A1.5 Sidra Intersection Analysis: Successive Construction (1 PV Facility at a time) + Existing Traffic Conditions

MOVEMENT SUMMARY

Site: [Site1 - Exisiting + Construction Traffic (Phased Construction)]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gariep Road South Aproach (from Groblershoop)												
1	L2	0	25.0	0.040	5.9	LOS A	0.0	0.0	0.00	0.57	0.00	52.8
2	T1	1	25.0	0.040	0.0	LOS A	0.0	0.0	0.00	0.57	0.00	55.3
3	R2	16	25.0	0.040	5.8	LOS A	0.0	0.0	0.00	0.57	0.00	52.2
Approach		17	25.0	0.040	5.4	NA	0.0	0.0	0.00	0.57	0.00	52.4
East: Trasnet Road East Aproach (From Bokpoort)												
4	L2	5	25.0	0.018	5.8	LOS A	0.0	0.2	0.01	0.57	0.01	52.7
5	T1	2	25.0	0.018	4.5	LOS A	0.0	0.2	0.01	0.57	0.01	53.0
6	R2	4	25.0	0.018	5.9	LOS A	0.0	0.2	0.01	0.57	0.01	52.1
Approach		12	25.0	0.018	5.6	LOS A	0.0	0.2	0.01	0.57	0.01	52.5
North: Griep Road North Aproach (from Upington)												
7	L2	11	25.0	0.011	5.8	LOS A	0.0	0.0	0.00	0.49	0.00	53.2
8	T1	2	25.0	0.011	0.0	LOS A	0.0	0.0	0.00	0.49	0.00	55.7
9	R2	1	25.0	0.011	5.7	LOS A	0.0	0.0	0.00	0.49	0.00	52.6
Approach		14	25.0	0.011	4.9	NA	0.0	0.0	0.00	0.49	0.00	53.5
West: Trnsnt road West Aproach (from farms)												
10	L2	0	25.0	0.003	5.8	LOS A	0.0	0.1	0.06	0.52	0.06	53.4
11	T1	3	25.0	0.003	4.5	LOS A	0.0	0.1	0.06	0.52	0.06	53.7
12	R2	0	25.0	0.003	5.9	LOS A	0.0	0.1	0.06	0.52	0.06	52.8
Approach		3	25.0	0.003	4.6	LOS A	0.0	0.1	0.06	0.52	0.06	53.7
All Vehicles		46	25.0	0.040	5.3	NA	0.0	0.2	0.01	0.54	0.01	52.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: ROYAL HASKONINGDHV (PTY) LTD | Processed: Friday, December 6, 2019 9:42:43 AM
Project: C:\Users\za00071\Documents\Work\ACWA-TIA\SIDRA intersection analysis\ACWA TIA.sip8

A1.6 Sidra Intersection Analysis: Simultaneous Construction (3 PV Facilities at one time) + Existing Traffic Conditions

MOVEMENT SUMMARY

Site: [Site1 -Exisiting + Construction Traffic (Simultaneous Construction-3PV)]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gariep Road South Aproach (from Groblershoop)												
1	L2	0	25.0	0.090	5.8	LOS A	2.2	18.8	1.00	0.48	1.00	39.1
2	T1	1	25.0	0.090	0.0	LOS A	2.2	18.8	1.00	0.48	1.00	40.4
3	R2	35	25.0	0.090	30.7	LOS D	2.2	18.8	1.00	0.48	1.00	38.7
Approach		36	25.0	0.090	29.7	NA	2.2	18.8	1.00	0.48	1.00	38.8
East: Trasnet Road East Aproach (From Bokpoort)												
4	L2	14	25.0	0.050	5.8	LOS A	0.1	0.5	0.01	0.58	0.01	52.6
5	T1	4	25.0	0.050	4.7	LOS A	0.1	0.5	0.01	0.58	0.01	52.9
6	R2	13	25.0	0.050	6.2	LOS A	0.1	0.5	0.01	0.58	0.01	52.0
Approach		31	25.0	0.050	5.8	LOS A	0.1	0.5	0.01	0.58	0.01	52.4
North: Griep Road North Aproach (from Upington)												
7	L2	29	25.0	0.022	5.8	LOS A	0.0	0.0	0.00	0.54	0.00	52.8
8	T1	2	25.0	0.022	0.0	LOS A	0.0	0.0	0.00	0.54	0.00	55.3
9	R2	1	25.0	0.022	5.8	LOS A	0.0	0.0	0.00	0.54	0.00	52.2
Approach		33	25.0	0.022	5.5	NA	0.0	0.0	0.00	0.54	0.00	53.0
West: Trnsnt road West Aproach (from farms)												
10	L2	0	25.0	0.009	5.8	LOS A	0.0	0.3	0.10	0.51	0.10	53.3
11	T1	9	25.0	0.009	4.7	LOS A	0.0	0.3	0.10	0.51	0.10	53.6
12	R2	0	25.0	0.009	6.1	LOS A	0.0	0.3	0.10	0.51	0.10	52.7
Approach		10	25.0	0.009	4.7	LOS A	0.0	0.3	0.10	0.51	0.10	53.6
All Vehicles		109	25.0	0.090	13.5	NA	2.2	18.8	0.34	0.53	0.34	47.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: ROYAL HASKONINGDHV (PTY) LTD | Processed: Friday, December 6, 2019 9:54:34 AM
Project: C:\Users\za00071\Documents\Work\ACWA-TIA\SIDRA intersection analysis\ACWA TIA.sip8

A1.7 Sidra Intersection Analysis-Cumulative Impact: Simultaneous Construction (3 PV Facilities) + Existing Traffic Conditions + Sanddraai SP Facility

MOVEMENT SUMMARY

▽ Site: [Site1 -Exisintg + Construction Traffic (Simultaneous Consruction 3PV) + Sandraai]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gariep Road South Aproach (from Groblershoop)												
1	L2	0	25.0	0.140	3.6	LOS A	3.3	28.2	1.00	0.61	1.00	31.2
2	T1	1	25.0	0.140	6.4	LOS A	3.3	28.2	1.00	0.61	1.00	32.0
3	R2	54	25.0	0.140	39.2	LOS E	3.3	28.2	1.00	0.61	1.00	31.0
Approach		55	25.0	0.140	38.5	NA	3.3	28.2	1.00	0.61	1.00	31.0
East: Trasnet Road East Aproach (From Bokpoort)												
4	L2	14	25.0	0.054	5.8	LOS A	0.1	0.6	0.01	0.58	0.01	52.5
5	T1	4	25.0	0.054	4.8	LOS A	0.1	0.6	0.01	0.58	0.01	52.8
6	R2	14	25.0	0.054	6.4	LOS A	0.1	0.6	0.01	0.58	0.01	51.9
Approach		32	25.0	0.054	6.0	LOS A	0.1	0.6	0.01	0.58	0.01	52.2
North: Griep Road North Aproach (from Upington)												
7	L2	48	25.0	0.034	5.8	LOS A	0.0	0.0	0.00	0.55	0.00	52.7
8	T1	2	25.0	0.034	0.0	LOS A	0.0	0.0	0.00	0.55	0.00	55.2
9	R2	1	25.0	0.034	5.8	LOS A	0.0	0.0	0.00	0.55	0.00	52.2
Approach		52	25.0	0.034	5.6	NA	0.0	0.0	0.00	0.55	0.00	52.8
West: Transnet road West Aproach (from farms)												
10	L2	0	25.0	0.017	5.8	LOS A	0.1	0.5	0.15	0.52	0.15	53.2
11	T1	18	25.0	0.017	4.9	LOS A	0.1	0.5	0.15	0.52	0.15	53.5
12	R2	0	25.0	0.017	6.2	LOS A	0.1	0.5	0.15	0.52	0.15	52.6
Approach		18	25.0	0.017	4.9	LOS A	0.1	0.5	0.15	0.52	0.15	53.5
All Vehicles		156	25.0	0.140	17.1	NA	3.3	28.2	0.37	0.57	0.37	42.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: ROYAL HASKONINGDHV (PTY) LTD | Processed: Friday, December 6, 2019 9:58:12 AM
Project: C:\Users\za00071\Documents\Work\ACWA-TIA\SIDRA intersection analysis\ACWA TIA.sip8

Royal HaskoningDHV
Enhancing Society Together

Curriculum Vitae

Leonie van Wyk

Transport Planning, Public Transport and Traffic Engineering, Knowledge Group Lead, Civil Engineer, Professional Project Manager

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C: +27835543399
Email: leonie.vanwyk@rhdhv.com

Leonie is the Transport Planning and Public Transport Knowledge Group Lead in the Infrastructure business unit in the RHDHV Johannesburg Woodmead office where she specialises in transportation engineering and project management. She obtained a Civil Engineering degree in 1992 at the University of Stellenbosch, an honour's degree (Geotechnical) in 1996 from the University of Pretoria, master's degree in Civil Engineering (Transportation) from the University of California at Berkeley in the USA. She registered as a Professional Engineer in 2006 (ECSA) and as a Professional Project Manager in 2014 (PMI).

She gained a wide range of experience in all aspects of transport planning, traffic engineering, transport masterplans, feasibility studies, and transport infrastructures projects.

Nationality
South African

Years of Experience
25 year(s)

Years with Royal HaskoningDHV
13 years

Professional memberships
Engineering Council of South Africa, Pr Eng, 20060021
South African Institute of Civil Engineers, Member 203405
Professional Project Manager (PmP), Project Management Institute, Member Number 1748623 (2014)

Qualifications

1998 MSc Civil Engineering Transportation, University of California, Berkeley, United States of America

1996 BEng (Hons) Civil Engineering Geotechnical, University of Pretoria, South Africa

1992 BEng Civil Engineering, University of Stellenbosch, South Africa

Professional experience

Marikana Mine Transport Plan Optimization

Period: 2019-2020
Client: Sibanye Stillwater, Jacques Pretorius, Jacques.Pretorius@sibanyestillwater.com; 082 920 2281
Project Value: R370,000 (fees)
Transport plan and optimization of bus and shuttle transport operations within the Marikana mining area. Optimization reviewed 118 routes, 30,000 passengers, 24 hour/7 day per week operations and included employees and scholar transport.
Position: Project Manager and Transport Planner

Gaborone Fairgrounds Special Economic Zone Precinct Plan

Period: 2019-2020
Client: SEZA Botswana, Mr Jayson Sechele, +267370 8303, sechelej@sez.co.bw
Project Value: R12 million (fees)
Precinct masterplan for Gaborone Fairground within Botswana including Business Case, Urban & Landscape Designs Master Plan, Layout Design for Undeveloped land within the SEZ. Traffic, roads masterplan and public transport plan for the precinct.
Position: Traffic Engineer and Transport Planner

City of Joburg Rea Vaya Watt Street Integrated Bus Rapid Transport System

Period: 2015-2018
Client: City of Johannesburg,
Lerato Kola 0824419594 LKola@jda.org
Phumla Mkize 0664766990 PMkhize@jda.org.za
Project Value: R5,000,000 (fees), R80,000,000 (Construction)
Detail design and tender for the upgrade of the Watt Street interchange in the Johannesburg CBD. Scope of work included detail design of two bridges, viaducts, retaining walls, road upgrades, bus rapid transport bus lanes, non-motorised transport, road signs, markings, traffic signals, pavement design, working drawings, tender documentation and bill of quantities with cost estimate.
Position: Project Manager

Doubling of Provincial Road Garsfontein Road Feasibility Study

Period: 2019-2020
Client: City of Tshwane
Ben Molleman, 0823723654, 0123583292, BenMol@tshwane.gov.za
Lutz Johannes, 0825635679, 0123587732, Lutzj@tshwane.gov.za
Project Value: R200,000
Feasibility study for the upgrade (doubling to dual carriageway) and reconstruction of Garsfontein Road Class 2 road in Pretoria, including economic study, traffic study, project initiation application complying with National Treasury's Standard for Infrastructure Procurement and Delivery Management.
Position: Project Manager and Transport Engineer

Rooihuiskraal Road – N14 onramp Feasibility Study

Period: 2019
Client: City of Tshwane
Ben Molleman, 0823723654, 0123583292, BenMol@tshwane.gov.za
Lutz Johannes, 0825635679, 0123587732, Lutzj@tshwane.gov.za
Project Value: R200,000
Feasibility study for the construction of the Rooihuiskraal On Ramp onto the N14 in Pretoria, including geometric layout, cost estimate, structures, traffic study.
Position: Project Manager and Transport Engineer

CoT Ad Hoc Assistance

Period: 2018-2021
Client: City of Tshwane
Ben Molleman, 0823723654, 0123583292, BenMol@tshwane.gov.za
Lutz Johannes, 0825635679, 0123587732, Lutzj@tshwane.gov.za
Project Value: R3,880,000
Ad hoc assistance to the CoT Roads and Transport Department as and when required. Work includes: traffic impact studies for upgrade various road links, onramps and intersections, GIS support, geometric upgrades, stakeholder coordination, training, cost estimates, feasibility studies. Projects completed under this appointment are: feasibility for the widening of Garsfontein Road, geometric design for Hazeldean Road, property evaluation on MonaVoni for compensation, N14-M37 Rooihuiskraal on ramp feasibility study, Eersterust pedestrian bridge, widening of Lenchen Avenue north, WUL Garsfontein Road, Justice Mohamed Street widening, CoT CITP EMME model update, traffic counts.

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Position: Project Manager and Transport Engineer

Provincial Class 2 routes (K-routes) route determination x 14 routes

Period: 2018-Oct 2019
Client: Gauteng Department of Roads and Transport
Nokuthula Modikoe, nokuthula.modikoe@gauteng.gov.za
Tel: 011 355 7131, Cell: 0648607849
Project Value:
Project A: R3,306,185 (incl)
Project C: R3,514,440 (incl)
Project F: R3,915,753 (incl)
Project H: R1,786,883 (incl)
Total: R12,523,260 (incl)
Route determination for 14 Class 2 mobility corridors (K-routes) within Gauteng Province over a total length of 400km. Scope of work included route determination cost estimate of transport infrastructure, (horizontal and vertical alignment of route centreline within a 400m corridor, access management), traffic analysis and transport modelling to determine future demand, environmental screening, stakeholder coordination, public participation, training of GDRT interns.
Position: Project Manager, Transportation Engineer

EMM Precinct Plans (9 areas)

Period: 2017-2018
Client: Ekurhuleni Municipality (sub-consultants to GAPP)
Martin Bekker, EMM Metropolitan Spatial Planning Division, +27(0)11-999-4026, martin.bekker@ekurhuleni.gov.za
Michelle Ortlepp Gapp Architects, michelle@jhb.gapp.net, 0845050404
Project Value: R9,000,000
Development of precinct plans (townplanning) for 9 areas within Ekurhuleni, including Aero City- Blaupan, Natalspruit-Kathoza Junction, KwaThema, Springs. Scope includes the roads masterplan, traffic analysis and public transport status quo analysis and future transport plan (roads, parking, public transport, traffic) proposal to meet the proposed landuse scenarios.
Position: Traffic and Transportation Engineer

Sir Seretse Khama International Airport Special Economic Zone Precinct Plan

Period: 2017
Client: RHDHV Botswana
Otukile Lekote, otukile.lekote@rhdhv.com, +2673952557
Project Value: P60,000
Development of precinct plan for SEZ around international airport in Gaborone. Scope include the roads, traffic and public transport status quo analysis and future proposal to meet the proposed landuse scenarios. Cost estimates of transport and public transport infrastructure. Transport plan for development of the area over time.
Position: Traffic Engineer and Transport Planner

KwaZulu Natal Traffic counting strategy

Period: 2016
Client: KZN DoT
Project Value: R200,000
Traffic count strategy and tender for KZN DoT to comply with DORA requirements.
Position: Traffic Engineer

CoT Ad hoc Assistance

Period: 2016-2018
Client: City of Tshwane
Ben Molleman, 0823723654 012 358 3292
BenMol@tshwane.gov.za
Lutz Johannes 0825635679 012 358 7732
Lutzj@tshwane.gov.za
Project Value: R1,600,000
Ad hoc assistance to the CoT Roads and Transport Department as and when required. Work includes: Lenchen Avenue extension (geometric), infrastructure backlog for CoT, Bulk services contribution policy, widening of Garstfontein Road feasibility study, road ownership, road safety audit.
Position: Project Manager and Transportation Engineer

Makhathini Roads Masterplan

Period: 2016
Client: KZN DoT
Rob Tarboton, relocated to the UK
Project Value: R250,000
Roads masterplan for Makhathini in the north of KZN. Project assessed the upgrading needs for arterial roads serving the Southern Makhathini Area within the local municipalities of Jozini and Umhlabuyalingana. The purpose of the assessment is to review and prioritise road upgrade projects in the area and to recommend the budget allocation for the next five years.
Position: Project Manager, Transport Planner

Bokpoort Solar Farm Traffic Impact Study

Period: 2016

Royal HaskoningDHV

Client: ACWA Power
Project Value: R650,000
Traffic Impact Study for the development of the Bokpoort Solar Plant near Upington.
Position: Project Manager, Traffic Engineer

Braamfontein Transport Plan

Period: 2016
Client: Johannesburg Development Agency
Nicolette Pingo, NPingo@jda.org.za, 0826210145
Nobuntu Ciko, NobuntuC@joburg.org.za, 0118704508, 0714139817
Project Value: R650,000
Transport plan of Braamfontein (Johannesburg CBD). Project includes a micro transport model (AIMSUN) of the area and testing the impact of various proposals and projects on the transport system. Study also addressed parking, pedestrian transport and public open spaces.
Cost estimate of upgrade of all infrastructure
Position: Project Manager, Transport Planner

Swaziland Border Patrol Road and Fence

Period: 2016
Client: Department of Public Works (subconsultants for Setplan)
Johan Jonas, j.jonas@iafrica.com, 0837881308
Project Value: R3,100,000
Route determination, planning and concept design of 520 km of border patrol roads and fencing along the RSA border with Swaziland and Mozambique. Transport study to optimise the system.
Position: Project Manager, Transport Planner

Ubuntu Local Municipality Roads and Stormwater Masterplan

Period: 2016
Client: Municipal Infrastructure Support Agency (MISA)
Ms Regina Ravele, Regina.ravele@misa.gov.za, 0718970611
Project Value: R680,000
Develop roads and stormwater masterplan for the Ubuntu Municipality in the Northern Cape.
Position: Project Manager, Transport Planner

Greater Tzaneen Municipality Roads and Stormwater Masterplan

Period: 2016
Client: Municipal Infrastructure Support Agency (MISA)
Ms Regina Ravele, Regina.ravele@misa.gov.za, 0718970611
Project Value: R600,000
Develop roads and stormwater masterplan for the Tzaneen Municipality in Limpopo.
Position: Project Manager, Transport Planner

Dr Kenneth Kaunda District Integrated Transport Plan and Transport Plans

Period: 2016
Client: North West Province
Mr Tsholofelo Maseng, TMaseng@nwpg.gov.za, +27183881152, 0847360443
Project Value: R2,100,000
Develop various transport plans for Dr Kenneth Kaunda District Municipality, including: JB Marks (Tlokwe and Ventersdorp) Comprehensive Integrated Transport Plan, Matlosana Local Integrated Transport Plan, Maquassi Hills Local Integrated Transport Plan, Transport Register (Previously CPTR), DrKKDM District Integrated Transport Plan, Operating License Plan.
First order cost estimate of infrastructure and public transport infrastructure
Position: Project Manager, Transport Planner

N18_03 Vryburg Road Safety and NMT Audit

Period: 2015
Client: SANRAL
Project Value: R120,000
Road safety and NMT inspection and audit along N18 Section 3 between km 45.0 to 48.612 in Huhudi Township, Vryburg, North West Province.
Project reviewed various safety aspects, including pedestrian, road geometry, etc. Work included safety audit, traffic impact assessment and concept geometric design of proposed road upgrades.
Position: Project Manager, Traffic Engineer, Safety Auditor

