photographs and the affected stormwater structures are to be included. The Original

Equipment Manufacturers (OEM) and the SANRAL's minimum requirements will need to be considered during the design stage.

The access point from Road R50505 falls within the jurisdiction of SANRAL; their standard access requirement is included in **Figure 7:15** below.

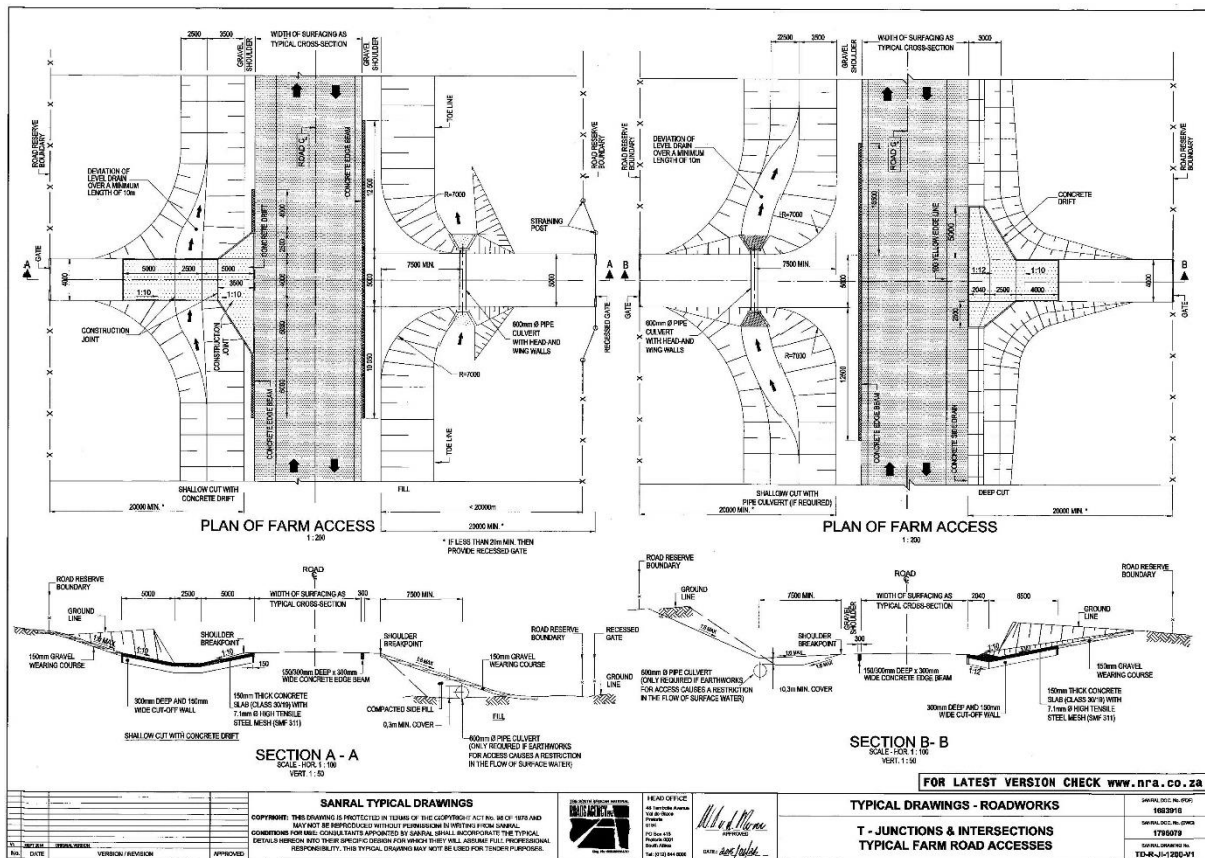


Figure 7:15 Typical Intersection and Farm Access Detail

Typical cross-sections for gravel roads have been indicated in **Figure 7:16** below and need to take into account the minimum requirements from OEM's.

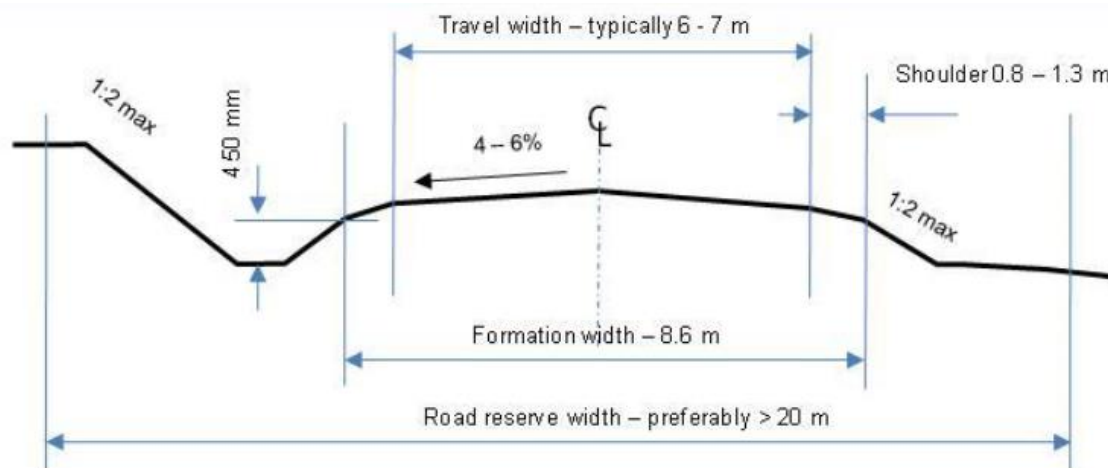


Figure 7:16 Typical Provincial Gravel Road Cross Section

The specific design considerations for this development are:

- Reduction in vehicle speed.
- Adequate law enforcement.