Non-motorised transport training facility and park in Polokwane

Period: 2015
Client: City of Polokwane
Mr Mannfred Gratz, 0834521833, 0152902000, mannfredg@polokwane.gov.za
Project Value: R5,000,000
Detail design and tender documentation for various non-motorised transport facilities in Polokwane, including: cycle lanes, walkways, mountain-bike tracks, children's

cycle training facilities, BMX race track and spectator viewing area to international standards, skateboard park, retail facility, restaurant and parking area.
Position: Project Manager, Traffic Engineer, Geometric Designer

Gautrain Tunnel Refurbishment Traffic Impact Study

Period: 2015
Client: ERM Consultants (for Bombela)
Project Value: R90,000
Traffic impact assessment for the impact of road closures and construction traffic during the refurbishment of the Gautrain tunnel between Park Station and Rosebank Station at 3 different emergency shafts within Johannesburg.
Position: Project Manager, Traffic Engineer

Milpark Precinct Plan, Johannesburg

Period: 2015
Client: Osmond Lange Architects (for City of Johannesburg)
Project Value: R70,000
Traffic impact assessment for the development of Milpark. Work included status quo assessment of roads, intersections, parking, traffic flows and future impact should certain developments occur. Transport plan for the development of the precinct.
Position: Project Manager, Traffic Engineer, transport Planner

Lehae Library Traffic Impact Assessment

Period: 2015
Client: Zitholele Consulting (for City of Johannesburg)
Project Value: R190,000
Traffic impact assessment for the development of Lehae Library, clinic, gym and other community facilities. Work included status quo assessment of roads, intersections, parking, traffic flows and future impact should the development occur.
Position: Project Manager, Traffic Engineer

Development of Comprehensive Integrated Transport Plan (CITP) for Ekurhuleni Metropolitan Municipality, South Africa

Period: 2012
Client: Ekurhuleni Metropolitan Municipality
Ms Yolisa Mashilwane, 0827856518 (Now at Uber)
Project Value: R8,713,300
RHDHV led a Consortium to develop a Comprehensive Integrated Transport Plan (CITP) for Ekurhuleni. The CITP covered master plans for public transport, non-motorised transport, freight transport, road network, land use integration, travel demand management, policy and legislation, institutional development, financial plan, project prioritisation and public participation. Cost estimate of projects.
Position: Project Manager
Overall Project Leader, Transportation Engineer

Ekurhuleni Metropolitan Municipality Roads Master Plan, South Africa

Period: 2011
Client: Ekurhuleni Metropolitan Municipality
Mr Marius van Huyssteen,
Marius.vHuyssteen@ekurhuleni.gov.za, 0824811578
Project Value: R4,500,000
SSI (now RHDHV) was appointed by EMM to develop a roads master plan for Ekurhuleni, including a review of the road classification. The plan will be aligned with other existing plans at local, provincial and national levels. The EMM's travel demand model was updated and used to determine the preferred road network to serve future land use scenarios. Micro-simulation models were developed for various sub-areas where development pressures require road network upgrades. Cost estimate of road upgrades and implementation program
Position: Project Manager
Overall Project Leader, Transportation Engineer

Public Transport Assessment in Gauteng Province Poorest of the Poor Areas, South Africa

Period: 2010
Client: Gauteng Department of Housing
Project Value: R762,920
This project involves the preparation of a detailed report on the existing public transport facilities and routes in the 20 PTP and 50 poorest wards in Gauteng, as part of a poverty alleviation program by the Gauteng Province.
Position: Engineer Transportation
Analysis of public transport infrastructure and services, data collection and analysis.
(T01.PTA.000388)

Reseal of National Route R40 from Hoedspruit to Mica, South Africa

Period: 2010

Royal HaskoningDHV

Client: South African National Roads Agency SOC Limited
Project Value: R50,700,000
Assessment, detail design, contract administration, construction monitoring and safety improvement of National route R40 from Hoedspruit to Mica.
Position: Engineer Transportation
Design report, tender documentation, traffic analysis

Reseal and reconstruction of R35 Section 2 from Bethal to Middelburg, South Africa

Period: 2010
Client: South African National Roads Agency SOC Limited
Project Value: R195,000,000
Assessment, detail design, contract administration, construction monitoring and safety improvement of the reconstruction of national route R35 section 2 from Bethal to Middelburg.
Position: Engineer Transportation
Design report, tender documentation, traffic analysis

OR Tambo International Airport Operations Support for FIFA 2010 Soccer World Cup, South Africa

Period: 2009
Client: Airports Company South Africa
Mr Justeyn van Zyl, 0823079465
Project Value: R3,500,000
Operational support to OR Tambo International Airport for 2010 Soccer World Cup Venue.
Position: Engineer Transportation
Traffic forecasting and demand modelling, operational plan.

World Cup 2010 Airport Transport Planning for Department of Transport, South Africa

Period: 2009
Client: Department of Transport
Project Value: R530,400
The project involves the update of the airport demand model for World Cup 2010 and transport operational planning for the World Cup 2010.
Position: Project Manager
Air traffic demand modelling, transport plan, project management, operational plan
(T01.PTA.000333)

Rustenburg Integrated Rapid Public Transport Network (IRPTN), South Africa

Period: 2009
Client: Rustenburg Local Municipality
Ms Amogelang Kgoathe, amo.kgoathe@gmail.com (Now at ITS), 0834696137
Mr Obed Moleele, +27 14 590 3687, +27 79 416 8954, omoleele@rustenburg.gov.za
Project Value: R3,000,000,000
Planning and implementation of the Rustenburg Integrated Public Transport Network (IRPTN).
Position: Project Manager, Engineer Transportation
Project manager for design and construction unit.

Transport operational plan for the Confederation Cup 2009 and the World Cup 2010, South Africa

Period: 2008
Client: City of Tshwane Metropolitan Municipality
Project Value: R3,894,480
Transport operational plan for the CoT for the World Cup 2010 and for the Confederation Cup 2009.
Position: Project Manager
Project management transport operational planning freight operational plan

Master Plan for Port Elizabeth and East London Airports, South Africa

Period: 2008
Client: Airports Company South Africa
Project Value: R8,838,775
Compile airport masterplan for Port Elizabeth and East London airports.
Position: Engineer Transportation
Calculation of landside demand in terms of traffic, area, kerb, lanes, roads, access, parking. Stakeholder coordination with local authorities regarding masterplan impact on external road network.

Design and monitoring of Reseal of National Route R101, Section 25X from Andriesloopspruit to Mokopane, South Africa

Period: 2008
Client: South African National Roads Agency SOC Limited
Project Value: R42,000,000
The road is an existing paved road which is part of the national route N1 (R101) Section 25X of about 32km in length from Andriesloopspruit to Mokopane in the Limpopo Province of South Africa. The project involves the assessment of the traffic regime, the condition of the road

and materials testing to establish the origin of distress and maintenance measures that have to be taken to repair the road. Designed maintenance measures include reseal, slurry texture treatment, slurry rutfilling and cold in situ recycling of failed areas. The project also includes site supervision during construction.
Position: Engineer Public Transport
Compilation of the tender documentation, bill of quantities and tender adjudication as per SANRAL requirements.

Pretoria North Station Modal interchange / K14 Zambezi Road Extension, South Africa

Period: 2008
Client: City of Tshwane Metropolitan Municipality
Project Value: R300,000,000
Development of inter-modal transfer facility at Pretoria North Station. Realignment of Paul Kruger street and other roads.
Position: Engineer Design
Pavement design, public transport, transportation Impact assessment and client liaison.

Aviation demand and capacity study for aviation sub-sector task team (ASSTT) for World Cup 2010, South Africa

Period: 2007
Client: Airports Company South Africa
Project Value: R5,000,000
RHDHV, in joint venture with Africon and NACO, was appointed to assist the Aviation Sub Sector Task Team to review the capacity of the aviation industry to handle the WC2010 demand, including airports, airlines and airspace.
Position: Engineer Transportation
Travel demand estimate, airport and airline capacity analysis.

N2-34 Ermelo to Piet Retief, South Africa

Period: 2007
Client: South African National Roads Agency SOC Limited
Project Value: R400,000,000
Detailed design, contract documentation and construction supervision of the reconstruction of the National Route 2 Section 34 from Piet Retief (km 0,00) to Ermelo (km 102,00) in the Mpumalanga Province. The work comprises of base and surface patching, rut filling and appropriate surface texture treatment over certain sections with reconstruction by means of recycling existing base and surfacing to existing vertical alignment on other sections. Ancillary works include improvements to the existing drainage system.
Position: Engineer Traffic
Traffic impact studies.

Assessment, detailed design, contract documentation and construction monitoring of reseal of National Route R37 Section 1 between Polokwane and Olifantsriver and Section 2 between Burgersfort, South Africa

Period: 2007
Client: South African National Roads Agency SOC Limited
Project Value: R46,158,420
The road from Polokwane to Burgersfort is an existing paved road of about 100km in length and it is situated in the Limpopo Province of South Africa. The project involves the assessment of the traffic regime, the condition of the road and materials' testing to establish the origin of distress and maintenance measures that have to be taken to repair the road. Designed maintenance measures include reseal, slurry texture treatment, slurry rutfilling and cold in situ recycling of failed areas. The project also includes site supervision during construction.
Position: Engineer Project
Tender documentation and tender adjudication

Crown City Access Road, South Africa

Period: 2007
Client: IPROP Limited
Project Value: R50,500,000
Design and construction of access ramps, loops and auxiliary lanes on M1 Motorway for access to Crown City Development, South West Johannesburg.
Position: Engineer Traffic
Traffic impact studies.

National Transport Master Plan, South Africa

Period: 2007
Client: Department of Transport
Project Value: R10,000,000
Develop Transport Master Plans for Western Cape and Kwa-Zulu Natal provinces from 2005-2050. The development of a national demand model for South Africa to model private, passenger and freight transport including all modes.
Position: Project Manager, Engineer Transportation

Airports and travel demand to airports in Western Cape and Kwa-Zulu Natal Provinces in South Africa.

North West Province Transport Planning Projects, South Africa

Period: 2006
Client: North West Department of Roads and Transport
Project Value: R2,000,000
Develop Provincial Land Transport Framework for North West Province according to Department of Transport requirements, including public transport, private and freight transport, spatial framework, stakeholder needs, institutional plan, financial plan and implementation program.
Position: Engineer Transportation, Project Manager
Project Manager, roads and private transport.

Southern District (Matlosana) Integration Transport Plan, South Africa

Period: 2006
Client: City of Matlosana
Project Value: R2,200,000
Develop an Integrated Transport Plan (ITP) for Southern District according to Department of Transport (DOT) requirements, including public transport, private and freight transport, spatial framework, stakeholder needs, institutional plan, financial plan and implementation program.
Position: Project Principal, Engineer Transportation
Overseeing Project. Project Manager, roads and private transport, projects, budgets and prioritisation

Cape Town International Airport master plan, South Africa

Period: 2006
Client: Airports Company South Africa
Project Value: R2,000,000
Upgrade of existing master plan for the airport at Cape Town (looking at 30-50 years study period) Activities include conceptual design for landside, terminal building facilities and airside facilities to accommodate expected future traffic in a phased development.
Position: Engineer Transportation
Landside transportation planning, internal roads and access to airport.

Specialist Advice Gautrain, South Africa

Period: 2006
Client: City of Tshwane Metropolitan Municipality
Project Value: R200,000
Ad hoc assistance to CTMM (City of Tshwane Metropolitan Municipality) related to Gautrain; including feeder distribution system, co-operation agreement and progress reports to council.
Position: Project Manager, Engineer Transportation
Project management and ad hoc technical support on Gautrain.
T01.PTA.000209

Sustainable Public Transport and Sport, 2010 Opportunity, South Africa

Period: 2006
Client: United Nations Development Programme
Project Value: R498,840
Development of sustainable transport options for WC 2010. Assessment of sustainable transport options selected venue cities.
Position: Engineer Transportation
Engineer providing technical input on projects.

Road Traffic Sign Policy for Ekurhuleni Metropolitan Municipality, South Africa

Period: 2006
Client: Ekurhuleni Metropolitan Municipality
Project Value: R199,000
Provide professional services for the development of uniform user friendly policy for road traffic signs; procedure for providing these signs, dealing with applications, management system and signs maintenance system
Position: Project Manager, Engineer Traffic
Project management, technical specialist on road signs.

High Level Public Transport Operational Plan for Nasrec 2010, South Africa

Period: 2006
Client: City of Johannesburg
Project Value: R282,840
Desktop reviews, Status Quo Analysis, Role of different modes analysis, operation plan
Position: Project Manager
Project Management, public transport inputs.

Royal HaskoningDHV

Mabopane Public Transport Study, South Africa

Period: 2006
Client: City of Tshwane Metropolitan Municipality
Project Value: R250,000
Provision of a public transport plan for the Mabopane Intermodal Transportation facility. Issues addressed were transport demand, appropriate routes, access points, supporting infrastructure required, parking requirements for two bus ranks, two taxi ranks and pedestrians.
Position: Engineer Public Transport, Project Manager
Concept design, public transport plan, project management

Master Plan Update for Johannesburg International Airport, South Africa

Period: 2005
Client: Airports Company South Africa
Project Value: R7,040,000
Technical consultancy services for the update of the existing JIA Master Plan (1997) in conjunction NACO to 55 MAP Ultimate Phase
Position: Engineer Transportation
Transportation planning, internal roads and land access to Johannesburg International Airport (JIA) for all development to 2005.

National Passenger Rail Master Plan, South Africa

Period: 2005
Client: Passenger Rail Agency of South Africa
Project Value: R2,000,000
PRASA appointed SSI (now RHDHV) Consortium together with three other Consortia to develop a National Passenger Rail Master Plan. Phase 1 involved Strategic Master Plan addressing commuter rail in the six Metro regions, as well as long-distance rail. Phase 2 involved detailed regional rail plans for each of the 6 commuter regions, including identification of demand corridors, priority rail corridors using a multi-criteria evaluation matrix approach. Rail strategies and projects with cost estimates were subsequently formulated for the short-term, medium-term and long-term. Finally, the project was extended to include a Rural Rail Plan.
Position: Engineer Civil
Transport engineer responsible for demand on corridors and cost estimates for various projects.

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this data correctly describes me, my qualifications and my experience.

_____

Signature

Date: _____

Royal HaskoningDHV

Peer Review – SMEC

Member of the Surbana Jurong Group

Bokpoort II PV Solar Farm

Peer Review of Addendum to Site Traffic Impact Assessment

Date: 28 May 2020

AUSTRALIA | ASIA | MIDDLE EAST | AFRICA | PACIFIC

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1. INTRODUCTION

SMEC was requested to conduct a peer review of the Addendum to Bokpoort II PV Solar Farm: Concentrated Solar Power Tower Facility, Site Traffic Assessment (24 January 2020) conducted by Royal Haskoning DHV. This Site Traffic Assessment was produced to form part of the Environmental Basic Assessment specialist studies. The report was checked for compliance with industry best practice from the Department of Environment Forestry and Fisheries EIA regulations as follows:

National Environmental Management Act, 1998 (Act No. 107 of 1998) Amendments to the Environmental Impact Assessment Regulations, 2014: Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6.

2. REVIEW

2.1 Scope Review

The Addendum Report analyses the intersection of the Gariep Road/ Transnet Road only, however the complete Site Traffic Assessment conducted in May 2016 extended to the N14/ Gariep Road intersection as well as the N8/ Gariep Road intersection. The scope of this Addendum Report is appropriate in a case where the trips generated by the revised proposed development do not exceed those generated by the previous development. SMEC did not review the original report and if the trips generated by the revised proposed development in any phase exceed those in the maximum phase of the original proposed development, then the Addendum should be extended to include the additional two intersections analysed in the original report to ensure that they too operate at an acceptable level.

2.2 Model Review

The intersection of Gariep Road and Transnet Road were analysed using SIDRA Intersection software which is considered acceptable software for this type of analysis. The SIDRA models were independently checked for this review and the model parameters are seen as appropriate. When the SIDRA Intersection models were run, slight differences to the results were obtained to those included in the Addendum report. This could be attributed to different versions of software. The results obtained do not indicate any changes to the requirements and mitigation measures included in the report. The following images show the SIDRA Intersection results obtained when the provided model was run.

MOVEMENT SUMMARY

Site: [Site1 - Pre Construction (Status Quo-2019)]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gariep Road South Aproach (from Groblershoop)												
1	L2	0	0,0	0,014	7,0	LOS A	0,0	0,2	0,02	0,48	0,02	30,6
2	T1	1	100,0	0,014	0,0	LOS A	0,0	0,2	0,02	0,48	0,02	71,0
3	R2	6	0,0	0,014	6,6	LOS A	0,0	0,2	0,02	0,48	0,02	31,1
Approach		7	14,1	0,014	5,0	NA	0,0	0,2	0,02	0,48	0,02	33,8
East: Trasnet Road East Aproach (From Bokpoort)												
4	L2	1	0,0	0,002	0,0	LOS A	0,0	0,0	0,02	0,01	0,02	30,9
5	T1	1	0,0	0,002	0,0	LOS A	0,0	0,0	0,02	0,01	0,02	20,0
6	R2	0	0,0	0,002	0,6	LOS A	0,0	0,0	0,02	0,01	0,02	30,7
Approach		2	0,0	0,002	0,1	LOS A	0,0	0,0	0,02	0,01	0,02	24,5
North: Griep Road North Aproach (from Upington)												
7	L2	1	0,0	0,004	7,0	LOS A	0,0	0,1	0,01	0,32	0,01	31,3
8	T1	2	0,0	0,004	0,0	LOS A	0,0	0,1	0,01	0,32	0,01	74,4
9	R2	1	0,0	0,004	6,6	LOS A	0,0	0,1	0,01	0,32	0,01	31,8
Approach		4	0,0	0,004	3,4	NA	0,0	0,1	0,01	0,32	0,01	44,3
West: Transnet road West Aproach (from farms)												
10	L2	0	0,0	0,000	0,0	LOS A	0,0	0,0	0,01	0,05	0,01	30,8
11	T1	0	0,0	0,000	0,0	LOS A	0,0	0,0	0,01	0,05	0,01	20,0
12	R2	0	0,0	0,000	0,7	LOS A	0,0	0,0	0,01	0,05	0,01	30,7
Approach		0	0,0	0,000	0,2	LOS A	0,0	0,0	0,01	0,05	0,01	26,1
All Vehicles		14	7,4	0,014	4,0	NA	0,0	0,2	0,02	0,35	0,02	33,9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Figure 2-1: Movement Summary: SIDRA Intersection Results- Status Quo

MOVEMENT SUMMARY

Site: [Site1 - Exisiting + Construction Traffic (Successive Construction)]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Garlep Road South Aproach (from Groblershoop)												
1	L2	0	25,0	0,039	7,7	LOS A	0,1	0,7	0,06	0,59	0,06	30,5
2	T1	1	25,0	0,039	0,2	LOS A	0,1	0,7	0,06	0,59	0,06	70,1
3	R2	16	25,0	0,039	7,3	LOS A	0,1	0,7	0,06	0,59	0,06	30,9
Approach		17	25,0	0,039	6,9	NA	0,1	0,7	0,06	0,59	0,06	32,0
East: Trasnet Road East Aproach (From Bokpoort)												
4	L2	5	25,0	0,018	0,0	LOS A	0,0	0,2	0,01	0,05	0,01	29,0
5	T1	2	25,0	0,018	0,1	LOS A	0,0	0,2	0,01	0,05	0,01	20,0
6	R2	4	25,0	0,018	0,8	LOS A	0,0	0,2	0,01	0,05	0,01	28,8
Approach		12	25,0	0,018	0,3	LOS A	0,0	0,2	0,01	0,05	0,01	26,7
North: Griep Road North Aproach (from Upington)												
7	L2	11	25,0	0,010	7,4	LOS A	0,0	0,1	0,00	0,54	0,00	30,7
8	T1	2	25,0	0,010	0,0	LOS A	0,0	0,1	0,00	0,54	0,00	70,9
9	R2	1	25,0	0,010	7,1	LOS A	0,0	0,1	0,00	0,54	0,00	31,2
Approach		14	25,0	0,010	6,3	NA	0,0	0,1	0,00	0,54	0,00	33,7
West: Trnsnt road West Aproach (from farms)												
10	L2	0	25,0	0,003	0,0	LOS A	0,0	0,1	0,06	0,02	0,06	29,0
11	T1	3	25,0	0,003	0,1	LOS A	0,0	0,1	0,06	0,02	0,06	20,0
12	R2	0	25,0	0,003	0,8	LOS A	0,0	0,1	0,06	0,02	0,06	28,9
Approach		3	25,0	0,003	0,2	LOS A	0,0	0,1	0,06	0,02	0,06	20,4
All Vehicles		46	25,0	0,039	4,5	NA	0,1	0,7	0,03	0,40	0,03	29,7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Figure 2-2: Movement Summary: SIDRA Intersection Results- Existing + Construction Traffic

MOVEMENT SUMMARY

Site: [Site1 -Exisiting + Construction Traffic (Simultaneous Construction-3PV)]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Garlep Road South Aproach (from Groblershoop)												
1	L2	0	25,0	0,087	8,0	LOS A	0,2	1,6	0,12	0,61	0,12	30,3
2	T1	1	25,0	0,087	0,6	LOS A	0,2	1,6	0,12	0,61	0,12	69,3
3	R2	35	25,0	0,087	7,7	LOS A	0,2	1,6	0,12	0,61	0,12	30,8
Approach		36	25,0	0,087	7,5	NA	0,2	1,6	0,12	0,61	0,12	31,3
East: Trasnet Road East Aproach (From Bokpoort)												
4	L2	14	25,0	0,050	0,0	LOS A	0,1	0,5	0,01	0,06	0,01	29,0
5	T1	4	25,0	0,050	0,3	LOS A	0,1	0,5	0,01	0,06	0,01	19,9
6	R2	13	25,0	0,050	1,0	LOS A	0,1	0,5	0,01	0,06	0,01	28,8
Approach		31	25,0	0,050	0,5	LOS A	0,1	0,5	0,01	0,06	0,01	27,2
North: Griep Road North Aproach (from Upington)												
7	L2	29	25,0	0,022	7,4	LOS A	0,0	0,1	0,00	0,59	0,00	30,5
8	T1	2	25,0	0,022	0,0	LOS A	0,0	0,1	0,00	0,59	0,00	70,0
9	R2	1	25,0	0,022	7,1	LOS A	0,0	0,1	0,00	0,59	0,00	31,0
Approach		33	25,0	0,022	6,9	NA	0,0	0,1	0,00	0,59	0,00	31,7
West: Trnsnt road West Aproach (from farms)												
10	L2	0	25,0	0,009	0,0	LOS A	0,0	0,3	0,10	0,04	0,10	29,0
11	T1	9	25,0	0,009	0,3	LOS A	0,0	0,3	0,10	0,04	0,10	20,0
12	R2	0	25,0	0,009	1,0	LOS A	0,0	0,3	0,10	0,04	0,10	28,8
Approach		10	25,0	0,009	0,3	LOS A	0,0	0,3	0,10	0,04	0,10	20,1
All Vehicles		109	25,0	0,087	4,7	NA	0,2	1,6	0,05	0,40	0,05	28,8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Figure 2-3Movement Summary: SIDRA Intersection Results- Existing + Construction Traffic (Simultaneous Construction- 3PV)

MOVEMENT SUMMARY

Site: [Site1 -Exisintg + Construction Traffic (Simultaneous Consruction 3PV) + Sandraai]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gariep Road South Aproach (from Groblershoop)												
1	L2	0	25,0	0,138	8,5	LOS A	0,3	2,7	0,16	0,63	0,16	30,2
2	T1	1	25,0	0,138	1,1	LOS A	0,3	2,7	0,16	0,63	0,16	68,6
3	R2	54	25,0	0,138	8,2	LOS A	0,3	2,7	0,16	0,63	0,16	30,6
Approach		55	25,0	0,138	8,0	NA	0,3	2,7	0,16	0,63	0,16	31,0
East: Trasnet Road East Aproach (From Bokpoort)												
4	L2	14	25,0	0,029	0,0	LOS A	0,1	0,9	0,01	0,06	0,01	28,9
5	T1	4	25,0	0,029	0,4	LOS A	0,1	0,9	0,01	0,06	0,01	19,9
6	R2	14	25,0	0,029	1,3	LOS A	0,1	0,9	0,01	0,06	0,01	28,8
Approach		32	25,0	0,029	0,6	LOS A	0,1	0,9	0,01	0,06	0,01	27,2
North: Griep Road North Aproach (from Upington)												
7	L2	48	25,0	0,034	7,4	LOS A	0,0	0,1	0,00	0,61	0,00	30,5
8	T1	2	25,0	0,034	0,0	LOS A	0,0	0,1	0,00	0,61	0,00	69,8
9	R2	1	25,0	0,034	7,1	LOS A	0,0	0,1	0,00	0,61	0,00	31,0
Approach		52	25,0	0,034	7,1	NA	0,0	0,1	0,00	0,61	0,00	31,2
West: Transnet road West Aproach (from farms)												
10	L2	0	25,0	0,017	0,0	LOS A	0,1	0,5	0,15	0,06	0,15	29,0
11	T1	18	25,0	0,017	0,5	LOS A	0,1	0,5	0,15	0,06	0,15	19,9
12	R2	0	25,0	0,017	1,1	LOS A	0,1	0,5	0,15	0,06	0,15	28,8
Approach		18	25,0	0,017	0,5	LOS A	0,1	0,5	0,15	0,06	0,15	20,0
All Vehicles		156	25,0	0,138	5,4	NA	0,3	2,7	0,08	0,44	0,08	28,5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: ROYAL HASKONINGDHV (PTY) LTD | Processed: Thursday, 14 May 2020 12:13:21
Project: C:\Users\mw2706655\Desktop\Peer Review\Received\ACWA TIA-14052020.sip8

Figure 2-4Movement Summary: SIDRA Intersection Results- Existing + Construction Traffic (Simultaneous Construction) + Sandraai

2.3 Report Review

The report provides an overview of the anticipated traffic generated by the development as well as mitigation measures to reduce the impact of the expected trips on the surrounding environment. The overall report estimates the trips generated and models the anticipated effects on the road network appropriately relative to standard industry practice in South Africa. Checks on the SIDRA Intersection models were conducted and the remedial measures related to road improvements were found to be satisfactory. The proposed mitigation measures are, in our opinion, appropriate to ensure the environmental impacts of the development from a traffic perspective are acceptable.

The following table outlines the requirements of specialist studies for Basic Assessments extracted from the ***National Environmental Management Act, 1998 (Act No. 107 of 1998) Amendments to the Environmental Impact Assessment Regulations, 2014: Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6***., the relevant section of the Addendum to Bokpoort II PV Solar Farm report where the relevant data can be found and the SMEC comment on this requirement.

Table 2-1: Regulations for Specialist Studies and Associated Comment

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report	SMEC Comment
(a) details of the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a *curriculum vitae*;	N/A	Submitted alongside the report.
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	N/A	This should be submitted alongside the report.
(c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1.1	The supplied information is sufficient from a transport impact perspective.
(cA) an indication of the quality and age of base data used for the specialist report;	Section 2.9	The supplied information is sufficient from a transport impact perspective.
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 2	The supplied information is sufficient from a transport impact perspective.
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 2.4	The supplied information is sufficient from a transport impact perspective.
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 2.3	The supplied information is sufficient from a transport impact perspective.
(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;	Section 6.2	Site plan alternatives not included as not relevant. Included information sufficient.
(g) an identification of any areas to be avoided, including buffers;	N/A	Not relevant to project.
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	N/A	A map showing the areas sensitive to dust could be included. General descriptions are included and, in our opinion, are sufficient.

(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Spread throughout document	Assumptions made are reasonable.
(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;	Section 6.2	The supplied information is sufficient from a transport impact perspective.
(k) any mitigation measures for inclusion in the EMPr;	Section 6.3	These measures are appropriate to mitigate traffic related environmental effects.
(l) any conditions for inclusion in the environmental authorisation;	Section 6.3	These measures are appropriate to mitigate traffic related environmental effects.
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 6.3	These measures are appropriate to mitigate traffic related environmental effects.
(n) a reasoned opinion— i. as to whether the proposed activity, activities or portions thereof should be authorised; iA. Regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr or Environmental Authorization, and where applicable, the closure plan;	N/A	Cover letter submitted alongside the report.
(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A	N/A
(p) any other information requested by the competent authority	N/A	N/A
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	N/A

3. EXCLUSIONS

The following have been excluded from the review process:

- Site Visit
- Verification of Traffic Count Data
- Meetings with relevant authorities
- Original Site Traffic Assessment: Bokpoort II Solar Farm Concentrated Solar Power Tower Facility, Bokpoort II Photovoltaic Facility 1 and Bokpoort II Photovoltaic Facility 2, Site Traffic Assessment, May 2016

4. CONCLUSION AND RECOMMENDATIONS

The Addendum Report is appropriate for submission as a Basic Assessment specialist report for traffic impacts, assuming that the trips generated by the development in its new format do not exceed those generated for the original traffic assessment process in 2016. In case the trips in this development do exceed those generated as calculated for the 2016 report, it is recommended that the Addendum report analysis be extended to include these two intersections.

The following documents received should be submitted alongside the report for approval:

- Curriculum vitae of specialist who compiled the report; and
- Cover letter providing a reasoned opinion as to whether the proposed activities should be authorised.

The following form should be submitted with the alongside the report for approval:

- A declaration that the specialist is independent in a form as may be specified by the competent authority.

The report provides sufficient evidence that traffic impact of the development can be mitigated through the interventions proposed and that in our view, all required components have been adequately addressed subject to the revised scheme traffic volumes being of a lesser magnitude when compared to the original 2016 traffic assessment.

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Date:	26 May 2020	Contact name:	Leonie van Wyk
Your reference:	ACWA Power (LTD) PTY	Telephone:	+27873521516
Our reference:	MD4195-RHD-ZZ-XX-CO-Z-0001	Email:	leonie.vanwyk@rhdhv.com
Classification:	Internal use only		

Addendum to Bokpoort II PV Solar Farm: Concentrated Solar Power Tower Facility, Site Traffic Assessment

This report is an Addendum to the following Site Traffic Assessment reports:
Bokpoort II Photovoltaic (PV) Solar Farm: Concentrated Solar Power Tower Facility;
Bokpoort II Solar Farm: Photovoltaic Facility 1; and
Bokpoort II Solar Farm: Photovoltaic Facility 2.

This report is for the development of ten x 200MW Photovoltaic Facilities at Bokpoort Solar Farm near Groblershoop as part of Phase II. The report addresses the impact of the development and operations on the traffic, internal and adjacent road network. This traffic study will form part of the Environmental Basic Assessment specialist studies for the development of the proposed PV facilities.

The traffic impacts of the Addendum (ten Photovoltaic Facilities) are comparable to the scenarios assessed in the previous Site Traffic Assessment reports and all impacts can be mitigated. The significance of the identified impacts was determined using the approach outlined by the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations (April 1998). The impacts were determined to have a moderate significance before mitigation and low signification if mitigation measures are utilized.

Leonie van Wyk
Traffic Engineer
Transport & Planning

Appendix B12: Visual including Peer Review by LOGIS

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

BASIC ASSESSMENT FOR THE DEVELOPMENT OF 8 NEW PV PLANTS & AMENDMENT OF 2 PV DEVELOPMENTS AT THE BOKPOORT FARM NEAR GROBLERSHOOP NORTHERN CAPE 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:	Royal HaskoningDHV			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	2	Percentage Procurement recognition	
Specialist name:	Paul da Cruz			
Specialist Qualifications:	BA Hons			
Professional affiliation/registration:				
Physical address:	Building 5, Country Club Estate, Woodlands Drive, Woodmead			
Postal address:	PO Box 867, Gallo Manor			
Postal code:	2052	Cell:	084 224 0088	
Telephone:	-	Fax:	-	
E-mail:	paul.dacruz@rhdhv.com			

2. DECLARATION BY THE SPECIALIST

I, _____Paul da Cruz_____, declare that –

- I act as the independent specialist (visual impact assessment) 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

Name of Company:

Royal HaskoningDHV

Date

25 May 2020

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, ___Paul da Cruz_____, 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

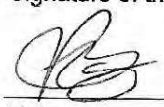
Name of Company

Royal HaskoningDHV

Date

25 May 2020

Signature of the Commissioner of Oaths



Date

CERTIFIED TRUE COPY OF THE ORIGINAL

Malcolm Roods

Commissioner of Oaths 1/06/2020
BA(Hons) LLB
(011) 798 6001
PO Box 867, Gallo Manor 2052
21 Woodlands Drive, Woodmead.

Royal HaskoningDHV
Enhancing Society Together

REPORT

Visual Impact Addendum Report for the Development of 8 New PV Plants and Amendment of 2 PV Developments on the Farm Bokpoort in the Northern Cape Province

Client: ACWA Power

Reference: MD4195TPRP2001201147
Status: S0/01
Date: 1/20/2020

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Document title:	Visual Impact Addendum Report for the Development of 8 New PV Plants and Amendment of 2 PV Developments on the Farm Bokpoort in the Northern Cape Province
Document short title:	Bokpoort 2 Visual Addendum
Reference:	MD4195TPRP2001201147
Status:	01/S0
Date:	1/20/2020
Project name:	Basic Assessment for the Proposed 8 New PV Developments and Amendment of 2 PV Developments on the Farm Bokpoort, Northern Cape
Project number:	MD4195
Author(s):	Paul da Cruz

Drafted by:	Paul da Cruz
Checked by:	
Date / initials:	
Approved by:	
Date / initials:	

Classification
Project related

Disclaimer

Royal HaskoningDHV

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Executive Summary

Royal HaskoningDHV (RHDHV) has been appointed by ACWA Power to undertake Basic Assessment Studies for the development of eight (8) new Photovoltaic (PV) Solar Power Plants of 200MW each on the Farm Bokpoort 390 located to the north of the town of Groblershoop in the Northern Cape Province. ACWA Power previously received Environmental Authorisation for the proposed development of PV and Concentrated Solar Power (CSP) Solar Plants on the Farm Bokpoort 390. ACWA Power wishes to change the CSP component of the proposed development to PV. Previously, approval for 2 PV facilities was obtained, PV 1 (Ndebele) and PV 2 (Xhosa), however the proposal for these two sites did not include the BESS for either of the sites as well as the capacity increase from 75 to 200MW.

As part of the original basic assessment study completed in 2016, visual impact assessment studies were undertaken by Golder Associates for the three separate components of the development – the CSP component and the two (2) PV components. As the project scope and components have changed to only include PV, an addendum report for the visual assessment aspect of the environmental studies for the proposed development is required to be undertaken. A single addendum report has been prepared based on the original two PV reports, and has been updated to include:

- a consideration of the revised visual baseline of the study area;
- a revised assessment of the visual impacts associated with the proposed solar development, considering the change in the development components;

Project Description

The site is within one of South Africa's eight renewable energy development zones and has therefore been identified as one of the most suitable areas in the country for renewable energy development, in terms of a number of environmental impact, economic and infrastructural factors.

A 2000 Megawatt (MW) Photovoltaic (PV) Solar Development is proposed. The proposed PV solar facility will cover 150 ha. The proposed development will consist of the following infrastructure:

- Solar PV modules that will be able to deliver up to 200 MW to the Eskom National Grid;
- Inverters that convert direct current (DC) generated by the PV modules into alternating current (AC) to be exported to the electrical grid;
- A transformer that raises the system AC low voltage (LV) to medium voltage (MV). The transformer converts the voltage of the electricity generated by the PV panels to the correct voltage for delivery to Eskom;
- Transformer substation; and
- Instrumentation and Control consisting of hardware and software for remote plant monitoring and operation of the facility.

Associated infrastructure includes:

- Mounting structures for the solar panels will be either rammed steel piles (preferred solution in terms of piles with pre-manufactured concrete footings to support the PV panels;
- Cabling between the structures, to be lain underground where practical;
- A new 132kV overhead powerline which will connect the facility to the National Grid via Eskom's existing Garona Substation. The powerlines vary in length and will be located within a servitude spanning 15.5m meters on both sides. The powerline towers will be 35m high;

- Battery Energy Storage System (BESS) - battery Power at Point of Connection: 150MW, area required: 16ha; the BESS will store approximately 4500m^3 of hazardous substance.;
- One water pipeline connection from the river (previously authorised) and different metering points at individual PV plants;
- Internal access roads (4 – 6 m wide roads will be constructed but existing roads will be used as far as possible) and fencing (approximately 3 m in height); and
- Shared infrastructure consisting of buildings, including a workshop area for maintenance, storage (i.e. fuel tanks, etc.), laydown area, parking, warehouse, and offices (previously approved).

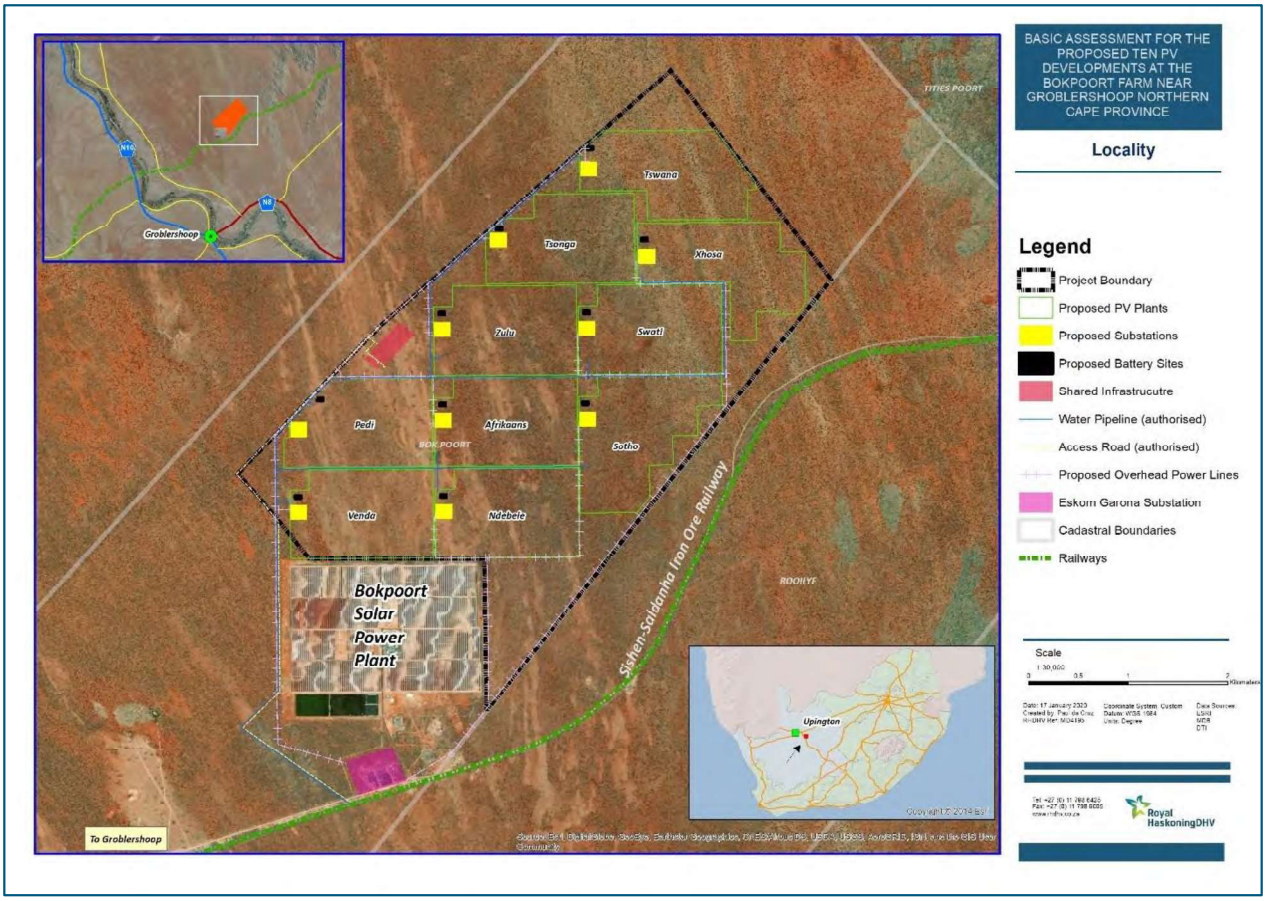

Figure i – Locality

Changes to Visual Baseline and Visual Receptor Locations

The physical aspects of the study area investigated as part of the original visual reports (i.e. topography, hydrology and rainfall, and vegetation cover) remain as described. The land use in the study area has changed little in the four year-period since the original visual reports were compiled.