- Implementation of pedestrian safety initiatives.
- Regular maintenance of farm fences and access cattle grids.
- Adequate road signage as per the latest South African Road Traffic Sign Manual (SARTSM) edition.
- Possible use of approved dust suppressant techniques.
- Appropriate, timely and high-quality maintenance of existing gravel roads in terms of TRH20.
- Design and construction of new gravel roads in terms of TRH20.
- Continuous engagement with OEM and Abnormal Load specialists; and
- Constant engagement with the North West Department of Public Works & Roads (NWDPWR) & SANRAL.

However, we should note that the figures indicated above are indicative as many of the components are still at the design stage and will only be confirmed closer to the construction time.

8. INTERNAL LAYOUTS

Hillardia PV Facility is to gain access from the Verbena PV Facility. Verbena PV Facility is to obtain access from the Euphorbia PV Facility, which will obtain access from either access alternative 1, 2 or 3.

All internal access roads should be designed to have a minimal impact on the environment and thus are in most cases, parallel to the contours to keep drainage line crossings to a minimum. The use of roads perpendicular to the contours for long sections should be avoided, as the risk of possible erosion is increased. Existing gravel roads should be considered in order to reduce the environmental impact. (Refer to **Figure 8:1**)

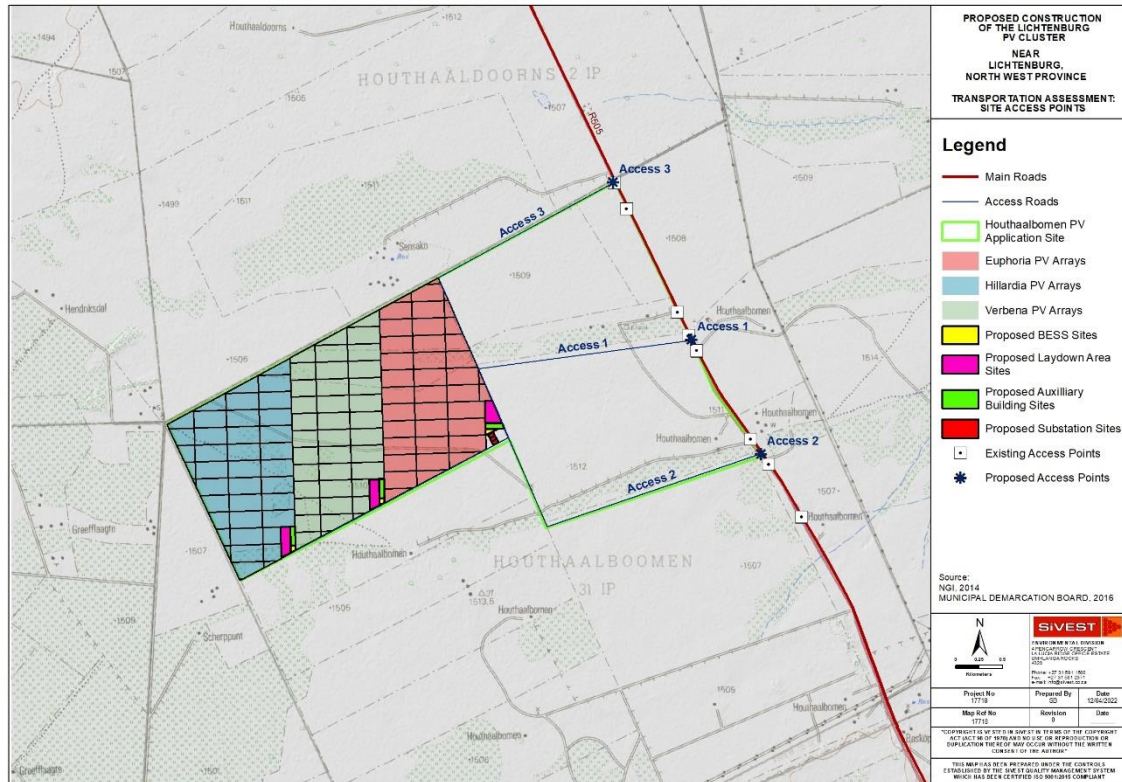


Figure 8:1 Hillardia PV - Internal Layouts showing access point

An internal network of roads has been assumed to be in a traditional grid pattern formation and will mainly consist of 5m wide gravel roads. The roads will have a horizontal and vertical alignment to accommodate vehicles and, more specifically, abnormal vehicles intended to use these roads to deliver and maintain the PV equipment.

We recommend that all internal access roads take into account, where possible and applicable, the PV facility stormwater management plan to reduce potential erosion risks.

In addition, we recommend that all internal access roads are constructed according to *TRH20 – Unsealed Roads: Design Construction and Maintenance*. For this assessment, we have assumed that the in-situ material below the topsoil is of 'G7' quality and can be used as a suitable road subgrade material, followed by an imported 'Gravel Wearing Course' material.

A suitable geotechnical study will however be required at predesign stage to understand better the design limitations on the development, followed by a preliminary design to 'value' Engineer the project.