Seven sensitive receptor locations are situated within a 10km radial area of the proposed development.

Table i -Static Sensitive Receptor Locations located within a 10km radius of the proposed development

Distance (radius around infrastructure)	Receptor Type	Receptor Name	Closest Distance to Proposed Development	Receptor located Within Viewshed?
0 - 5 km	Farmstead (main homestead and smaller household)	Bokpoort Farmstead	1,97km	Yes
5 - 10 km	Two Farmsteads	Eben Haeser Farmstead	7.71km	No
	Farmstead (main homestead and smaller household)	La Gratitude Farmstead	6.25km	No
	Farmstead (main homestead and 3 smaller households)	Tities Poort Farmstead	7.9km	No
	Farmstead (main homestead and 2 smaller households)	Dinas Rus Farmstead	9.34km	No
	Farmstead (2 households)	Bloubos Farmstead	10.38km	No
	Farmstead (3 households)	Hoekvalkte Farmstead	10.58km	No

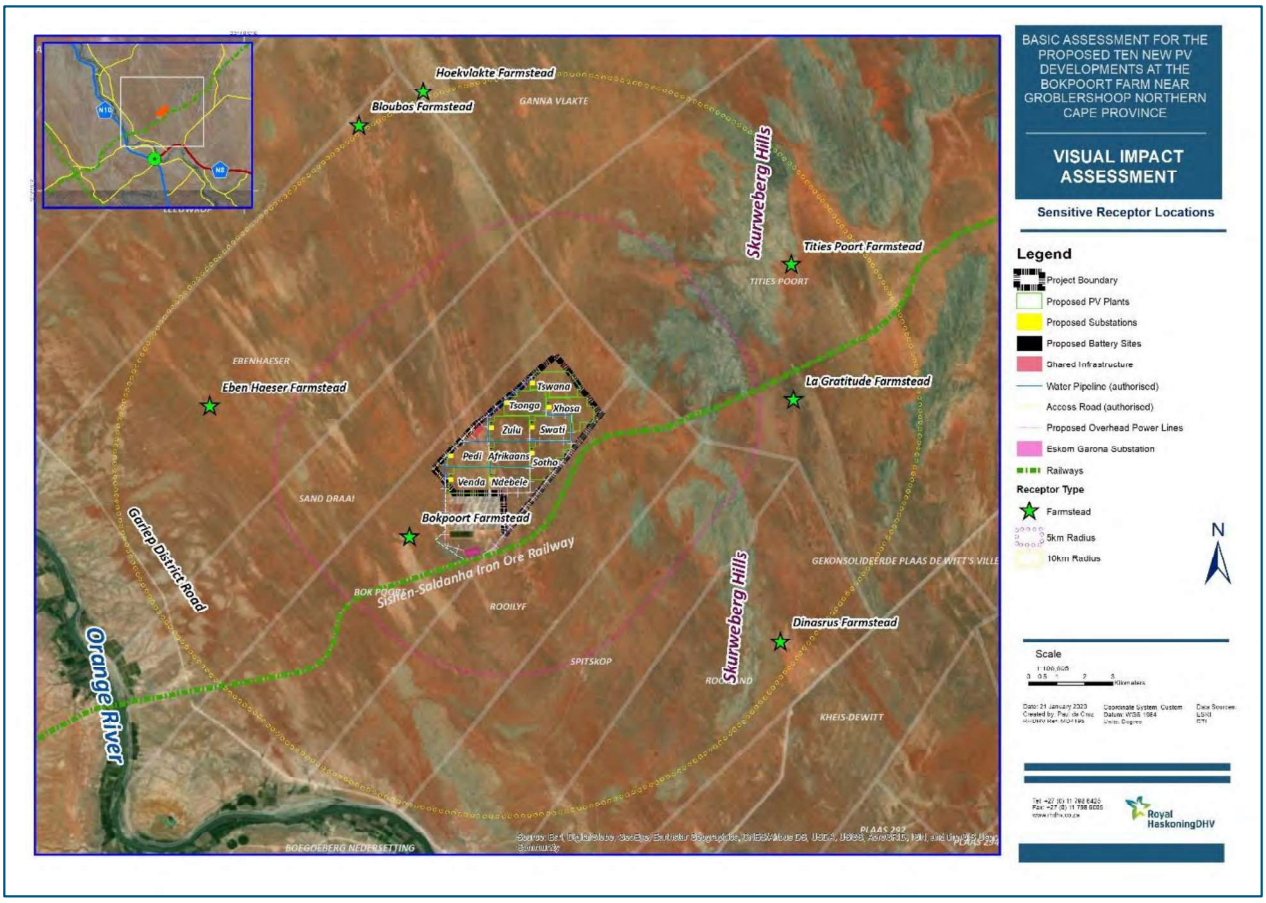

Figure ii – Sensitive Receptor locations situated within 10km of the proposed development

There are no public access transient receptor locations (i.e. roads or rail) located within the 0-5km of the development site. A very short stretch of the Gariep District Road is located within the 10km radial area of the site, but apart from this stretch of road no other transient receptor locations are situated within 10km of the development site.

Assessment of Visual Impacts

As distance is a significant factor in the experiencing of visual impacts, the site context is important in how impacts associated with the proposed development on the development site are likely to be experienced. The vast majority of receptor locations are located greater than 10km distant from the facility and are predominantly located along the Orange River (within the Orange River corridor). Accordingly, a potentially significant distance between the solar facility components and the majority of the receptor locations is present.

All but one of the (sensitive) receptor locations located within a distance of 10km of the proposed development fall into a zone of low potential visual exposure. The Bokpoort Farmstead is the only receptor location that is situated within the zone of moderate to high visual exposure. This receptor location is located within the viewsheds of the development; it is located on an isolated hillside with an aspect that faces in a northwards arc towards the development site. The raised position of the farmstead in relation to the surrounding plains entails that it is exposed to a clear view of much of the terrain. The receptor location will thus be subject to a high degree of visual exposure and thus a high level of visual intrusion. The visual intrusion factor associated with the new development would be ameliorated however by a number of factors, in particular the screening effect of vegetation around the homestead and the existing presence of the Bokpoort 1 CSP Facility as viewed from the receptor location.

Of the six other sensitive receptor locations located within a distance of 10km of the development site, ***none*** are located within the viewshed of either the northern or southern part of the development, thus meaning that none of these six receptor locations will be exposed to any views of the proposed development. Parts of the 5-10km radial area around the proposed development are located within the viewsheds of the development, in particular the viewshed of the northern part of the development which covers a greater area as the northern part of the development is located on higher-lying ground than the southern part of the development footprint. However significant parts of the radial area fall outside of the viewshed of the development. This is largely due to the presence of hilly / mountainous terrain located within the north-eastern and eastern parts of the 10km radial area that screens much of the surrounds, preventing views towards the development site.

Beyond the 10km radial area the visual exposure factor associated with the proposed plant would be minimal and twinned with the absence of visibility of the plant in large areas where receptor locations are clustered, in particular along the Orange River corridor, the potential for visual impacts to be generated is low to minimal. Most of the Orange River corridor lies outside of the viewshed of the development, and accordingly will not be affected by the proposed development.

When non-static receptor locations are considered, the visual intrusion factor of the development will be very low to minimal. Most of the Gariep District Road is located outside of the viewshed of the development, and thus will be exposed to no visual exposure to the proposed development.

The proposed development could also be associated with other visual-related potential impacts:

- **Glint and glare**: Glint and glare can become a problematic issue associated with solar power facilities. However, as the proposed development will not be visible to the vast majority of receptor locations in the study area it will not create any glint or glare impacts. In addition, PV arrays are not typically associated

with glint or glare as the PV surfaces are non-reflective, and only the metal supports could potentially cause glare, thus greatly reducing the potential for glint or glare-related impacts.

- **Lighting impacts in the context of the night-time environment**: the night-time environment of the wider area is characterised by limited sources of lighting, especially in the area to the east of the Orange River. The Bokpoort 1 CSP Plant has introduced a set of lights into this dark environment and is the only really visible source of light on the eastern side of the Orange River (when viewed from afar). If similar lighting was developed at the proposed facility, the relative proximity of the proposed facility to the Bokpoort CSP Plant when viewed from the area to the west would effectively add to the cluster of lighting that is already visible in this part of the study area. The number of lights as visible could more than double and the development would result in the introduction of further light spill into a generally unlit night-time environment.
- **Dust plume-related visual impacts**: The generation of dust plumes could constitute a visual impact, although it would only be transient in nature. Dust plumes associated with the proposed development that could become problematic in a visual context could be generated by the clearing of vegetation on the development site during construction and by construction traffic along the access roads to the development site, which would likely be the Gariep District Road and the Transnet Access road, both of which are not tarred and from which dust would be generated. If it were to occur excessively, dust plume creation could be construed as a visual impact. The distance factor and limited viewshed ameliorate the potential impact of dust plumes generated on the site, but generation of dust plumes by a large increased volume of heavy vehicle traffic may be perceived as a negative visual intrusion in addition to negative perceptions regarding dust-related grazing impacts, as well as road safety.

Overall, the degree of visual intrusion associated with the proposed development is likely to be low at worst, with the distance between most of the receptor locations and the development site being the greatest contributing factor, twinned with the non-visibility of the development in large parts of the study area. The proposed development is thus very unlikely to result in the creation of a visual impact, or perceptions of visual impact by people inhabiting the sensitive receptor locations in the 10km radial area or moving transiently within the area. Twinned with the presence of the Bokpoort 1 CSP Plant and the Eskom Garona Substation the proposed solar development will add to the presence of large-scale power generation infrastructure in the study area, but which due to its remote location and the low density of human settlement will not generate any degree of visual exposure beyond that which is very low, thus being unlikely to generate any visual impacts.

From a visual impact assessment perspective the proposed development (activity) is acceptable and should be authorised as the development will not adversely affect the visual receiving environment in a significant manner;

Mitigation

A number of mitigation measures have been recommended to be implemented, **and must be included as conditions in the Environmental Authorisation for the Development:**

- Clearing of vegetation on the construction site musty be undertaken in a phased manner, so as to prevent the large-scale exposure of soils and substrate that could result in atmospheric conditions (wind) creating large dust plumes on the site.
- Regular dust abatement measures must be applied on the construction site, as detailed in the development's EMPr.
- Lighting of the plant at night must be limited to security lighting (where this is necessary). It is acknowledged that emergency operational lighting may be required, but this must not be permanently lit, only being lit when such emergency operational lighting is required.

- The height of any lights should be limited; more lights of lower height should be installed rather than fewer floodlights that would be visible from a wider area.
- All lighting must be downward, and inward facing (towards the plant), to avoid light spill into surrounding areas.
- Speed limits for construction vehicles, in particular heavy trucks travelling along the site access roads (including the Gariep District Road and the Transnet Railway Road), must be set, and must be rigorously enforced. It is recommended that speed limits of <50km/hr be set, especially in the vicinity of (i.e. within 500m) of households / farmsteads located close to the Gariep District Road.

Impact Rating Matrix Assessment

Aspect / Impact	Construction - Significance Rating before Mitigation	Construction - Significance Rating after Mitigation	Operation- Significance Rating before Mitigation	Operation - Significance Rating after Mitigation	Decommissioning- Significance Rating before Mitigation	Decommissioning - Significance Rating after Mitigation
Visual Impacts Associated with the Development Components	Low	Low	Low	Low	Low	Low
Lighting-related Impacts	N/A	N/A	Low	Low	N/A	N/A
Generation of Dust Plumes from the construction footprint	Low	Low	N/A	N/A	Low	Low
Generation of Dust Plumes from construction traffic on access routes	Low	Low	N/A	N/A	Low	Low

Acronyms

Acronym	Acronym description
CSP	Concentrated Solar Power
PV	Photovoltaic
RHDHV	Royal HaskoningDHV

Glossary

Glossary Term	Glossary Text
Aeolian	Wind-borne – i.e. referring to wind-borne and deposited materials, and erosion caused by wind
Glare	The sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted, which causes annoyance, discomfort, or loss in visual performance and visibility
Glint	Glint is a brief flash of light.
Micro-topography	Small scale variations in the height and roughness of the ground surface; in the context of this report the definition includes structures such as buildings and larger-sized vegetation that can restrict views
Viewshed	A viewshed is an area of land, water, or other environmental element that is visible to the human eye from a fixed vantage point

Royal HaskoningDHV

Specialist Declaration

I, **Paul da Cruz**, declare that I –

- act as a specialist consultant in the field of Visual Impact Assessment
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014 (as amended in 2017);
- have and will not have any vested interest in the proposed activity proceeding;
- have no, and will not engage in, conflicting interests in the undertaking of the activity;
- undertake to disclose, to the competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the Environmental Impact Assessment Regulations, 2014 (as amended in 2017); and
- will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not.

PAUL DA CRUZ

Expertise of Specialist

Paul da Cruz of RHDHV is a very experienced visual impact assessment practitioner, having undertaken visual impact assessments on a number of large development projects. Paul's key list of visual impact assessment experience at RHDHV is listed below.

Paul da Cruz Visual Impact Assessment (VIA) Experience at Royal HaskoningDHV (SSI) – April 2012 to present time:

- Visual and Tourism Study: Addendum Report to the Thyspunt Transmission Lines EIA Visual and Tourism Specialist Studies to Assess the impacts of the proposed lines on the Elands River Valley
- Visual Impact Assessment (VIA) for the Matimba Continual Ashing EIA (Eskom Generation), Lephalale, Limpopo
- VIA for the expansion of Mining Activities at the Black Mountain Mine, Springbok Area, Northern Cape
- VIA for the proposed Valleyview housing Development, eMalahleni, Mpumalanga
- VIA for the Eskom Underground Coal Gasification (UCG) Project, Amersfoort, Mpumalanga
- VIA for the Lydenburg-Merensky 132kV power line, Limpopo-Mpumalanga
- VIA for the Mining Rights Application for the Ekangala Quarry near Bronkhorstspruit
- VIA for the Eskom Mbumbu-Tsakane 132kV Power line in the Acornhoek area, Mpumalanga
- VIA for the proposed SANRAL P166 Bypass Road in Mbombela, Mpumalanga

- Visual Impact Assessment Screening Study for the proposed Transnet Waterberg Haul Line Railway Project (Lephalale to Ermelo)
- VIA for the proposed Sanddraai Solar Power Plant at Groblershoop, Northern Cape
- VIA for the upgrading of the Mkuze Airport, KwaZulu-Natal
- VIA for the Proposed NEO1 Solar Power Plant in Mafeteng, Lesotho

Older Visual Impact Experience:

- VIA for the proposed relocation of the Skukuza Conference Centre, Kruger National Park
- VIA for the proposed re-commercialisation of the Skukuza Airport, Kruger National Park
- VIA for the proposed development of residential apartments in Ramsgate, KZN
- Strategic Visual Impact Assessment Study for the Marula Region Strategic Environmental Assessment, Kruger National Park
- VIA for the redevelopment of the Newmarket Racecourse, Alberton, Gauteng
- VIA for a new Eskom Transmission Substation, Malelane, Mpumalanga
- VIA for the Thyspunt Transmission Lines Integration Project, Eastern Cape
- VIA for proposed Eskom Distribution Power lines, Delareyville – Kophela, North West
- VIA for the Spoornet Coallink Power line Projects in KZN and Mpumalanga
- VIA for a Solar Power Plant Project in Kimberley, Northern Cape
- VIA for the Mookodi Integration Project, proposed power lines and substations in the Vryburg / Stella Area, North West (project currently underway)
- VIA for a wind farm project in Noupoort, Northern Cape
- VIA for a wind farm project in the Prieska (Copperton) area, Northern Cape

1 Introduction

Royal HaskoningDHV (RHDHV) has been appointed by ACWA Power to undertake Basic Assessment Studies for the development of eight (8) new Photovoltaic (PV) Solar Power Plants of 200MW each on the Farm Bokpoort 390 located to the north of the town of Groblershoop in the Northern Cape Province. ACWA Power previously received Environmental Authorisation for the proposed development of PV and Concentrated Solar Power (CSP) Solar Plants on the Farm Bokpoort 390. ACWA Power wishes to change the CSP component of the proposed development to PV. Previously, approval for 2 PV facilities was obtained, PV 1 (Ndebele) and PV 2 (Xhosa), however the proposal for these two sites did not include the BESS for either of the sites as well as the capacity increase from 75 to 200MW.

As part of the original basic assessment study completed in 2016, visual impact assessment studies were undertaken by Golder Associates for the three separate components of the development – the CSP component and the two PV components. As the project scope and components have changed to only include PV, an addendum report for the visual assessment aspect of the environmental studies for the proposed development is required to be undertaken. A single addendum report has been prepared based on the original two PV reports.

1.1 Aims of the Study

The aims of the study are to undertake:

- a consideration of the revised visual baseline of the study area;
- a revised assessment of the visual impacts associated with the proposed solar development, considering the change in the development components;

1.1.1 Project (Study Area) Location and Description

The site is within one of South Africa's eight renewable energy development zones and has therefore been identified as one of the most suitable areas in the country for renewable energy development, in terms of a number of environmental impact, economic and infrastructural factors.

A 2000 Megawatt (MW) Photovoltaic (PV) Solar Development is proposed in total over the area. The proposed PV solar facility will cover 150 ha each. The proposed development will each consist of the following infrastructure:

- Solar PV modules that will be able to deliver up to 200 MW to the Eskom National Grid;
- Inverters that convert direct current (DC) generated by the PV modules into alternating current (AC) to be exported to the electrical grid;
- A transformer that raises the system AC low voltage (LV) to medium voltage (MV). The transformer converts the voltage of the electricity generated by the PV panels to the correct voltage for delivery to Eskom;
- Transformer substation; and
- Instrumentation and Control consisting of hardware and software for remote plant monitoring and operation of the facility.

Associated infrastructure includes:

- Mounting structures for the solar panels will be either rammed steel piles (preferred solution in terms of piles with pre-manufactured concrete footings to support the PV panels;
- Cabling between the structures, to be lain underground where practical;
- A new 132kV overhead powerline which will connect the facility to the National Grid via Eskom's existing Garona Substation. The powerlines vary in length and will be located within a servitude spanning 15.5m meters on both sides. The powerline towers will be 35m high;
- Battery Energy Storage System (BESS) - battery Power at Point of Connection: 150MW, area required: 16ha; the BESS will store approximately 4500m^3 of hazardous substance.;
- One water pipeline connection from the river (previously authorised) and different metering points at individual PV plants;
- Internal access roads (4 – 6 m wide roads will be constructed but existing roads will be used as far as possible) and fencing (approximately 3 m in height); and
- Shared infrastructure consisting of buildings, including a workshop area for maintenance, storage (i.e. fuel tanks, etc.), laydown area, parking, warehouse, and offices (previously approved).

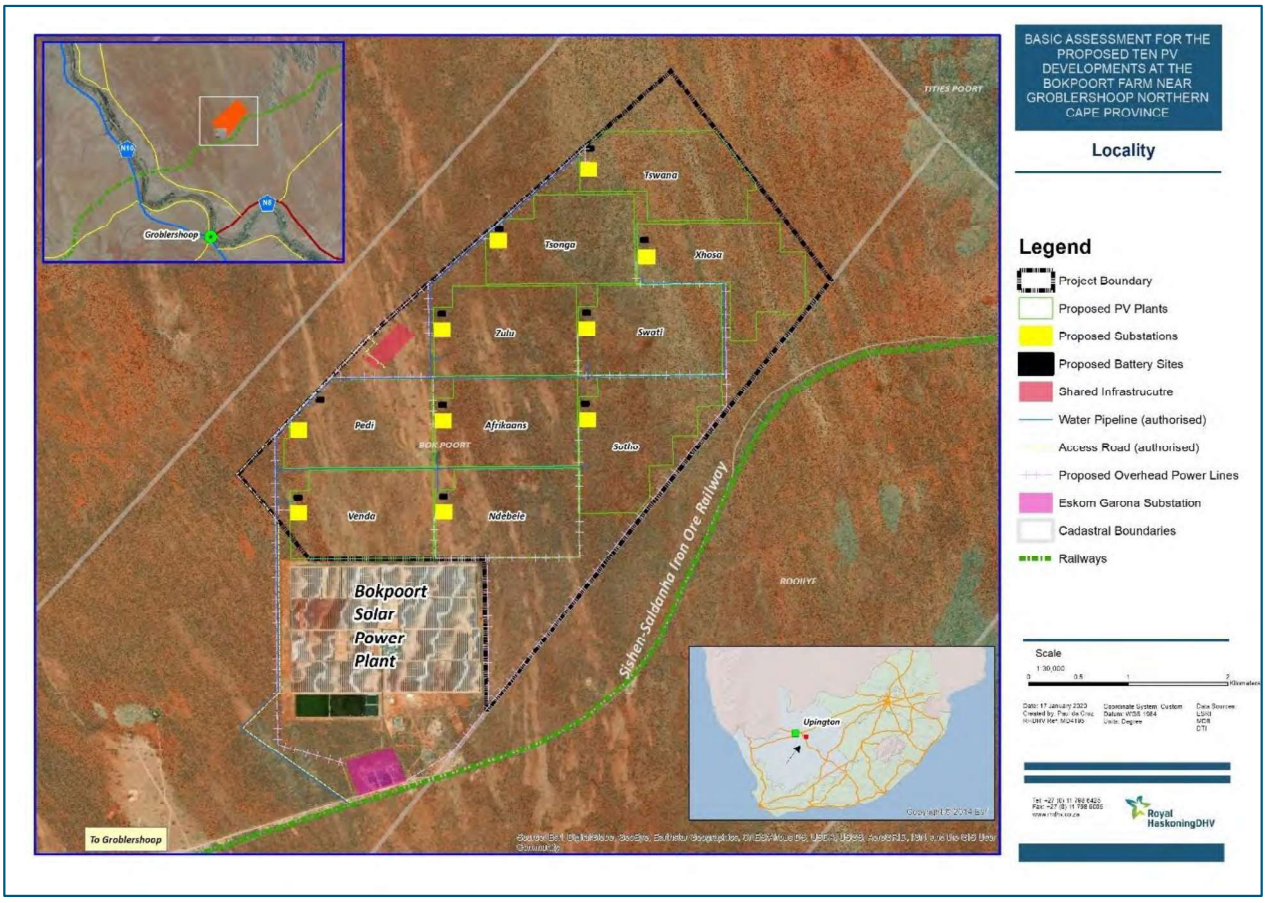

Figure 1 – Locality Map

1.2 Assumptions and Limitations

This is addendum report is not a stand-alone visual impact report and has been prepared to update the two (2) visual impact reports prepared by Golder Associates for the original basic assessment process completed in 2016. As such this report assumes that the original two visual impact assessment reports adequately and accurately described the baseline visual environment of the study area and accurately undertook the assessment of viewsheds associated with the proposed development.

This addendum report has utilised the original reports' assessment of viewsheds associated with the original northern and southern PV plants. These viewsheds were generated for the northern and southern PV plants respectively. As the overall footprint of the development has not changed, and as the design (height) of the PV components has not changed markedly these viewsheds represent the northern and southern extents of the current development. Accordingly, the viewsheds are an accurate representation of the southern and northern extents of the ten proposed PV facilities.

It should be noted that the 'experiencing' of visual impacts is subjective and largely based on the perception of the viewer or receptor. The presence of a receptor in an area potentially affected by the proposed solar power development does not thus necessarily mean that a visual impact would be experienced.

It has been assumed that households and farmsteads located within the study area are sensitive receptors – i.e. receptor locations at which a perception of visual impact could be generated. Existing Power Generation / power transmission infrastructure and the people that work at such locations in the study area have not been classified as being sensitive receptors in a visual impact context.

1.3 Methodology

The Methodology adopted in the two (2) visual impact reports prepared by Golder Associates for the original basic assessment process completed in 2016 is detailed in Section 2.0 of each report.

For the addendum study, the following methodology has been adopted:
Changes to the visual baseline of the study area, and to the visual receptor locations within the study area have been investigated, in order to acquire an understanding of the current visual baseline of the receiving environment. This has been investigated in the context of developments that have occurred since the original visual assessments were competed in 2016. An updated list of static visual receptor locations within a 10km radius of the proposed development has been compiled.

The assessment of visual impacts associated with the proposed development have then undertaken. The nature of visual impacts has been explored and the generic visual impacts associated with photovoltaic solar power plants are detailed. An analysis of the degree of visual intrusion caused by the proposed PV Facility at receptor locations in the study area has been undertaken through the assessment of the likely visibility of the proposed development components at receptor locations, based on the viewsheds generated as part of the original visual impact assessments has been undertaken. As part of the assessment of visual impacts, the assessment of the following aspects has been undertaken:

- Glint and glare
- Lighting (night-time assessment)
- Dust plumes created by construction vehicles and vegetation clearing

As part of the assessment of impacts, relevant mitigation measures, if applicable, have been detailed.

2 Changes to Visual Baseline and Visual Receptor Locations

2.1 Landscape Physical Characteristics and Landuse

This part of the report investigates any changes to the visual baseline in the area that may have occurred since the undertaking of the original visual studies (in 2016), which if affected, could affect the experiencing of visual impacts associated with the proposed development.

The physical aspects of the study area investigated as part of the report (i.e. topography, hydrology and rainfall, and vegetation cover) remain the same as described in the original reports. Land-use change can often occur more rapidly than changes to a landscape's physical attributes, although vegetation cover change often occurs in conjunction with land-use change. The land-use in the study area has changed little in the four year-period since the original visual reports were compiled. Away from the Orange River corridor the predominant land-use in the wider study area and including the majority of the Bokpoort Farm remains livestock rearing, predominately sheep. The Orange River valley / corridor is predominated by the presence of irrigated agriculture, with the establishment of grape (sultana) vineyards evidently becoming more common. Game farming and hunting still occur in the Kalahari Oryx Game Farm located to the north and north-west of the Bokpoort Farm. The Bokpoort (1) CSP plant remains the only energy generation-industrial facility in the wider area with no other solar or wind power generation facilities having been constructed to date. There appears to have been little to no growth in settlements in the study area, with Groblershoop remaining a small rural town along with a handful of smaller settlements located close to the Orange River corridor.

2.2 Visual Receptors

The original visual reports listed the number of structures within a 10km radius of the site. As the area beyond 10km of the development site would be very unlikely to be subject to any form of visual exposure to the development (refer to Figure 5), this addendum report focusses on a 10km radius of the development site. This addendum report has identified all *sensitive* receptor locations in the 10km radial area (Table 1).

Table 1 -Static Sensitive Receptor Locations located within a 10km radius of the proposed development site

Distance (radius around infrastructure)	Receptor Type	Receptor Name	Closest Distance to Proposed Development	Receptor located Within Viewshed?
0 - 5 km	Farmstead (main homestead and smaller household)	Bokpoort Farmstead	1,97km	Yes
5 - 10 km	Two Farmsteads	Eben Haeser Farmstead	7.71km	No
	Farmstead (main homestead and smaller household)	La Gratitude Farmstead	6.25km	No
	Farmstead (main homestead and 3 smaller households)	Tities Poort Farmstead	7.9km	No

	Farmstead (main homestead and 2 smaller households)	Dinas Rus Farmstead	9.34km	No
	Farmstead (2 households)	Bloubos Farmstead	10.38km	No
	Farmstead (3 households)	Hoekvalkte Farmstead	10.58km	No

In the context of visual impact assessment, it is important to note that not all structures can be considered to be sensitive receptors to the development, especially where the structures are associated with the undertaking of a similar activity or process to the proposed development that would not be associated with any degree of visual sensitivity. The original reports listed seven (7) structures as being located within a 5km radius around the site, all of which were listed as households. However only two are non-industrial or non-power generation-related, being the Bokpoort Farmstead and an associated farmworker's dwelling. The remainder are located either at the Bokpoort CSP Plant or at the Eskom Garona Substation. As such these other structures and the people working within them are unlikely to display any degree of visual sensitivity and accordingly only one sensitive receptor location exists within a 5km radius of the development footprint.

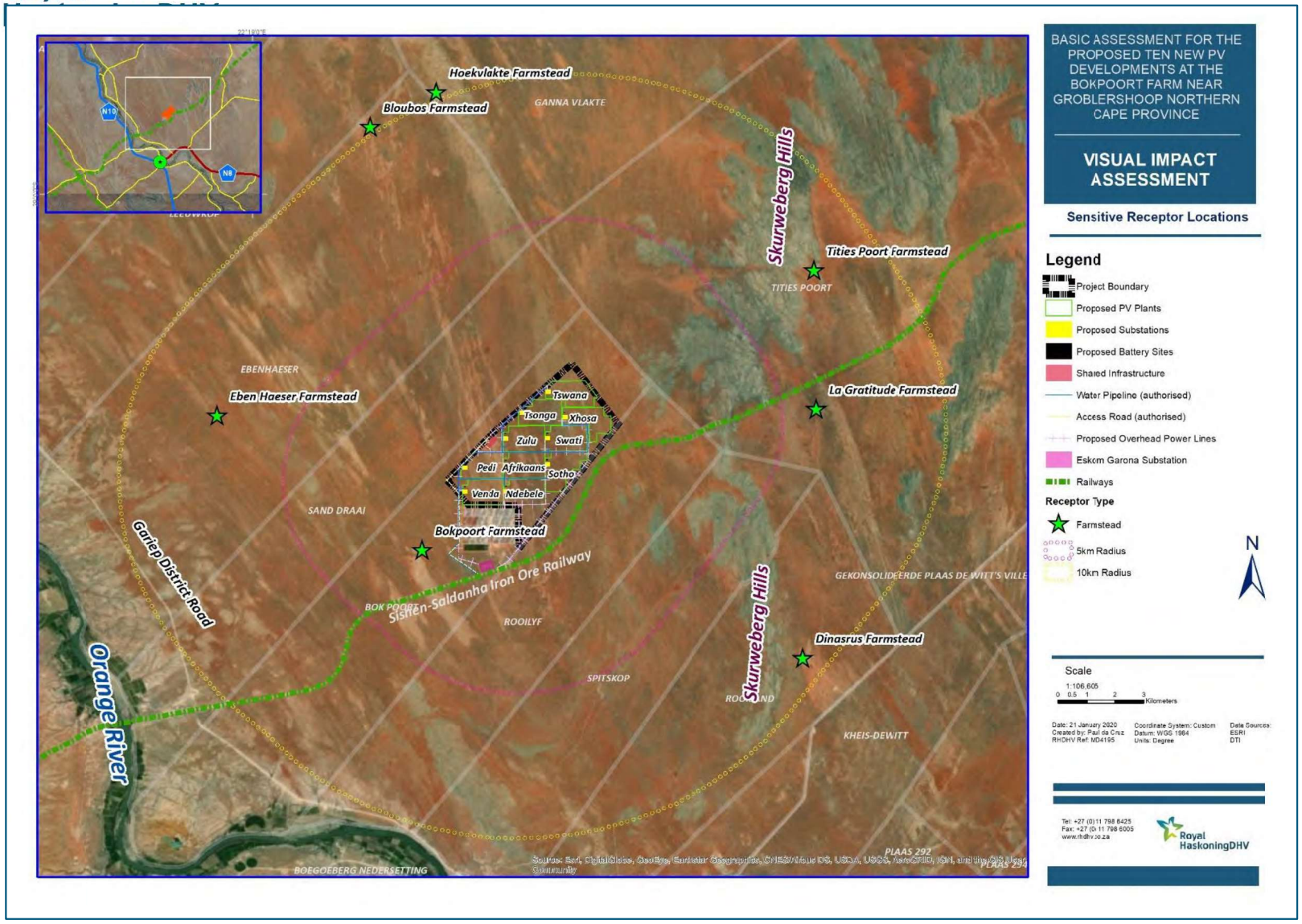

Figure 2 – Location of Sensitive Receptor Locations within a 10km radius of the proposed development

Within a 5-10km radius, the original report identified a further fifteen (15) structures. The assessment completed for this addendum report identified six (6) *sensitive* receptor locations within the 5-10km radius[1]. All of these are farmsteads, with each farmstead typically consisting of a number of households.

There are no public access transient receptor locations (i.e. roads or rail) located within the 0-5km radial area of the development site. The Transnet Railroad is located within the radial area however this is a non-public access road and access is limited to employees of Transnet, and for the stretch of the road from the Gariep Road to the Bokpoort CSP Plant, to people working at the Solar Power Plant. This road is thus not considered as a route on which potential sensitive receptors could travel. The Transnet Railway is not a passenger railway, only transporting iron ore (raw materials) from Sishen to Saldanha. As such the railway can also not be considered to be a transient receptor location.

Only a short stretch of the Gariep District Road enters the 10km radial area. This is the primary and only public access road located on the eastern side of the Orange River corridor in the area and which is located within the area surrounding the proposed development. The road runs from the N8 National Road east of Groblershoop north-westwards, running largely parallel to the course of the river, in the direction of the small settlement of Gariep and eventually linking to the N14 National Road and Olifantshoek to the north. The road also provides access to the only other road bridge across the Orange River between Groblershoop and Upington. As such the Gariep Road is an important public route that carries local traffic in the area to the north-east of Groblershoop.

3 Impact Assessment

3.1 Generic aspects of visual impacts associated with developments and structures

Before exploring the site-specific impacts associated with the proposed development, it is necessary to explore some generic aspects of visual impact as associated with new developments such as the proposed solar power development.

- Size and footprint of an object/ development

Size of a new object / series of objects placed into a landscape is an important determinant in terms of visibility. The larger a structural feature, the more it is likely to be visible. Spatial footprint is also an important factor, as the larger the spatial footprint of a development, the more it will be likely to occupy a large portion of a landscape, thus having a greater potential to alter the visual character of the landscape.

- Viewing distance

The distance of the viewer / receptor location away from an object is the most important factor in the context of the experiencing of visual impacts. Beyond a certain distance, even large structural features tend to be much less visible and are difficult to differentiate from the surrounding landscape. The visibility of an object is likely to decrease exponentially with increasing distance away from the object, with maximum impact being exerted on receptors at a distance of 500m or less. The impact decreases exponentially as one moves away from the source of impact, with the impact at 1000m being a quarter of the impact at 500m away (see Figure 3 below). At 5000m away or more, the impact would be negligible.

[1] *The Hoekvalkte and Bloubos Farmsteads are located just outside of the 10km radial area but have been included in this assessment*

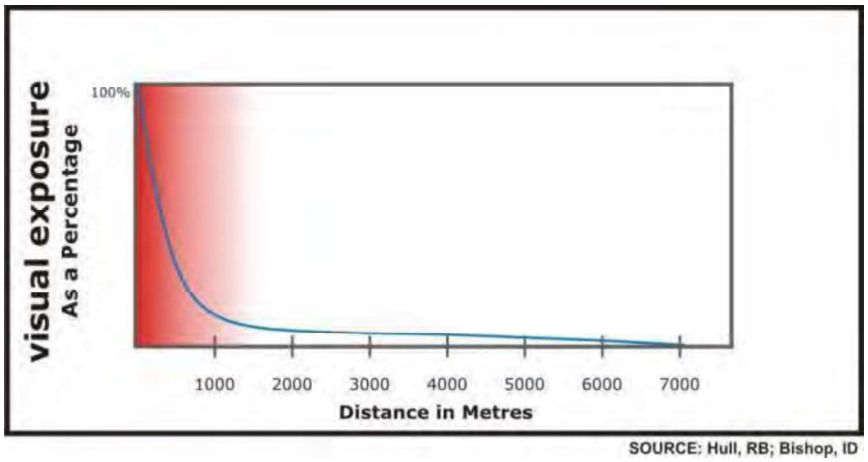

Figure 3 - Diagram Illustrating Diminishing Visual Exposure over Distance

- Presence of receptors

It is important to note that visual impacts are only experienced when there are receptors present to experience the impact; thus, in a context where there are no human receptors or viewers present there are not likely to be any visual impacts experienced.

- Viewer perception

As described above, value can be placed in a landscape in terms of its aesthetic quality, or in terms of its sense of identity or sense of place with which it is associated. If no such values are held with respect to a landscape, there is less likely to a perception of visual impact if the landscape is visually altered. Development within a landscape may not be perceived negatively at all if the development is associated with progress or upliftment of the human condition. The perception of visual impacts is thus highly subjective and thus involves 'value judgements' on behalf of the receptor. The context of the landscape character, the scenic / aesthetic value of an area, and the types of land use practiced tend to affect the perception of whether new developments are considered to be an unwelcome intrusion. Sensitivity to visual impacts is typically most pronounced in areas set aside for the conservation of the natural environment (such as protected natural areas or conservancies), or in areas in which the natural character or scenic beauty of the area acts as a draw card for visitors (tourists) to visit an area, and accordingly where amenity and utilitarian ecological values are associated with the landscape.

When landscapes have a highly natural or scenic character, amenity values are typically associated with such a landscape. Structural features such as industrial / power generation developments and related infrastructure are not a feature of the natural environment but are rather representative of human (anthropogenic) change to a landscape. Thus, when placed in a largely natural landscape, such structural features can be perceived to be highly incongruous in the context of the setting, especially if they affect or change the visual quality of a landscape. It is in this context of incongruity with a natural setting that new developments are often perceived to be a source of visual impact.

- Landform (topographical) and micro-topographical context

The landform context of the environment in which the object is placed is an important factor. The location of the feature within the landform setting – i.e. in a valley bottom or on a ridge top is important in determining the relative visibility of the feature. In the latter case, the feature would be much more visible and would 'break' the horizon, if a viewer was located 'inferior' (lower than) to the object in the topographical context. Similarly, the landform context in which the viewer is located is important in that topography can inherently

block views towards an object if the viewer is located in a setting such as a steep-sided valley or on an aspect facing away from the object.

The micro-topography within the landscape setting in which the viewer and object are located is also important; the presence of micro-topographical features and objects such as buildings or vegetation that would screen views from a receptor position to an object can remove any visual impact factor associated with it.

- Landscape development context

The presence / existence of other anthropogenic objects associated with the built environment may influence the perception of whether a new development is associated with a visual impact. Where buildings and other infrastructure exists, the visual environment could be considered to be already altered from a natural context and thus the introduction of a new structural feature into this setting may be considered to be less of a visual impact than if there was no existing built infrastructure visible.

- Receptor type and nature of the view

Visual impacts can be experienced by different types of receptors, such as people driving along roads, or people living / working in the area in which the structural feature is visible. The receptor type in turn affects the nature of the typical 'view' of a potential source of visual impact, with views being permanent in the case of a residence or other place of human habitation, or transient in the case of vehicles moving along a road. The nature of the view experienced affects the intensity of the visual impact experienced.