9. IMPACT RATING ASSESSMENT

The 'Impact Rating System' considers the nature, scale and duration of the effects on the environment, and whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages:

- Planning
- Construction
- Operation
- Decommissioning

A rating points-based system is applied to the potential environmental impacts and includes objective evaluations of the impact mitigation. These impacts can be found in **Table 9.2** below.

In summary, all impacts were classified as 'Medium to Low' with a large majority of the impacts changing to 'Low' after implementing suitable mitigation measures. This rating applies to all alternatives considered.

9.1 Rating System Used to Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the possible mitigation of the impact. Impacts have been consolidated into one (1) rating. In assessing the significance of each issue the following criteria (including an allocated point system) are used:

Table 9.1 Rating of Impacts Criteria

ENVIRONMENTAL PARAMETER		
A brief description of the environmental aspect likely to be affected by the proposed activity (e.g. Surface Water).		
ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE		
Include a brief description of the impact of the environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted by a particular action or activity (e.g., an oil spill in surface water).		
EXTENT (E)		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY (P)		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	The impact will certainly occur (With greater than a 75% chance of occurrence).
REVERSIBILITY (R)		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with the implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.

3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES (L)		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resources.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in a significant loss of resources.
4	Complete loss of resources	The impact results in a complete loss of all resources.
DURATION (D)		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through a natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a period that the impact can be considered transient (Indefinite).
INTENSITY / MAGNITUDE (I / M)		
Describes the severity of an impact (i.e. whether the impact can alter the functionality or quality of a system permanently or temporarily).		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but the system / component continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	The impact affects the continued viability of the system/component, and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of

		rehabilitation and remediation.
4	Very high	The impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation are often impossible. If possible rehabilitation and remediation are often unfeasible due to the extremely high costs of rehabilitation and remediation.

SIGNIFICANCE (S)

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula:

Significance = (Extent + probability + reversibility + irreplaceability + duration) x magnitude/intensity.

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact Significance Rating	Description
5 to 23	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
5 to 23	Positive Low impact	The anticipated impact will have minor positive effects.
24 to 42	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
24 to 42	Positive Medium impact	The anticipated impact will have moderately positive effects.
43 to 61	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
43 to 61	Positive High impact	The anticipated impact will have significant positive effects.
62 to 80	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
62 to 80	Positive Very high impact	The anticipated impact will have highly significant positive effects.

Table 9.2 Hillardia PV – Impact Rating Table

HILLARDIA PV FACILITY																				
ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I/M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I/M	TOTAL	STATUS (+ OR -)	S
Construction Phase																				
Additional Traffic Generation	Increase in Traffic	2	4	1	2	1	3	30	-	Medium	<ul style="list-style-type: none"> • Ensure staff transport is done in the 'off peak' periods and by bus, if possible • Stagger material, component, and abnormal loads delivery. 	2	4	1	2	1	2	20	-	Low
	Increase of Incidents with pedestrians and livestock	2	3	2	4	1	2	24	-	Medium	<ul style="list-style-type: none"> • Upgrade of existing / new access points. • Reduction in the speed of vehicles. • Adequate enforcement of the law. • Implementation of pedestrian safety initiatives. • Regular maintenance of farm fences & access cattle grids. 	2	3	2	4	1	1	12	-	Low
	Increase in Dust from gravel roads	2	3	2	2	1	2	20	-	Low	<ul style="list-style-type: none"> • Upgrade of existing / new access point. • Reduction in the speed of the vehicles. • Construction of gravel roads in terms of TRH20. • Implement a road maintenance program under the auspices of the respective transport department. • Possible use of approved dust suppressant techniques. 	2	3	2	2	1	2	20	-	Low
	Increase in Road Maintenance	2	3	2	2	2	2	22	-	Low	<ul style="list-style-type: none"> • Implement a road maintenance program under the auspices of the respective transport department. 	2	3	2	2	1	2	20	-	Low
Abnormal Loads	Additional Abnormal Loads	3	3	1	2	1	1	10	-	Low	<ul style="list-style-type: none"> • Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods or stagger delivery. • Adequate enforcement of the law. 	3	2	1	2	1	1	9	-	Low
Internal Access Roads	Increase in Dust from gravel roads	1	4	1	1	1	2	16	-	Low	<ul style="list-style-type: none"> • Enforce a maximum speed limit on the development. • Appropriate, timely and high-quality maintenance required in terms of TRH20. • Possible use of approved dust suppressant techniques. 	1	3	1	1	1	2	14	-	Low
	New / Larger Access points	1	4	1	2	1	1	9	-	Low	<ul style="list-style-type: none"> • Adequate road signage according to the SARTSM. • Approval from the respective roads department. 	1	4	1	2	1	1	9	-	Low
Operational Phase																				