- Weather and visibility

Meteorological factors, such as weather conditions (presence of haze, or heavy mist) which would affect visibility can impact the nature and intensity of a potential visual impact associated with a structural feature.

3.2 Generic Visual Impact Issues related to Solar Power Plants

3.2.1 Impacts associated with large-scale solar power facilities

It is important to note that the development and associated environmental assessment of solar power plants in South Africa is relatively new, and thus it is valuable to draw on international experience. Thus, this section of the report draws on international literature and web material to describe the generic impacts associated with solar power.

In general, solar power generating facilities need to occupy a very large area in comparison to other types of power generation facilities relative to the level of power output generated (Sullivan *et al*, 2012). This is an important component of the visual aspect of solar power plants as they can occupy large parts of a landscape, especially when viewed from an elevated position.

The large size, strong regular geometry of solar facilities, and the use of mirrors or glass panels with metal supporting structures, may result in high visual contrast being created that is visible for long distances in many instances (Sullivan *et al*, 2012). In favourable viewing conditions, large facilities can be visible from a distance of 16km or greater; it should be noted however that viewed from such long distances, the facilities may not be recognisable as solar facilities (Sullivan, *et al*, 2012). Built structures associated with solar power facilities would introduce complex, rectilinear geometric forms and lines and artificial looking textures and colours into the landscape; these would typically contrast markedly with natural appearing landscapes (US Department of Interior, 2013).

Previous studies have indicated that the ancillary infrastructure such as power blocks, substations, or cooling towers are also important in contributing towards observed visual contrasts and visual intrusion, particularly in the case of concentrating solar facilities (Sullivan *et al*, 2012). The visual impacts associated with this ancillary infrastructure is most pronounced in the case of views towards facilities from a low angle or low elevation, where the viewer is on the same, or lower horizontal plane as the facility. From low viewing angles, taller structures such as cooling towers extend far above the much lower collector arrays, creating a vertical contrast, and being particularly prominent if they extend above the horizon. If metallic (or containing metallic components), these can also be associated with glinting or glare.

A commonly expressed concern is whether glint or glare would negatively affect aircraft flying above the facility. It should be noted that in recent times several large-scale solar projects have been completed and constructed at or near certain major airports in the USA (such as Denver International Airport or the Oakland FedEx International Airport Hub) without any reports of such problems (Power Engineers, 2010). It should be noted however that the solar power facilities at these airports are solar panel facilities that are typically low in reflectivity.

As most solar power plants tend to be located in vacant or uninhabited areas due to space availability, the landscape context is often natural; in this context the solar field could be considered to be a visual intrusion that possibly acts to alter the visual environment, especially if the pre-development visual context is natural. The level of visual exposure to the power plant (and potential visual intrusion of the facility) is dependent on the location of the solar fields in relation to receptor locations.

The proposed PV structures will rotate on an axis and are proposed to be a maximum of 4m in height above the ground (approximate in height to a 1-1.5 storey building). The low profiles of these solar collector arrays of PV facilities entail that these are typically able to be fully or partially screened by desert vegetation in flat landscapes where viewpoints are not elevated (U.S Department of the Interior, 2013). These typically however require very flat terrain and the solar field for these facilities is typically completely cleared and levelled (US Department of Interior, 2013); this relates to the clearing of vegetation as discussed below in section 3.2.2.

3.2.2 Vegetation clearing

One of the important potential indirect impacts of a solar power development relates to the clearing of natural vegetation. Clearing of vegetation could result in the potential loss of vegetative screening, which would result in the opening of views. Importantly in a visual contrast context the clearing of vegetation could result in the exposure of soils which could contrast with the colour of surrounding natural vegetation as well as potentially creating significant changes in form, line, colour, and texture for viewers close to the solar field. Lastly (especially in arid settings in which solar power plants are often developed) vegetation removal could result in windblown dust which could constitute an indirect visual impact (US Department of the Interior, 2013).

The proposed development will require the clearing of vegetation over most of the development footprint. The plant footprints will need to be graded and terraced where necessary, in order to provide a level surface for foundations. This practice of clearing vegetation will intensify the visibility of the solar energy facility, particularly in locations where natural woody vegetation would exist, but to a lesser degree when the proposed facility is located on land where woody vegetation does not occur.

3.2.3 Lighting

Due to the nature of solar power plants which would primarily be operational during sunlit (daylight) hours, lighting (at night) is not a major operational component of such facilities. However solar power generation facilities would include exterior lighting around buildings, parking areas, and other work areas, as well as security and other lighting around and on support structures (e.g., the control building) (US department of the Interior, 2013). In the context of a natural setting in which there would be little to no lighting, visible lighting at solar power generation facilities could constitute light pollution, especially in settings where land-uses and activities (e.g. ecotourism establishments) which value the absence of lighting in a natural setting. Maintenance activities conducted at night, such as mirror or panel washing might require vehicle-mounted lights, which could also contribute to light pollution (US department of the Interior, 2013). Light pollution impacts associated with utility-scale solar facilities include sky glow, light trespass, and glare (US department of the Interior, 2013).

3.3 Analysis of degree of visual intrusion caused by the proposed PV Facility at receptor locations in the study area

As distance is a significant factor in the experiencing of visual impacts (refer to section 3.1 above), the site context is important in how impacts associated with the proposed development on the development site are likely to be experienced. As detailed in the original PV visual impact reports for the proposed development, the vast majority of receptor locations are located greater than 10km distant from the facility and are predominantly located along the Orange River (within the Orange River corridor). Accordingly, a potentially significant distance between the solar facility components and the majority of the receptor locations is present. In this addendum report distance banding from the proposed facility footprint has been used to determine the zone of likely visual exposure to the facilities into which the respective receptor locations would fall. Increasing distance from the proposed facility footprint has been used to give an indication of the likely visibility or potential degree of visual exposure to the solar plant developments from different parts of the study area. The following zones (distance bandings) have been utilised:

- <2km – zone of high potential visual exposure
- 2km-5km – zone of moderate potential visual exposure
- 5km-10km – zone of low potential visual exposure
- >10km – zone of marginal / negligible visual exposure

It is very important to note that all but one of the (sensitive) receptor locations located within a distance of 10km of the proposed development fall into the zone of **low potential visual exposure**. The Bokpoort Farmstead is the only receptor location that is situated within the zone of moderate to high visual exposure. This receptor location is located within the viewshed of the development (Figures 4&5); it is located on an isolated hillside (Figure 6) with an aspect that faces in a northwards arc towards the development site. The raised position of the farmstead in relation to the surrounding plains entails that it is exposed to a clear view of much of the terrain (refer to Figure 6).

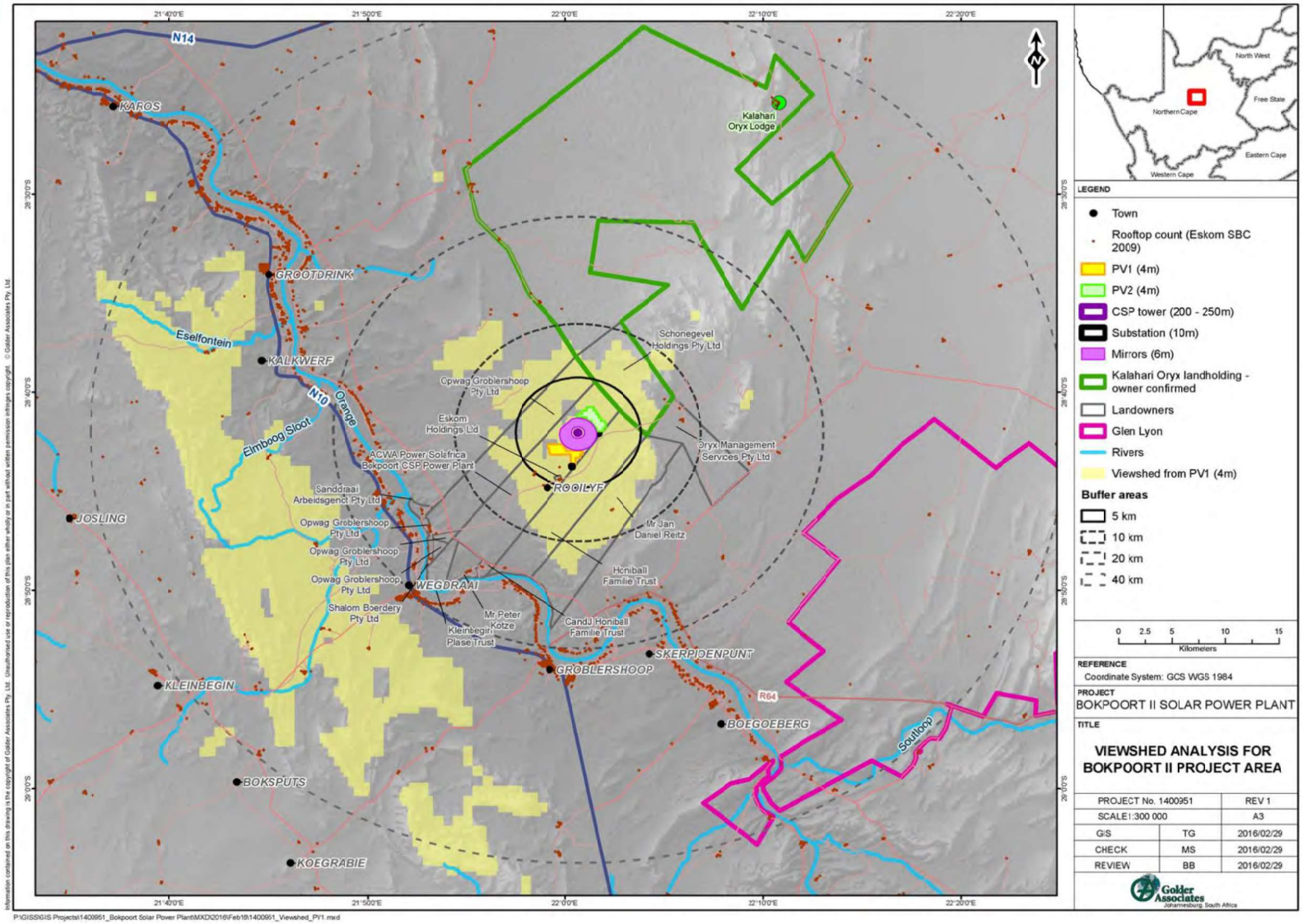

Figure 4 - Viewshed Analysis undertaken as part of the original Visual Impact Assessment for the original PV1 component – representative of the southern part of the development site

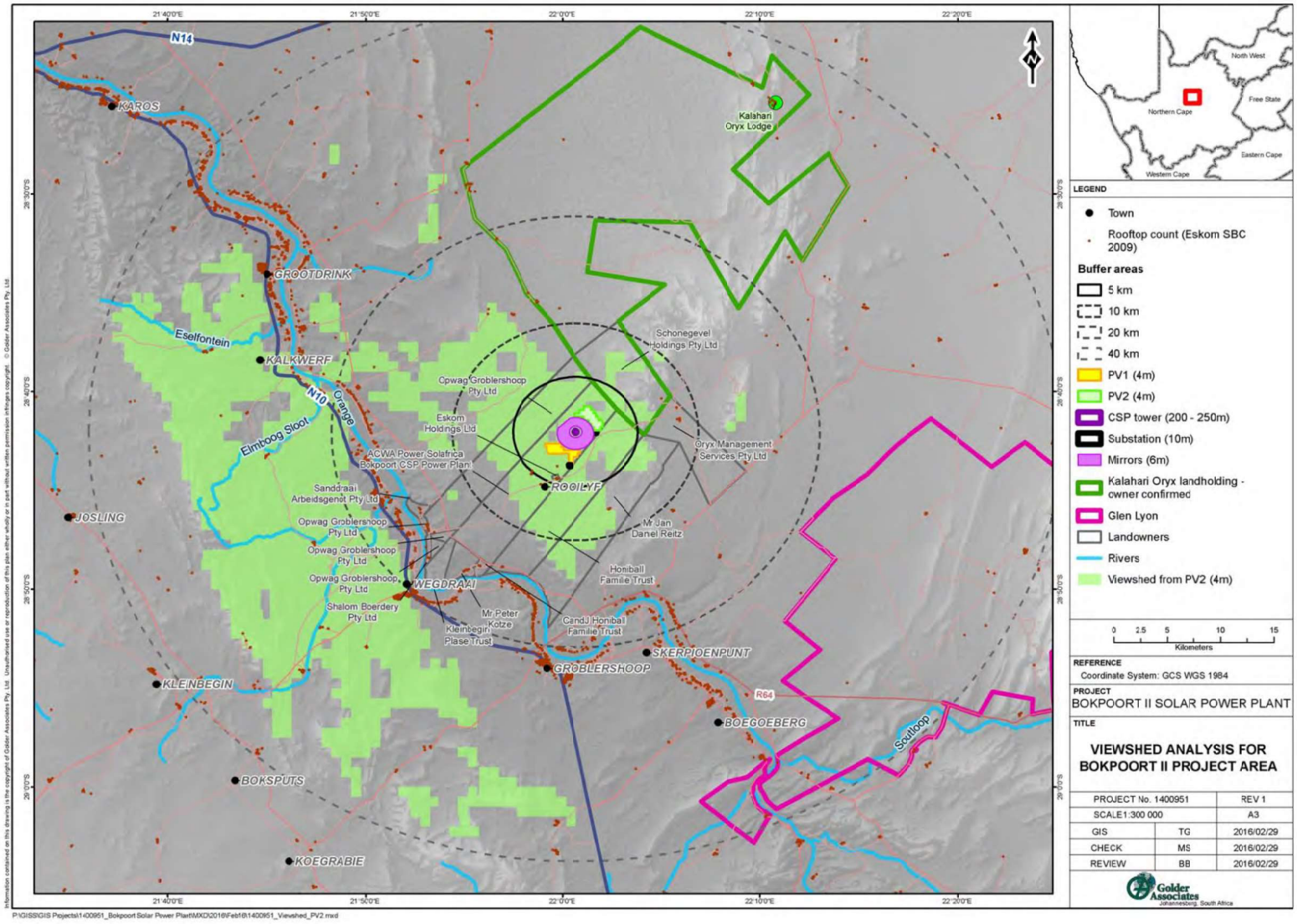

Figure 5 – Viewshed Analysis undertaken as part of the original Visual Impact Assessment for the original PV2 component – representative of the northern part of the development site

The receptor location will thus be subject to a high degree of visual exposure and thus a high level of visual intrusion. The visual intrusion factor associated with the new development would however be ameliorated by a number of factors; firstly, the new development would be viewed in the context of existing views of the Bokpoort 1 CSP Plant. As the 10 proposed PV plants would be located directly adjacent to the existing solar power plant, these would be viewed as an extension of the existing solar plant in the context of a view of the landscape that has already been transformed from a completely natural context. In addition, the vegetation (large mature trees) located around the farmstead would be effective in screening the receptor from views to the surrounding areas.

Figure 6 – The Bokpoort Farmstead viewed from the Sanddraai Property to the west. Note the elevated position of the farmstead in relation to the surrounding terrain.

Of the six other sensitive receptor locations located within a distance of 10km of the development site, ***none*** are located within the viewshed of either the northern or southern part of the development (Figures 4&5), thus meaning that **none of these 6 receptor locations will be exposed to any views of the proposed development**. Parts of the 5-10km radial area around the proposed development are located within the viewsheds of the development, in particular the viewshed of the northern part of the development which covers a greater area as the northern part of the development is located on higher-lying ground than the southern part of the development footprint. However significant parts of the radial area fall outside of the viewshed of the proposed development (Figures 4&5). This is largely due to the presence of hilly / mountainous terrain located within the north-eastern and eastern parts of the 10km radial area. This higher-lying terrain screens much of the 10km radial area in which the receptors are located, blocking views towards the site footprint.

Beyond the 10km radial area the visual exposure factor associated with the proposed plant would be minimal and twinned with the absence of visibility of the plant in large areas where receptor locations are clustered, in particular along the Orange River corridor would result in a negligible visual impact. Most of the Orange River corridor lies outside of the viewshed of the development, and accordingly will not be visually affected by the proposed development.

When non-static receptor locations are considered, the visual intrusion factor of the development will be very low to negligible. The only public access located in the 10km radial area is a short section of the Gariep District Road. This, and the other stretches of the road are located outside of the viewsheds of the development (Figures 4&5), and thus will be exposed to no visual exposure to the proposed development.

Figure 7 View in the direction of the development site from the raised portion of the Gariep District Road that crosses the Transnet Railway; neither the Bokpoort 1 Solar Plant or the proposed development are o/ would be visible.

Overall, the degree of visual intrusion associated with the proposed development components is likely to be low at worst, with the distance between most of the receptor locations and the development site being the greatest contributing factor, twinned with the non-visibility of the development in large parts of the study area. The proposed development is thus very unlikely to result in the creation of a visual impact, or perceptions of visual impact by people inhabiting the sensitive receptor locations in the 10km radial area or moving transiently within the area. Twinned with the presence of the Bokpoort 1 CSP Plant and the Eskom Garona Substation the proposed solar development will add to the presence of large-scale power generation infrastructure in the study area, but which due to its remote location and the low density of human settlement

will not generate any degree of visual exposure beyond that which is very low, thus being unlikely to generate any visual impacts.

3.3.1 Glint and Glare analysis

As described in section 3,3,1 above, glint and glare can become problematic aspects of a solar power plant. As described above the proposed development will not be visible to the vast majority of sensitive receptor locations in the study area and thus will not create any glint or glare impacts at these locations. Where it is visible, the proposed development would be located at a significant distance from much of the study area from which it potentially could be viewed. In addition, PV arrays are not typically associated with glint or glare as the PV surfaces are non-reflective, and only the metal supports could potentially cause glare, thus greatly reducing the potential for glint or glare-related impacts. Thus, glint and glare associated with the proposed development is unlikely to be a visual impact-related issue.

3.3.2 Assessment of lighting impacts associated with the Proposed Development

In order to assess the impact of lighting at the proposed solar power station facility, it is necessary to explore the nature of the night-time environment in the study area.

Most parts of the study area are highly rural in nature with a very low density of human settlement. Accordingly, the night-time environment within the wider area is thus characterised by few sources of artificial lighting. Where these occur, these are highly localised. The location of the viewer is important as viewers located in low-lying terrain settings (such as in the Orange River valley) would not be able to view the lights in the surrounding area. However viewers in higher lying settings, such as certain of the receptor locations on higher-lying ground closer to the N10 national road west of the Orange River valley would be able to view a greater area, and thus see the light sources in this wider area (including the ground to the east of the river).

The primary sources of lighting are floodlights that illuminate on a permanent (nightly) basis in a number of the small settlements located along the N10 including Wegdraai, Saalskop and Grootdrink to the north as well as in certain parts of Groblershoop and the settlement of Boegoeberg to the south. A number of these very tall floodlights provide general illumination for these respective settlements in the absence of (lower) street lighting. The height of these lights makes them highly visible in an otherwise dark night-time context. When viewed from a high point the effect is of 'islands of light' in an otherwise very dark, unlit night-time context.

The Bokpoort 1 CSP Plant has introduced a further set of lights into this dark environment and is the only really visible source of light on the eastern side of the Orange River (when viewed from afar). The Bokpoort 1 CSP Plant is located relatively far from the Orange River and cannot be discerned from the higher points on the western side of the Orange River during the day. However, a set of lights at the power plant is visible from higher-lying terrain to the west of the river. A collection of lights is visible at the plant's location. These lights are likely to be tall, floodlight-type lights in order to be viewed from the higher lying areas to the west of the river. This set of lights adds to the few sources of lighting visible in the wider area.