Additional Traffic Generation	Increase in Traffic	2	1	1	2	3	1	9	-	Low	• The increase in traffic for this phase of the development is negligible and will not have a significant impact.	2	1	1	2	3	1	9	-	Low
	Increase of Incidents with pedestrians and livestock	2	1	1	2	3	1	9	-	Low	• The increase in traffic for this phase of the development is negligible and will not have a significant impact.	2	1	1	2	3	1	9	-	Low
	Increase in Dust from gravel roads	2	1	1	2	3	1	9	-	Low	• The increase in traffic for this phase of the development is negligible and will not have a significant impact.	2	1	1	2	3	1	9	-	Low
	Increase in Road Maintenance	2	1	1	2	3	1	9	-	Low	• The increase in traffic for this phase of the development is negligible and will not have a significant impact.	2	1	1	2	3	1	9	-	Low
Abnormal Loads	Additional Abnormal Loads	3	1	1	2	3	1	10	-	Low	• The increase in traffic for this phase of the development is negligible and will not have a significant impact.	3	1	1	2	3	1	10	-	Low
Internal Access Roads	New / Larger Access points	1	1	1	2	3	1	8	-	Low	• Adequate road signage according to the SARTSM. • Approval from the respective roads department.	1	1	1	2	3	1	8	-	Low
Decommissioning Phase																				
Additional Traffic Generation	Increase in Traffic	2	4	1	2	1	3	30	-	Medium	• Ensure staff transport is done in the 'off peak' periods and by bus. • Stagger material, component, and abnormal loads delivery.	2	4	1	2	1	2	20	-	Low
	Increase of Incidents with pedestrians and livestock	2	3	2	4	1	2	24	-	Medium	• Reduction in the speed of vehicles. • Adequate enforcement of the law. • Implementation of pedestrian safety initiatives • Regular maintenance of farm fences & access cattle grids.	2	3	2	4	1	1	12	-	Low
	Increase in Dust from gravel roads	2	3	2	2	1	2	20	-	Low	• Reduction in the speed of the vehicles. • Appropriate, timely and high-quality maintenance required in terms of TRH20. • Possible use of approved dust suppressant techniques. • Implement a road maintenance program under the auspices of the respective transport department.	2	3	2	2	1	2	20	-	Low
	Increase in Road Maintenance	2	3	2	2	2	2	22	-	Low	• Implement a road maintenance program under the auspices of the respective transport department.	2	3	2	2	1	2	20	-	Low
Abnormal Loads	Additional Abnormal Loads	3	2	1	2	1	1	9	-	Low	• Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods or stagger delivery. • Adequate enforcement of the law.	3	2	1	2	1	1	9	-	Low
Internal Access Roads	Increase in Dust from gravel roads	1	4	1	1	1	1	8	-	Low	• Enforce a maximum speed limit on the development. • Appropriate, timely and high-quality maintenance required in terms of TRH20. • Possible use of approved dust suppressant techniques.	1	3	1	1	1	2	14	-	Low
	New / Larger Access points	1	4	1	2	1	1	9	-	Low	• Adequate road signage according to the SARTSM. • Approval from the respective roads department.	1	4	1	2	1	1	9	-	Low

Cumulative																				
Additional Traffic Generation	Increase in Traffic	2	4	1	2	1	4	40	-	Medium	<ul style="list-style-type: none"> • Ensure a large portion of vehicles travelling to and from the proposed development travels in the 'off peak' periods or by bus. • Coordination between all developers in the area. 	2	4	1	2	1	3	30	-	Medium
	Increase of Incidents with pedestrians and livestock	2	3	2	4	1	3	36	-	Medium	<ul style="list-style-type: none"> • Reduction in the speed of vehicles. • Adequate enforcement of the law. • Implementation of pedestrian safety initiatives. • Regular maintenance of farm fences, and access cattle grids. • Coordination between all developers in the area. 	2	3	2	4	1	2	24	-	Medium
	Increase in Dust from gravel roads	2	3	2	2	1	4	40	-	Medium	<ul style="list-style-type: none"> • Reduction in the speed of the vehicles. • Construction of gravel roads in terms of TRH20. • Implement a road maintenance program under the auspices of the respective transport department. • Possible use of approved dust suppressant techniques. • Coordination between all developers in the area. 	2	3	2	2	1	2	20	-	Low
	Increase in Road Maintenance	2	3	2	2	2	2	22	-	Low	<ul style="list-style-type: none"> • Implement a road maintenance program under the auspices of the respective transport department. • Coordination between all developers in the area. 	2	3	2	2	2	2	22	-	Low
Abnormal Loads	Additional Abnormal Loads	3	3	1	2	1	4	40	-	Medium	<ul style="list-style-type: none"> • Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods. • Adequate enforcement of the law. • Coordination between all developers in the area. 	3	2	1	2	1	2	18	-	Low
Internal Access Roads	Increase in Dust from gravel roads	1	4	1	1	1	3	24	-	Medium	<ul style="list-style-type: none"> • Enforce a maximum speed limit on the development. • Appropriate, timely and high-quality maintenance required in terms of TRH20. • Possible use of approved dust suppressant techniques. 	1	3	1	1	1	2	14	-	Low
	New / Larger Access points	1	4	1	2	1	2	18	-	Low	<ul style="list-style-type: none"> • Adequate road signage according to the SARTSM. • Approval from the respective roads department. 	1	4	1	2	1	1	9	-	Low

10. CUMULATIVE IMPACT ASSESSMENT

SiVEST undertook every effort to obtain the information (including specialist studies, BA / EIA / Scoping and EMPr Reports) for the surrounding developments within 35 km of the proposed PV facility and associated grid infrastructure, however many of the documents are not currently, publicly available. To this extent, the information that could be obtained from the surroundings, and planned renewable energy developments were considered as part of the cumulative impact assessment. Fourteen (14) renewable energy projects were identified within a 35 km radius of the proposed development as shown in **Table 10.1** below. The renewable energy developments considered as part of this Transportation Study are as follows:

Table 10.1 Proposed Renewable Energy developments within a 35km radius.

Applicant	Project	Technology	Capacity	Status of Application / Development
Euphorbia PV (Pty) Ltd	Euphorbia PV	Solar	120MW	EIA Process underway
Verbena PV (Pty) Ltd	Verbena PV	Solar	120MW	EIA Process underway
Themeda PV (Pty) Ltd	Themeda PV	Solar	100MW	EIA Process underway
Aristida PV (Pty) Ltd	Aristida PV	Solar	100MW	EIA Process underway
Abo Wind Lichtenburg 2 PV (Pty) Ltd	Lichtenburg 2 Solar Energy Facility	Solar	100MW	Unknown
Biotherm Energy (Pty) Ltd	The 75MW Tlisitseng PV1 SEF	Solar	75MW	Unknown
Barleria PV (Pty) LTD	Barleria PV	Solar	75MW	Pending Decision
Dicoma PV (Pty) LTD	Dicoma PV	Solar	75MW	Pending Decision
Setaria PV (Pty) LTD	Setaria PV	Solar	75MW	Pending Decision
Abo Wind Lichtenburg 1 PV (Pty) Ltd	Lichtenburg 1 Solar PV	Solar ¹	100MW	Unknown
Acsa PV	Bloemfontein Airport	Unknown	Unknown	Unknown
Hibernia Solar (Pty) Ltd	Hibernia Solar Energy Facility	Unknown	Unknown	Unknown
Megawatt One Photovoltaic (Pty) Ltd	Hibernia Solar Energy Facility	Unknown	Unknown	Unknown
Batloung Baga Shole Power Company	Unknown	Solar	64MW	Unknown

The information obtained for other planned renewable energy developments in the surroundings is indicated in **Figure 10:1** below.

¹ The DFFE dataset indicates this project as onshore wind, however, in the technology status it is indicated as Solar PV. It is assumed that it is Solar PV.

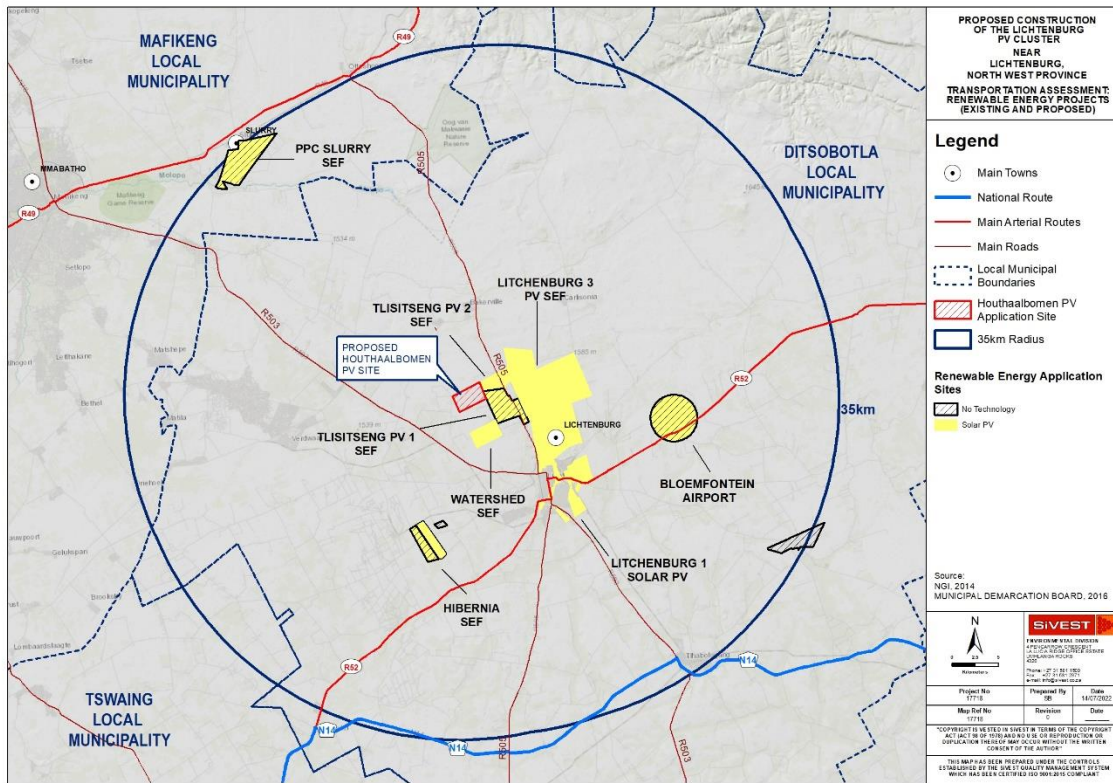


Figure 10:1 Proposed Renewable Energy Developments within a 35km radius

Based on the above, this Transportation Study has considered the cumulative impacts, which were further assessed in **Section 9** above.

11. COMPARATIVE ASSESSMENT OF ALTERNATIVES

Various design and layout options for the proposed PV Facility were considered and assessed as part of this Transportation Study. These include alternative access positions; however, no alternatives for the proposed PV Facility. The layout, as shown in **Figure 7:5** are described below.