It should be noted that it is not known what type of lighting is planned at the proposed facility. However if similar type of lighting was developed at the proposed facility, the relative proximity of the proposed facility

to the Bokpoort 1 CSP Plant when viewed from the area to the west would effectively add to the cluster of lighting that is already visible in this part of the study area. The number of lights as visible could more than double. The degree of visibility of lighting would depend on the height of the lights, the degree of illumination (strength) and their orientation. It is important to note that lighting at the proposed plant may not become a permanent feature of the light time environment if it is not operated on a permanent (nightly) basis, and only used in case of emergency maintenance requirements.

3.3.3 Dust Plume-related Visual Impacts

The generation of dust plumes could constitute a visual impact, although it would only be a transient impact that is dependent on atmospheric factors such as wind. Dust plumes associated with the proposed development that could become problematic in a visual context could be generated in two ways:

- By the clearing of vegetation on the development site during construction, leaving the underlying soils exposed, and through the subsequent movement of construction vehicles or through bulk earth moving activities.
- By construction traffic along the access roads to the development site, which would likely be the Gariep District Road and the Transnet Access road, both of which are not tarred and from which dust would be generated.

The study area is located in an arid environment, and thus the generation of dust is not necessarily incongruent in this setting. Dry, hot conditions can create dust plumes or whirlwinds. However, if it were to occur excessively, dust plume creation could be perceived as a visual impact. The risk of excessive dust creation relates to the potential vegetation clearing across the entire development footprint, rather than the phased clearing of vegetation. It is accepted that vegetation across most of the development footprint will need to be cleared but should the entire development footprint be cleared of vegetation at the start of the construction period, this will leave the underlying soils exposed over a very large area for a relatively long period of time. In particular in the northern parts of the site where sandier soils as opposed to gravelly substrate is encountered, the risk of mobilisation of this substrate by wind would be high.

The visual impacts associated with such increased dust plume creation would be ameliorated by the same factors that will ameliorate the degree of visual impact associated with the proposed PV plant infrastructure – i.e. the remote location of the site twinned with the topographical characteristics of the area that entail that the development site would not be visible from large parts of its surrounds and the distance of sensitive receptors from the site. In this regard dust plumes generated on the development site are unlikely to be perceived as a source of visual impact, nonetheless mitigation needs to be applied to prevent this impact from occurring.

The Gariep District Road is an unsurfaced (untarred) road and accordingly dust is typically generated by vehicles travelling along it. The road surface is comprised of material that originates from calcrete and thus fine white dust is mobilised by vehicles moving along the road. Dust generation on the road, however, has in the past proved to be a contentious issue in the context of the construction of the Bokpoort Solar Power Plant and the large number of construction vehicles that travelled along the road and which generated large volumes of dust. The objections from local farmers and landowners were centred on the adverse impacts of the depositing of large volumes of fine dust on the vegetation surrounding the road that allegedly greatly reduced the palatability of the vegetation and the overall grazing capacity of the veld. The transport of components of the proposed PV plant developments by road would result in a highly significant daily increase in the volume of heavy vehicle traffic along the road, which would last for much of the duration of the construction period. In this context the generation of dust plumes by a large increased volume of heavy

vehicle traffic may be perceived as a negative visual intrusion in conjunction with negative perceptions regarding dust-related grazing impacts, as well as road safety concerns.

A different set of receptors to those potentially affected by the development footprint would potentially be exposed to the dust plumes generated by construction traffic along the Gariep District Road. If construction traffic approached the development site from the south-east – i.e. from the N8 National Road – a number of farmsteads, including three farmsteads located close to the road, and a greater number along the opposite side of the Orange River – would be exposed to the regular dust plumes generated by construction vehicles. Though not necessarily significant as an impact on its own, the visual intrusion of the dust plumes could be perceived to have significant nuisance value in combination with negative perceptions of adverse effects on vegetation and concerns relating to road safety. It is important that mitigation be implemented to reduce the impact and extent of dust generated by the large numbers of construction vehicles that will need to use this road to access the site.

Dust plumes generated along the Transnet Rail access road could have a similar visual effect, but apart from a short stretch of the road located close to the Gariep District Road. This road is remote from any areas of public access and dust plume-related impacts will be mitigated by the distance factor in a similar manner to dust plumes generated on the development site.

3.4 Mitigation Measures

Due to the remote location of the proposed development and the low degree of visual intrusion anticipated with the plant, detailed design-related mitigation measures are not required. However, for a number of other aspects of the proposed development, in particular for dust creation, lighting and construction access which could potentially be associated with potential visual impacts, mitigation measures are specified, as detailed below.

3.4.1 Vegetation Clearing

- It is strongly recommended that clearing of vegetation only be undertaken in a phased manner, so as to prevent the large-scale exposure of soils and substrate that could result in atmospheric conditions (wind) creating large dust plumes on the site.
- Regular dust abatement measures must be applied on the construction site, as detailed in the development's EMPr.
- If high wind conditions are forecast for the area, bulk earthworks, in particular in the sandy, northern parts of the site characterised by parallel-running dunes should ideally not be undertaken in order to reduce the mobilisation of large volumes of dust.

3.4.2 Lighting-related mitigation measures

Lighting at the plant could potentially exert a visual impact, especially if floodlight-type lighting was to be developed at the plant. Accordingly, the following mitigation measures should be implemented with regards to lighting:

- Lighting of the plant at night should be limited to security lighting (where this is necessary). It is acknowledged that emergency operational lighting may be required, but this should not be permanently lit, only being lit when such emergency operational lighting is required.

- The height of any lights should be limited; more lights of lower height should be installed rather than fewer floodlights that would be visible from a wider area.
- All lighting should be downward, and inward facing (towards the plant), to avoid light spill into surrounding areas.

3.4.3 Mitigation measures for dust creation on access roads

- Speed limits for construction vehicles, in particular heavy trucks, must be set, and must be rigorously enforced. It is recommended that speed limits of <50km/hr be set, especially in the vicinity of (i.e. within 500m) of households / farmsteads located close to the Gariep District Road. Lower speeds will limit dust plume creation.
- Speed limits and dust abatement measures must be applied along both the Gariep District Road and along the Transnet Rail access road.
- Dust abatement measures must be applied along all non-tarred access routes (e.g. dust suppression with water). These must be focussed on stretches of the access routes located within 500m of households and farmsteads located close to the access road.
- Consideration must be given to timing the movement of construction traffic to and from the site during cooler periods of the day during which dust suppression with water would be more effective due to lower temperatures and lower evaporation rates.

3.4.4 Other visual mitigation measures

- Within linear servitudes and on the development site, all cleared areas during the construction phase that will not form part of the plant footprint, including power line and pipeline servitudes should be rehabilitated and replanted with grass or low shrubs with non-invasive root systems, in order to avoid the creation of areas devoid of vegetation that may be visible from receptor locations.
- Where applicable and depending on Eskom's requirements, it is recommended that the monopole power line tower be used (as opposed to the steel lattice tower) in order to reduce the visibility of power line towers. Wooden power line tower poles are also preferable to steel lattice tower types.

3.5 Impact Rating Matrix

3.5.1 Visual Impacts associated with the proposed development components (proposed PV Plant)

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
Construction	• The construction site would not be visible to the vast majority of the receptor locations in the study area, and thus would not cause any visual impact for the majority of the study area	**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Medium Short (-2) **Probability:** **Possible** (0.5) **Significance: Low (-2.5)**	• It is strongly recommended that clearing of vegetation only be undertaken in a phased manner, so as to prevent the large-scale exposure of soils and substrate that could result in a large visual contrast compared to the surrounding vegetation.	**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Short term (-1) **Probability:** **Possible** (0.5) **Significance: Low (-2)**
Operations	• The PV arrays would not be visible to the vast majority of the receptor locations in the study area, and thus would not cause any visual impact for the majority of the study area.	**Intensity:** Moderately Low (-2) **Extent:** Local (-2) **Duration:** Long term (-4) **Probability:** **Possible** (0.5) **Significance: Low (-4)**	• Within linear servitudes and on the development site, all cleared areas during the construction phase that will not form part of the plant footprint, including power line and pipeline servitudes should be rehabilitated and replanted with grass or low shrubs with non-invasive root systems, in order to avoid the creation of areas devoid of vegetation that may be visible from receptor locations.	**Intensity:** Moderately Low (-2) **Extent:** Local (-2) **Duration:** Long term (-4) **Probability:** **Possible** (0.5) **Significance: Low (-4)**
Decom-missioning		**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Medium Short (-2) **Probability:** **Possible** (0.5) **Significance: Low (-2.5)**		**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Medium Short (-2) **Probability:** **Possible** (0.5) **Significance: Low (-2.5)**
Cumulative	• The proposed development will be located immediately adjacent to the Bokpoort Solar Power Facility, so when	**N/A**	N/A	**N/A**

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
	viewed from the surrounds it will form part of a visual environment that is already transformed from a natural context. The proposed development will add to the transformation of the landscape in the local area, thus increasing the cumulative visual effect on the landscape. However the remoteness of the location lowers the overall cumulative visual impact in a wider study area context.			

3.5.2 Lighting-related Impacts

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
Construction	• No lighting impacts are anticipated in the construction phase as all construction is expected to occur during daylight hours.	N/A	N/A	N/A
Operations	• Lighting at the Solar Power Plant could create a visual impact on the night-time environment by introducing new sources of lighting to a relatively unlit night-time environment. This impact would be more pronounced if lighting sources were permanently lit at night and if floodlight-type lighting was used.	**Intensity:** Moderately Low (-2) **Extent:** Local (-2) **Duration:** Long term (-4) **Probability:** **Possible** (0.5) **Significance: Low (-4)**	• Lighting of the plant at night should be limited to security lighting (where this is necessary), and emergency operational lighting must only be lit when required. • The height of any lights should be limited; more lights of lower height should be installed rather than fewer floodlights that would be visible from a wider area. • All lighting should be downward, and inward facing (towards the plant), to avoid light spill into surrounding areas.	**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Long term (-4) **Probability:** **Possible** (0.5) **Significance: Low (-3.5)**
Decom-missioning		N/A	N/A	N/A

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
Cumulative	• The proposed development will be located immediately adjacent to the Bokpoort Solar Power Facility and lighting at the new plant would increase the number of lighting sources able to be viewed from this area. Permanent lighting at the new plant would thus increase the number of light sources, albeit in a cluster rather than adding diffuse lighting sources to the landscape, further altering the overall dark night time environment to a more lit one.	**N/A**	As above for operation	N/A

3.5.3 Generation of Dust Plumes from Construction at the plant footprint

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
Construction	• The construction site would not be visible to the vast majority of the receptor locations in the study area, and thus dust plumes generated at the construction site would be unlikely to cause any visual impact for the majority of the study area	**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Medium Short (-2) **Probability:** **Possible** (0.5) **Significance: Low (-2.5)**	• It is strongly recommended that clearing of vegetation only be undertaken in a phased manner, so as to prevent the large-scale exposure of soils and substrate that could result in large-scale mobilisation of unconsolidated substrate by wind. • Dust suppression measures must be implemented on the construction site. • Bulk earthworks must not occur on (forecast) very windy days.	**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Short term (-1) **Probability:** **Possible** (0.5) **Significance: Low (-2)**
Operations	N/A			
Decom-missioning	As above, for Construction	**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Medium Short (-2)	As above for construction	**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Medium Short (-2)

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
		Probability: **Possible** (0.5) **Significance: Low (-2.5)**		**Probability:** **Possible** (0.5) **Significance: Low (-2.5)**
Cumulative	• Generation of dust plumes is not incongruous to this hot arid environment, but the area surrounding the development site is not characterised by the large-scale generation of large dust plumes on a regular basis. Such an impact would not further an existing impact.	**N/A**	N/A	**N/A**

3.5.4 Generation of Dust Plumes from Construction Traffic on the access roads

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
Construction	• Large numbers of heavy construction vehicles will need to access the site along public access routes to transport infrastructure components to the site. Such a large number of vehicles will greatly increase the volumes of traffic compared to the ambient traffic volumes on the Gariep District Road. Each vehicle could create a dust plume that could constitute visual intrusion or nuisance factor that could be negatively perceived by adjacent landowners in addition to concerns regarding vegetation impacts and road safety.	**Intensity:** Moderately Low (-2) **Extent:** Local (-2) **Duration:** Medium Short (-2) **Probability: Highly Probably** (0.75) **Significance: Low (-4.5)**	• Dust suppression measures must be implemented, especially on road stretches located within 500m of households / farmsteads located close to the access route. • Speed limits must be kept as low as possible and strictly enforced.	**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Medium Short (-1) **Probability:** **Possible** (0.5) **Significance: Low (-2)**
Operations	N/A		•	

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
Decom-missioning	As above, for Construction	**Intensity:** Moderately Low (-2) **Extent:** Local (-2) **Duration:** Medium Short (-2) **Probability: Highly Probably** (0.75) **Significance: Low (-4.5)**	As above for construction	**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Medium Short (-2) **Probability: Possible** (0.5) **Significance: Low (-2.5)**
Cumulative	• Generation of dust plumes by vehicles travelling along the Gariep District Road is typical of the study area visual environment due to the unsurfaced nature of the road. However there is currently a very low volume of traffic along this road and vehicle-generated dust plumes are accordingly highly intermittent. The increase in dust plume generation would thus not constitute a cumulative impact.	**N/A**	N/A	**N/A**

4 Conclusion

The proposed development is likely to be associated with a low to minimal degree of visual impact due mainly to the distance factor, twinned with the non-visibility of the development in large parts of the study area. The proposed development is thus very unlikely to result in the creation of a visual impact, or perceptions of visual impact by people inhabiting the sensitive receptor locations in the 10km radial area or moving transiently within the area.

Accordingly from a visual impact assessment perspective the proposed development (activity) is acceptable and should be authorised as the development will not adversely affect the visual receiving environment in a significant manner;

The following mitigation measures must be included as conditions of the environmental authorisation for the development:

- Clearing of vegetation on the construction site must be undertaken in a phased manner, so as to prevent the large-scale exposure of soils and substrate that could result in atmospheric conditions (wind) creating large dust plumes on the site.
- Regular dust abatement measures must be applied on the construction site, as detailed in the development's EMPr.
- Lighting of the plant at night must be limited to security lighting (where this is necessary). It is acknowledged that emergency operational lighting may be required, but this must not be permanently lit, only being lit when such emergency operational lighting is required.
- The height of any lights should be limited; more lights of lower height should be installed rather than fewer floodlights that would be visible from a wider area.
- All lighting must be downward, and inward facing (towards the plant), to avoid light spill into surrounding areas.
- Speed limits for construction vehicles, in particular heavy trucks travelling along the site access roads (including the Gariep District Road and the Transnet Railway Road), must be set, and must be rigorously enforced. It is recommended that speed limits of <50km/hr be set, especially in the vicinity of (i.e. within 500m) of households / farmsteads located close to the Gariep District Road.

No monitoring requirements for inclusion in the EMPr or environmental authorisation are proposed.

5 References

- Powergen Engineers, 2010, Panoche Valley Solar Farm Project - Glint and Glare Study; Report prepared for Solargen Energy
- Sullivan, R.G., Kirchler, L.B., McCoy, C., McCarty, J., Beckman, K., and Richmond, P, 2012, Visual Impacts of Utility-scale Solar Energy Facilities on Southwestern Desert Landscapes. National Association of Environmental Professionals 37th Annual Conference, Portland OR, May 21–24, 2012.
- United States Department of the Interior. 2013. Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands. Bureau of Land Management. Cheyenne, Wyoming. 342 pp, April.

Appendix 1

Curriculum Vitae of Author

Royal HaskoningDHV
Enhancing Society Together

Curriculum Vitae

Paul da Cruz

Associate

Advisory Group: Road and Rail; Environmental Services Knowledge Group

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Paul offers a varied set of skills and a wide set of experience in different disciplines. He performs the role of an environmental specialist in the disciplines of freshwater (wetland) assessment, visual impact assessment and avifaunal assessment, as well as EIA project management. As the GIS specialist for the Environmental Team he undertakes GIS-based spatial analysis and has developed a GIS-based screening tool for EIA Regulation Listing Notice 3 Activities. Paul also undertakes ECO environmental auditing.

Paul's extensive wetland assessment experience was gained during work undertaken for the Mondi wetlands project and ensuing work in the consulting field in South Africa over 15 years.

He worked in the UK for three years in regulatory and water resources assessment roles for both the Environment Agency in England and SEPA. During this period he gained excellent experience and skills relating to catchment management planning, hydro-ecological risk assessment, water resource regulations and water resources strategies.

Nationality
South African / Portuguese

Years of Experience
18 years

Years with Royal HaskoningDHV
8 years

Qualifications
1998 BA (Hons) Geography and Environmental Studies, University of Witwatersrand, Johannesburg, South Africa

Memberships
Wetland Society of South Africa

Professional experience at RHDHV (selected key projects)

Basic Assessment for the proposed Planning & Design for the Maintenance and/or Upgrade of the Patrol Roads and Fencing on the Borders between RSA, Swaziland & Mozambique – Phases 1& 2

> Start Date: 2017

> Client: National Department of Public Works

Position: BA Project Manager for Phase 1 and Freshwater (Wetland) Specialist for the Phase 1&2 Projects

- Assigned Tasks: Undertook the wetland component of the Freshwater Study for the project (Phases 1&2).
- Managed the Basic Assessment Process for the Phase 1 component (KZN-Mozambique border)
- Provided GIS analysis and mapping support for the Phases 1&2 BA and WULA Processes
- Undertook the Application for Amendment of the Phase 1 Environmental Authorisation (2020)

ESIA for the proposed NEO1 20MW Photovoltaic Power (PV) Generation Development Project in Mafeteng, Lesotho

> Start Date: 2018

> Client: One Power Consortium

Position: Freshwater (Wetland) Specialist

- Assigned Tasks: Undertaking the Freshwater Study for the ESIA
- Compilation of a Post-authorisation wetland rehabilitation plan and monitoring protocol
- Undertaking the Visual Impact Assessment for the ESIA.

EIA for the P166 Bypass Road in Mbombela

> Start Date: 2012

> Client: Endecon Ubuntu (SANRAL)

Position: EIA Project Manager and Specialist

- Assigned Tasks: Managed the EIA, including tasks such as overseeing the public participation process and compiling the EIA Report.
- As a specialist undertook the Visual and Surface Water Specialist Studies

EIA for the Underground Coal Gasification (UCG) Project at the Majuba Power Station, Mpumalanga

> Start Date: 2008

> Client: Eskom Holdings SOC Ltd

Position: Specialist

- Assigned Tasks: Undertook the detailed wetland impact and functional assessments.
- Updating of the visual impact assessment.

Environmental Impact Assessment (EIA) and Waste Management Licence for the Matimba Power Station Ash Disposal Facility, South Africa

> Start Date: 2012

> Client: Eskom Holdings SOC Ltd

Position: Specialist

- Assigned Tasks: Undertook the Visual Specialist Study in support of the EIA
- Undertook the Surface Water Specialist Study for the Water Use Licence.

Basic Assessment for the Proposed Ten New PV Solar Developments at the Bokpoort Farm near Groblershoop, Northern Cape

> Start Date: 2019

> Client: ACWA Power

Position: Specialist

- Undertook the surface water specialist study

EIA for the proposed 100MW Concentrated Solar Power Plant in Groblershoop, South Africa

> Start Date: 2014

> Client: Lereko Metier Capital Growth Fund Manager (Pty) Ltd

Position: Specialist

- Assigned Tasks: Undertook the visual impact assessment study
- Undertook the surface water specialist study

Royal HaskoningDHV

Proposed Forest Park Apartments Residential Development in La Lucia, eThekwini Municipality

> Start Date: 2019
> Client: Penguin Property Investments
Position: Specialist
- Assigned Tasks: Undertook the Freshwater Study (Wetland and Riparian Delineation)

Construction of the LongLake Logistics Park Development, Modderfontein, Johannesburg

> Start Date: 2019
> Client: Fortress Investments
Position: Environmental Control Officer (ECO)
- Assigned Tasks: Undertaking the ECO (environmental auditing) of the construction site for a period of 12 months.