Table 11.1 Comparative Assessment Key

PREFERRED	The alternative will result in a low impact / reduce the impact / result in a positive impact
FAVOURABLE	The impact will be relatively insignificant
LEAST PREFERRED	The alternative will result in a high impact / increase in the impact
NO PREFERENCE	The alternative will result in equal impacts

Table 11.2 Comparative Assessment of Alternatives: Access Road

Alternative	Preference	Reasons (incl. potential issues)
ACCESS ROAD ALTERNATIVES		
Access Road Alternative 1	Preferred	<ul style="list-style-type: none"> Existing farm access from Road R50505

Alternative	Preference	Reasons (incl. potential issues)
		<ul style="list-style-type: none"> Existing gravel road to the proposed development Minor upgrades are required to both access and gravel roads Shortest distance to proposed development
Access Road Alternative 2	Favourable	<ul style="list-style-type: none"> New access from Road R50505 Requires approvals from SANRAL New gravel road to the proposed development
Access Road Alternative 3	Favourable	<ul style="list-style-type: none"> Existing farm access from Road R50505 Existing gravel road to the proposed development Minor upgrades are required to both access and gravel roads Longest distance to proposed development with the more gravel road upgrades than 'Alternative 1'

12. CONCLUSIONS AND IMPACT STATEMENT

The main objective of the 'Transportation Study' is to determine the impact/s the proposed Hillardia PV Facility development will have on the immediate and greater area concerning transportation. The proposed development is located in a rural part of the North West Province, with the existing road network providing access to the development. Several other renewable energy developments have already been completed or are in the process of being completed in the immediate area.

The construction phase for this development will typically generate the highest number of additional vehicles. Of these additional vehicles, ± 23 trips / hour will occur in the morning and afternoon outside of the peak period, while ± 2 trips / hour will occur during the midday peak for construction material and abnormal loads. The impact will, however, be temporary and is considered to be nominal if adequately mitigated. During the operation phase, it is expected that the facility will accommodate ± 50 employees and generate an additional ± 20 trips / day in the morning and afternoon peak period. This impact is considered to be nominal.

- In conclusion;
 - All proposed access points from Road R50505 have sufficient sight distance of $>350\text{m}$ and are not located within and / or near any drainage lines and are therefore acceptable. However, the preferred option from a project programming and cost perspective is Alternative 2 & 3.
 - Access upgrades on Road R 50505 will be required at all the alternative access points.
 - Access road upgrades between the access position on Road R50505 and the development will be required.

- All access position upgrades on R50505 require approval and a wayleave application from the South African National Roads Agency (SANRAL) before work commences.
 - Mitigation measures to be included in the construction phase:
 - As far as practically possible, ensure staff transport is done in the 'Off Peak' period and by bus to reduce impact in the peak periods.
 - Stagger material, component, and abnormal load deliveries.
 - Adequate road signage on all external roads carrying development traffic according to the South African Road Traffic Sign Manual (SARTSM).
 - Reduction in the speed of vehicles.
 - Adequate enforcement of the law.
 - Implementation of pedestrian safety initiatives.
 - Regular maintenance of farm fences & access cattle grids.
 - Construction of gravel roads in terms of Technical Recommendations for Highways (TRH20).
 - Implement a road maintenance program under the auspices of the respective transport department; and
 - Possible use of approved dust suppressant techniques.
 - A more comprehensive route analysis be completed before construction to get a better understanding of the works required and the potential risks.
 - No fatal flaws or preferences were identified for any proposed site alternatives, construction laydown areas, substation locations or Power line routes.
- Impact Statement;
 - Concerning this report, associated assessment and the findings made within, it is SiVEST's opinion that the Hillardia PV will have a nominal impact on the existing traffic network. The project is therefore deemed acceptable from a transport perspective, provided the recommendations and mitigation measures in this report are implemented.

13. REFERENCES

KZN Transport – *Concrete Causeway Details (1996)*

South African National Roads Agency Limited – *Drainage Manual (5th Edition)*

American Association of State Highway Transportation Officials - *Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400) (2001)*

Technical Recommendations for Highways (TRH11) – *Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads (7th Edition - 2000)*

Technical Recommendations for Highways (TRH17) – *Geometric Design of Rural Roads (1988)*

Technical Recommendations for Highways (DRAFT-TRH20) – *Unsealed Roads: Design, Construction and Maintenance (2013)*

Technical Recommendations for Highways (TRH26) – *South African Road Classification and Access Management Manual (2012)*

APPENDIX A: SPECIALIST CURRICULUM VITAE

CURRICULUM VITAE

Merchandt Le Maitre

Name	Merchandt Le Maitre
Profession	Civil Engineer
Name of Firm	SiVEST SA (Pty) Ltd
Present Appointment	Divisional Manager: Civil Engineering Division
Years with Firm	17 Years
Date of Birth	25 September 1982, Johannesburg, South Africa
ID Number	820925 5037 086
Nationality	South African



Education

- University of Johannesburg (2006)
- University of South Africa (2016)

Professional Qualifications

- N Dip: Civil Engineering
- B Tech: Civil Engineering (Water)
- Pr.Tech.Eng. (Reg. No. 2018300094)

Membership in Professional Societies

- Engineering Council of South Africa (ECSA) – Pr Tech Eng; (Reg N° 2018300094)
- South African Institute of Civil Engineers (SAICE)
- South African Wind Energy Associations (SAWEA)

Employment Record

Nov 2020 – present	SiVEST SA (PTY) LTD: Divisional Manager
May 2004 – Oct 2020	SiVEST SA (PTY) LTD: Senior Civil Engineering Technician
Jan 2004 – April 2004	Con Roux Zambia - Junior Foreman
Dec 2002 – Dec 2003	Neda Engineering - Vacation Work

Language Proficiency

LANGUAGE	SPEAK	READ	WRITE
English	Fluent	Fluent	Fluent
Afrikaans	Fluent	Fluent	Fluent

Years of Working Experience: 17

Countries of Work Experience

- South Africa
- Swaziland
- Zambia
- Kenya
- Namibia

Fields of Expertise

- Bulk Services Studies
- Feasibility Studies
- Service Reports
- Infrastructure Design
- Contract Documentation & Procurement
- Contract Administration
- Procurement and Construction Monitoring

Overview

Merchandt joined SiVEST as a student Civil Engineering Technician in 2004 to which he received a company bursary to complete his studies and join the company permanently thereafter. Since joining permanently he has been actively involved in numerous township projects and associated infrastructure projects.

A summary of the experience in each field is indicated below:

Roads & Stormwater

Design, Implement & Contract Administration:

- Provincial Road Intersections (Class 2 Roads)
- Municipal Roads (Class 3-5 Roads)
- Residential & Industrial Township services
- Bulk Stormwater Infrastructure

Hydrology

- Attenuation Reports
- Flood Inundation Assessments / Floodline Reports
- Stormwater Management Reports
- Stormwater Assessments / Investigations
- Roof Gutter & Down Pipe Design / Assessments / Reports

Water & Sanitation

Design, Implement & Contract Administration:

- Water supply lines including Bulk Water
- Water pump stations
- Sanitation networks including Outfall Sewers
- Sewer pump stations
- Farm Irrigation Network

Renewable Energy

- Transportation Impact Assessments
- Water Demand Assessments
- Glint & Glare Assessments
- Stormwater Management Reports

- Preliminary Engineering Reports & Designs

Projects Experience (by Sector)

TOWNSHIP SERVICES

- Tijger Valley Extension 10, 20, 21, 22, 23, 27, 38-44, 72, 105-113, 19, 62, 103, 104, 34, 35, 36, 123 etc. - Design, Procurement, Contract Administration and Monitoring.
- Derdepoort Extension 181- Design, Procurement, Contract Administration and Monitoring.
- Project Springbok, Sasolburg - Design, Procurement, Contract Administration and Monitoring.
- Arcadia Extension 11 - Design, Procurement, Contract Administration and Monitoring.
- Lakeside Erf 181- Design, Procurement, Contract Administration and Monitoring.
- Longmeadow Extension 10, 11 & 12 - Design, Procurement, Contract Administration and Monitoring.
- Bushwillow Estate - Design, Procurement, Contract Administration and Monitoring.
- Forum Homini – Draughting Monitoring of Dam Spillway construction & sewer reticulation.
- Longmeadow Extension 7, 8, 9, 10, 11, 12 – Township services and design of earth retaining wall.
- Lakeside Erf 181 – Design and supervision of Township Services including Attenuation facilities.
- Mbabane Kingdom Hall – Bulk earthworks and road Design, Procurement, Contract Administration and Monitoring.
- Kungwini Bulk Water – Draughting and supervision of a Steel Bulk Water Supply Pipe.
- Mooikloof Booster Station – Design and supervision of a water booster pump facility..
- PTN 2 of 148 Athol – Compiling and analysis Stormwater Assessment.
- Mooibosch Development – Compiling of Services reports and Floodline Determination.
- Hazeldean Extension 39 – Design and supervision of Township Services.
- Hazeldean Retirement – Design of Township Services.
- Kungwini Collector Sewer – Design of Collector Sewer.
- Maroeladal Extension 9 – Design and compilation of Services Report.
- Hazeldean Oukraal – Design of Township Services
- Hazeldean Business Park – Design and compilation of Services Reports.
- Erf 181 Derdepoort – Design and compilation of Services Reports and preliminary design of Provincial Intersection.
- Erf 92 Edenburg – Floodline Determination and design and compilation of the Services reports.
- Longmeadow Extension 12 Stormwater – Design of Stormwater Reticulation.
- Astral Foods - Design, Procurement, Contract Administration and Monitoring of civil services.
- Eastgate Solar Roof – Glint & Glare Assessment
- Cotton Gin Mpumalanga – Design & Procure all services

ROADS & INTERSECTION DESIGN

- D631 Intersection – Design, Wayleave Approval, Procurement, Contract Administration and Monitoring.
- D36 Intersection & Road Widening - Design, Wayleave Approval, Procurement.
- K34 Intersection – Design, Wayleave Approval, Procurement, Contract Administration and Monitoring.
- K101 Intersection – Design, Wayleave Approval.
- Justice Mahomed, University, Walton Jameson Rd Intersection – Design, Wayleave Approval.
- Cedar Road West – Design, Wayleave Approval, Procurement, Contract Administration and Monitoring.
- Brikor – Design of New Intersection.
- New Zealand Embassy – Design of Intersection.
- East Point Game - Design, Wayleave Approval, Procurement, Contract Administration and Monitoring.

HYDROLOGY AND STORMWATER

- Hazeldean Floodline - Data collection, Flood determination and compilation.

CURRICULUM VITAE

Merchandt Le Maitre

- Gautrain Railway Stormwater Management – Design and compile stormwater management and attenuation facilities.
- Stormwater Modelling for Project Springbok – Attenuation of hazardous material in stormwater system.
- Sappi Ngodwana Floodline – Data collection, Flood determination and compilation. This floodline included cognisance of the Ngodwana dam.
- Irene Mall Stormwater Management - Accommodation of the Post Development stormwater flow through an existing township / suburb.
- Loftus Park Stormwater Management – Accommodation of the Post Development stormwater flow through an existing township / suburb.
- Pienaars River Floodline Modelling – Modelling of the river through two future Class 1 & 3 road bridge structures.
- Renewable Energy Stormwater Management – A number of Management Plans for the Renewable Energy sector has been completed.
- Longmeadow Extension 10 (Pick & Pay) – Design and compilation of Stormwater Management report.
- Erf 4173 Peter Place – Floodline Determination.
- Irene Mall Township – Design of Township Services and Stormwater Management.
- Mitsubishi McCarthy Midrand – Design and compilation of Stormwater Management report.
- Isago @ N12 – Floodline Determination.
- Innoland – Floodline Determination.
- Lot 204 Edenburg – Floodline Determination
- Erf 90 Douglasdale – Floodline Determination.
- PTN 35 Houtkoppen – Floodline Determination.
- Erf 4173 Peter Place – Floodline Determination.
- Hyde Close Floodline – Floodline Determination.
- Chartwell Floodline – Floodline Determination
- Hyundai East Rand – Roof Gutter & Down Pipe design
- Oilifants River – Floodline Determination

WATER TRANSFER / RETICULATION AND SANITATION COLLECTORS / OUTFALLS

- Bojanala Platinum District Municipality – Water & Sanitation Bulk Master Planning.
- Hazeldean Development – Bulk Water Supply & Collector Sewer Design, Procurement, Contract Administration and Monitoring.
- Mamba Kingdom – Bulk Water Analysis.
- Lesedi Local Municipality Bulk Water - Design, Wayleave Approval, Procurement, Contract Administration and Monitoring.
- NEF Tomato Paste Project – Design of Farm Irrigation Network

RENEWABLE ENERGY

- Dyansons Klip 5 – Stormwater Management Report
- De Aar Solar – Stormwater Management Report
- Droogfontein Solar – Stormwater Management Report
- Mierdam Solar – Stormwater Management Report
- Prieska– Stormwater Management Report
- Hoekplaas – Stormwater Management Report
- Noupoort WEF – Stormwater Management Report
- Copperton PV – Stormwater Management Report
- Klipgats PV – Stormwater Management Report
- Tooverberg Wind Energy Facility – Transportation Impact Assessment & Water Demand Assessment
- Umsobomvu Solar Energy - Transportation Impact Assessment
- Prieska Solar Energy - Transportation Impact Assessment Amendment
- Droogfontein Solar Energy - Transportation Impact Assessment Amendment

CURRICULUM VITAE

Merchandt Le Maitre

- Loeriesfontein Solar Energy - Transportation Impact Assessment Amendment
- Koeris WEF - Transportation Impact Assessment Amendment
- East Gate Shopping Centre - Glint & Glare Assessment
- Oya Energy - Glint & Glare Assessment
- Yemaya – Glint & Glare Assessment
- Beaufort West WEF – Preliminary Engineering Design
- Heuweltjies WEF – Transportation Study
- Kraaltjies WEF – Transportation Study
- Koup 1 & 2 – Transportation Study
- Grootegeluk Solar Project – Transportation Study
- Renewstable Swakopmund – Glint & Glare Assessment
- Several projects are Confidential as they are not yet in the public domain and hence have not been included in the list above.

OTHER

- Project Springbok – Design of Services and Railway Siding.
- Phalaborwa Mining Company – Preliminary Design of Bulk Water feed and Railway Line.
- Kansanshi Copper Mine, Zambia – Junior Site Foreman.
- Final QC for Sasol Secunda.
- NDT testing – MMC Nelspruit, Global Forest Products Sabie.
- Boiler inspections and preliminary design – MMC Nelspruit, Global Forest Products, TSB Malelane.

Computer Skills

- AutoCAD Civil 3D
- AutoCAD Storm and Sanitary Analysis
- Microsoft Office
- Microsoft Project
- TechnoCAD
 - Surfmate
 - Roadmate
 - Pipemate
 - Watermate
- AutoTURN (Vehicle Turning Simulation Software)
- RiverCAD
- HecRAS
 - 1D Flood Modelling
 - 2D Flood Modelling

A handwritten signature in black ink, appearing to read "W. Maitre".

APPENDIX B: SPECIALIST DECLARATION



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

PROPOSED HILLARDIA PV IN THE NORTH WEST PROVINCE

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at <https://www.environment.gov.za/documents/forms>.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:

Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:

Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	SIVEST SA (PTY) LTD			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	2	Percentage Procurement recognition	100%
Specialist name:	MERCHANDT LE MAITRE			
Specialist Qualifications:	B TECH – CIVIL ENGINEER			
Professional affiliation/registration:	ECSA (PR TECH ENG No: 2018300094)			
Physical address:	LOFTUS PARK, BUILDING A, 5 TH FLOOR, 416 KIRKNESS STR, ARCADIA, PRETORIA			
Postal address:	PO BOX 2921, RIVONIA			
Postal code:	2128	Cell:	072 435 8497	
Telephone:	011 798 0600	Fax:	011 803 7272	
E-mail:	MERCHANDTM@SIVEST.CO.ZA			

2. DECLARATION BY THE SPECIALIST

I, MERCHANDT LE MAITRE, declare that –

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



Signature of the Specialist

SIVEST SA (PTY) LTD

Name of Company:

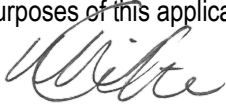
12TH JULY 2022

Date

Details of Specialist, Declaration and Undertaking Under Oath

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, MERCHANDT LE MAITRE, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.



Signature of the Specialist

SIVEST SA(PTY) LTD

Name of Company

11TH JULY 2022

Date

Signature of the Commissioner of Oaths

Date



SiVEST Civil Engineering Division

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