Geometric Improvements to 11 Intersections in the City of Johannesburg

> Start Date: 2019
> Client: Johannesburg Roads Agency (JRA)
Position: Environmental Control Officer (ECO)
- Assigned Tasks: Compiled EMPrs for the Northern and Southern Contract Sites
- Undertook the ECO (environmental auditing) of the intersection upgrade sites.

Development of Precinct Plans for the Port Elizabeth and East London Airports

> Start Date: 2019
> Client: Airports Company South Africa (ACSA)
Position: Specialist
- Assigned Tasks: Undertaking the Surface Water and Terrestrial Ecology Component of the Precinct Planning

Development of Precinct Plans for the Ekurhuleni Metropolitan Municipality

> Start Date: 2017
> Client: Ekurhuleni Metropolitan Municipality
Position: Specialist
- Assigned Tasks: Undertook the Surface Water and Terrestrial Ecology Component of the Precinct Planning

Route Determination for Various K-Route Roads in Gauteng Province

> Start Date: 2017
> Client: Gauteng Department of Roads and Transport
Position: Freshwater Specialist
- Assigned Tasks: Undertaking the Surface Water Component of the Environmental Screening Studies of the various planned routes

Basic Assessment and Water Use Application for decommissioning and replacement of a section of the Firham-Platrand Power Line, Mpumalanga

> Start Date: 2017
> Client: Eskom Holdings SOC Ltd
Position: Specialist
- Assigned Tasks: Undertaking the Freshwater (wetland) study for the BA and WUA processes, including the compilation of a wetland rehab plan and risk assessment

Basic Assessment for the Development of a Battery Storage Site (Substation) near Mount Fletcher, Eastern Cape

> Start Date: 2018
> Client: Eskom Holdings Limited
Position: Freshwater Specialist
- Assigned Tasks: Undertook the Freshwater Study (wetland assessment) for the Project

Basic Assessment and Water Use Application for the new Lydenburg - Merensky 132kV Power Line, South Africa

> Start Date: 2013
> Client: Eskom Holdings SOC Ltd
Position: Specialist
- Assigned Tasks: Undertaking the Surface Water, Avifaunal and Visual Studies for the Basic Assessment

Basic Assessment for the Proposed Waterborne Sewer in Mayflower Village, South Africa

> Start Date: 2014
> Client: Mpumalanga Department of Rural Development
> Position: Specialist
- Assigned Tasks: Undertook the surface water (wetland delineation) specialist study for the Basic Assessment

Royal HaskoningDHV

Basic Environmental Impact Assessment for the Development of Mzinti Feedlot at Nkomazi Local Municipality, South Africa

> Start Date: 2014
> Client: Mpumalanga Department of Rural Development
Position: Specialist
- Assigned Tasks: Undertook the surface water (wetland delineation) specialist study for the Basic Assessment

Basic Assessment for the Eskom 132kV Power Line from Mbumbu Substation to the Proposed Tsakani Substation, Mpumalanga, South Africa

> Start Date: 2014
> Client: Eskom Holdings SOC Ltd
Position: Specialist
- Assigned Tasks: Undertook the visual and surface water specialist studies as part of the Basic Assessment.

Kwameyi-Teekloof Water Supply - Wetland Delineation Study, South Africa

> Start Date: 2014
> Client: Isambulluo Environmental Consultants (Sibgem Management and Consulting Engineering)
Position: Project Manager & Specialist
- Assigned Tasks: Undertook the wetland assessment and delineation study for a proposed bulk water supply project in the Harding area, KZN

Design, Construction & Rehabilitation Work at Rietspruit Dam, Ventersdorp, South Africa

> Start Date: 2014
> Client: Department of Water Affairs and Forestry
Position: Specialist
- Assigned Tasks: Undertook a wetland delineation assessment as part of an environmental screening study

Impendle Bulk Water Supply Investigation, KZN

> Start Date: 2011
> Client: uMgungundlovu District Municipality
> Project Value: R185,000,000.00
Position: Specialist
- Assigned Tasks: Undertook wetland assessments (Wetland Health and Functionality Assessments) in support of the Water Use Licence

75MW CSP project in Bokpoort, South Africa

> Start Date: 2013
> Client: ACWA Power Solafrica Bokpoort CSP Power Plant (Pty) Ltd
Position: Specialist
- Assigned Tasks: Undertook the Surface Water Study for a proposed water pipeline, in support of the BA

Gamma-Kappa 765kV Power Line EIA, South Africa

> Start Date: 2012
> Client: Nzumbulo Heritage Solutions
Position: Surface Water Specialist
- Assigned Tasks: Undertook the Surface Water Study.

Luiperdshoek Basic Assessment (BA) and Water Use Licence Application (WULA) for Eskom, South Africa

> Start Date: 2012
> Client: Eskom Holdings SOC Ltd
Position: Specialist
- Assigned Tasks: Undertook the Avifaunal study in support of the Basic Assessment

Basic Assessment (BA) and Environmental Management Programme Report (EMPR) Amendment for Black Mountain Mine, South Africa

> Start Date: 2012
> Client: Black Mountain Mining (Pty) Ltd
Position: Specialist
- Assigned Tasks: Visual Impact Assessment Specialist Input.

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Basic Assessment (BA) for the proposed 23 km 132KV line from Kliphoek to Panbult, South Africa

> Start Date: 2012

> Client: Eskom Holdings SOC Ltd

Position: Specialist

- Assigned Tasks: Undertook the Wetland and Avifauna Specialist Studies

Ekangala Quarry Mining Application and S24G Rectification

> Start Date: 2012

> Client: City of Tshwane Metropolitan Municipality

Position: Specialist

- Assigned Tasks: Undertook the wetland delineation study and compiled the Wetland Rehabilitation Plan

Wetland Assessment Specialist Study for proposed Letaba NDP projects in Limpopo Province

> Start Date: 2012

> Client: Nzumbulo Heritage Solutions

- Assigned Tasks: Undertook the Surface Water Study.

Mooidraai - Smitskloof 132/22kV Environmental Impact Assessment, South Africa

> Start Date: 2012

> Client: Eskom Holdings SOC Ltd

Position: Specialist

- Assigned Tasks: Undertook the Avifaunal Study

EIA for the proposed Upgrade to the Mkuze Airport

> Start Date: 2016

> Client: Umhlosinga Development Agency (KZN Treasury)

Position: Visual Impact Specialist

- Assigned Tasks: Undertook the Visual Impact Assessment for the Project

Royal HaskoningDHV

With its headquarters in Amersfoort, The Netherlands, Royal HaskoningDHV is an independent, international project management, engineering and consultancy service provider. Ranking globally in the top 10 of independently owned, nonlisted companies and top 40 overall, the Company's 6,000 staff provide services across the world from more than 100 offices in over 35 countries.

Our connections

Innovation is a collaborative process, which is why Royal HaskoningDHV works in association with clients, project partners, universities, government agencies, NGOs and many other organisations to develop and introduce new ways of living and working to enhance society together, now and in the future.

Memberships

Royal HaskoningDHV is a member of the recognised engineering and environmental bodies in those countries where it has a permanent office base.

All Royal HaskoningDHV consultants, architects and engineers are members of their individual branch organisations in their various countries.

Integrity

Royal HaskoningDHV is the first and only engineering consultancy with ETHIC Intelligence anti-corruption certificate since 2010.

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Peer Review - LOGIS

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13 May 2020

Acwa Power
Care of Lusani Madali

Per email: LRathanya@acwapower.com

Dear Lusani

PEER REVIEW OF VISUAL IMPACT ASSESSMENT (VIA) REPORT

Visual Impact Addendum Report for the Development of Eight New PV Plants and Amendments of Two PV Developments on the Farm Bokpoort in the Northern Cape Province

1. BACKGROUND

Lourens du Plessis was appointed by Acwa Power to undertake an independent peer review for a Visual Impact Assessment (VIA) for the *Bokpoort 2 Visual Addendum* (document short title) undertaken by Paul da Cruz from Royal Haskoning DHV (Pty) Ltd.

2. SCOPE OF THE REVIEW

This peer review is an independent assessment of the methodology and approach utilised by Royal Haskoning DHV with regard to the VIA. The review assesses whether the VIA has adopted best practice, comprehensively applied methodologies that reflect best practice and drawn conclusions that are reasonably supported by the adopted methodology.

3. REVIEWER

Lourens provides professional Geographical Information Systems (GIS) services to a wide range of clients that require the processing, analysis and presentation of geospatial data. His overarching function is the application of GIS in environmental management and planning, impact assessments and spatial modelling, but his services often extend to a much broader range of business sectors.

He is an accomplished Visual Impact Assessment (VIA) specialist who has successfully undertaken over a 100 visual impact assessments for a wide variety of developments, ranging from mining, renewable energy facilities, power lines to roads and lodges.

He has a BA degree in Geography and Anthropology and is a Professional Geo-Information Science (GISc) Practitioner registered with the South African Geomatics Council (SAGC).

4. PROJECT DESCRIPTION

Acwa Power proposes to develop eight Photovoltaic (PV) Solar Energy Facilities (SEFs) on the Farm Bokpoort 390 located north of the town Groblershoop in the Northern Cape Province. The proposed facility is located within the Upington Renewable Energy Development Zone (REDZ 7).

Each proposed PV Facility will have total maximum output capacity of 200 MW, and will include the following:

- Inverters that convert direct current (DC) generated by the PV modules into alternating current (AC) to be exported to the electrical grid;
- A transformer that raises the system AC low voltage (LV) to medium voltage (MV). The transformer converts the voltage of the electricity generated by the PV panels to the correct voltage for delivery to Eskom;
- Transformer substation; and
- Instrumentation and Control consisting of hardware and software for remote plant monitoring and operation of the facility.

Associated infrastructure includes:

- Mounting structures for the solar panels will be either rammed steel piles (preferred solution in terms of piles with pre-manufactured concrete footings to support the PV panels;
- Cabling between the structures, to be lain underground where practical;
- A new 132kV overhead powerline which will connect the facility to the National Grid via Eskom's existing Garona Substation. The powerlines vary in length and will be located within a servitude spanning 15.5m meters on both sides. The powerline towers will be 35m high;
- Battery Energy Storage System (BESS) - battery Power at Point of Connection: 150MW, area required: 16ha; the BESS will store approximately 4500m3 of hazardous substance;
- One water pipeline connection from the river (previously authorised) and different metering points at individual PV plants;
- Internal access roads (4 – 6 m wide roads will be constructed but existing roads will be used as far as possible) and fencing (approximately 3 m in height); and
- Shared infrastructure consisting of buildings, including a workshop area for maintenance, storage (i.e. fuel tanks, etc.), laydown area, parking, warehouse, and offices (previously approved).

5. PEER REVIEW OF SPECIALIST REPORT

Having undertaken a desktop review of the VIA compiled by Royal Haskoning DHV, the author is satisfied with the findings of the report and are in agreement that the visual impacts of the proposed development are not unacceptable in nature or fatally-flawed.

The reviewer is of the opinion that the VIA report have generally adopted a methodology that was sound and in line with best practice.

The view sheds generated appear accurate and most mitigation measures recommended are sensible, practical and appropriate to the nature and scale of the proposed development. Additionally direct (primary), indirect (secondary) and cumulative impacts were considered and addressed.

The reviewer is in agreement with the significance of the visual impacts as stated within the VIA report.

The anticipated post mitigation visual impacts are predominantly expected to be of **low** significance. These visual impacts on sensitive visual receptors (if and where present) in closer proximity to the proposed facility are not considered to be fatal flaws for the proposed PV Plants.

Considering all factors, it is recommended that the development of the facility as proposed be supported; subject to the implementation of the recommended mitigation measures and management programme.

Yours sincerely,

Lourens du Plessis (PrGISc)

Lourens du Plessis

Professional GISc Practitioner | Visual Impact Assessment Specialist

Personal Information:

- Date of Birth: 1969-11-13
- Marital Status: Married
- Nationality: South African
- Contact no: 082 922 9019
- Email: lourens@logis.co.za
- Web: logis.co.za

Years of Industry Experience

- 30 years'

Countries of Experience

- South Africa; Lesotho; Swaziland; Mozambique; Botswana; Zimbabwe; Namibia; Angola; Guinea; Ghana; Uganda

Qualifications and Memberships

- BA (University of Pretoria) Geography and Anthropology (Majors), 1993
- Professional Geo-Information Sciences (GISc) Practitioner registered with the South African Geomatics Council (SAGC). Membership no. PGP0147
- Member: Geo-Information Society of South Africa (GISSA)

Key Skills and Competencies

- Arc/Info and ArcGIS
- Arcview
- QGIS
- Postflight Terra 3D
- PlanetGIS
- Vistapro
- Various GIS support applications
- Microsoft (Word/Excel/Access)

Professional Overview

Lourens provides professional **Geographical Information Systems (GIS)** services to a wide range of clients that require the processing, analysis and presentation of geospatial data. His overarching function is the application of GIS in environmental management and planning, impact assessments and spatial modelling, but his services often extend to a much broader range of business sectors. These include the application of GIS in:

- Agriculture
- Bulk service providers and utilities
- The renewable energy sector
- Electricity generation and distribution
- Mining and exploration
- Urban and rural development planning
- Conservation and tourism
- Strategic integrated planning
- Environmental education and social awareness
- Engineering, transport and infrastructure development

He is an accomplished **Visual Impact Assessment (VIA)** specialist who has successfully undertaken over a 100 visual impact assessments for a wide variety of developments, ranging from mining, renewable energy facilities, power lines to roads and lodges.

Lourens has a multi-disciplinary approach to projects and therefore specialises in creating synergy between planning professionals and project specialists (regardless of the type of project) in order to provide uniform, quality spatial data products, solutions and services.

Experience and Expertise

- Data sourcing and acquisition
- Data capture and processing
- Data evaluation, conversion and transfer
- Geodatabase development/implementation/maintenance
- System design and development
- Spatial analysis/modelling (visibility, slope, aspect, etc.)
- Digital terrain modeling
- Terrain evaluation and site screening
- Image processing and analysis
- Impact assessment and impact management
- Environmental management
- GIS-based decision support systems development
- Project management and report writing
- Map production, display, queries and reporting
- Environmental sciences expertise
- Process development
- Visual impact assessment
- GPS fieldwork and aerial surveys
- Drone data processing

Project Experience

General projects *(A brief description of some prominent and relevant projects)*

GIS mapping and database for Black Eagle habitats and flight patterns in the Karoo National Park

Environmental planning and development control schemes for the Drakensberg Babangibone, Cathkin Peak and Garden Castle development nodes

Goukou River (Stilbaai) Environmental Structure Plan

Conservation and open space proposals for the Umhlanga Forest

Grootvlei mine water pumping operation (Blesbokspruit sub-catchment)

GIS services for the Saldanha steel plant

ENPAT Provincial (1:250,000 scale GIS decision support systems) based on an inventory of environmental and socio-economic geographical data

- ENPAT Northern Province (Limpopo Province)
- ENPAT Mpumalanga
- ENPAT North-West

ENPAT Metropolitan (1:50,000 scale GIS decision support systems) containing environmental and socio-economic geographical data that were evaluated for conservation opportunities, development constraints and agricultural constraints

- ENPAT Gauteng
- ENPAT Cape Town
- ENPAT Durban Functional Region (DFR)
- ENPAT Bloemfontein/Botshabello
- ENPAT Port Elizabeth

ENPAT National (1:1,000,000 scale GIS decision support system) and ENPAT publication

Environmental Management Frameworks (EMF). Frameworks of spatially represented information connected to environmental management parameters designed to aid in the pro-active identification of potential conflict between development proposals and critical and/or sensitive environments

- EMF Northern Province (Limpopo Province)
- EMF Mpumalanga
- EMF North-West

Spatial Development Initiatives (SDI). The fast tracking of the EMF concept for priority SDI's

- Lubombo Corridor SDI
- Coega Industrial Development Zone (IDZ)
- Wild Coast SDI
- West Coast Investment Initiative

Sigma colliery: North-West strip operation

Development masterplan for the Tswaing Crater Museum

Conservation plan for the Rietvlei Nature Reserve

GIS services for the planning and management of the Chobe National Park (Botswana)

GIS services for an environmental overview of South Africa

Demarcation/delineation of regions in South Africa

Orange-Vaal (ORVAAL) transfer scheme - Caledon cascades scheme

ENPAT Provincial (1:250,000 scale GIS decision support systems) based on an inventory of environmental and socio-economic geographical data

- ENPAT Eastern Cape
- ENPAT Free State
- ENPAT Kwa-Zulu Natal

Environmental Management Frameworks (EMF). Frameworks of spatially represented information connected to environmental management parameters designed to aid in the pro-active identification of potential conflict between development proposals and critical and/or sensitive environments

- EMF Eastern Cape
- EMF Free State
- EMF Kwa-Zulu Natal

Hennops River EMF (environmental inventory and management proposals in Centurion)

The Important Bird Areas (IBA) of South Africa map and database

Centurion Metropolitan Substructure Environmental Management Framework (EMF)

Alexandra renewal project EMF

Carbon Sinks and Sequestration - Eastern Cape Wild Coast. Information maps for the "Carbon Sinks - A Rehabilitation Option for South Africa's Natural Environment" report

Prince Edward and Marion Islands. Maps for the World Heritage Site (WHS) bid document

Theewaterskloof and Genadendal - Integrated spatial data management system

Gauteng Communication Network Strategy (GAUCONS). Environmental zones for the control of the construction of telecommunication structures

Gauteng Industries Buffer Zones. The mapping of industrial and mining activities, the creation of buffer control zones and the development of a GIS-based decision support system for the Gauteng Province

Limpopo National Park (LNP) Mozambique. Base maps for fieldwork and planning

Schmidtsdrift Environmental Management Program Report (EMPR)

Loch Vaal Environmental Management Framework (EMF)

Rustenburg - Strategic Environmental Assessment (SEA). The creation of environmental control zones, a GIS-based decision support system and information poster

Faerie Glen Nature Reserve Strategic Environmental Assessment (SEA)

Willow Quarries - Environmental Impact Assessment (EIA). Modeling of mining expansion plan and the potential impact on Golden Mole habitats

Ekurhuleni Metropolitan Municipality (EMM) Environmental Management Framework (EMF)

Limpopo - State of the Environment Report (SoER)

Windhoek (Namibia) - Environmental Structure Plan (ESP)

Gauteng Supplementation and Implementation of EIA Regulations Project (EIA SIP)

Siyanda District Municipality Environmental Management Framework (EMF)

Olifants and Letaba River Catchments Environmental Management Framework (EMF)

Barberton Nature Reserve environmental sensitivity mapping and land use zoning plan

Regional Strategic Environmental Assessments (Regional Assessments)

Regional assessment for the Eskom Wind Energy Facility (Sere) in the Western Cape

Regional assessments for the Eskom Wind Integration Project (WIP)
- Area 1: West Coast (Saldanha to Garies)
- Area 2: Overberg Region
- Area 3: Beaufort West region
- Area 4: Eastern Cape (Tsitsikamma to Port Elizabeth)
- Area 5: Northern Cape (Hondeklipbaai to Port Nolloth)

Sandveld Wind Energy Regional Assessment

West Coast National Park (Saldanha area) Regional Assessment

Regional Assessment for the Theewaterskloof Municipal area

Brand-se-Baai (Exxaro) wind energy regional assessment

Overberg (BioTherm) wind energy regional assessments
- Area 1: Gordons Bay to Pearly Beach)
- Area 2: Napier RA (Agulhas NP/Swellendal region)

Suurplaat/Sutherland (Investec Wind Energy Development) Regional Assessment

Waterberg (Limpopo) Concentrating Solar Power (CSP) Regional Assessment (Exxaro)

Western Cape Province Regional SEA for Wind Energy facility developments

ISS Global Mining Regional SEA for Power Station Developments in Mpumalanga Province

Northern Cape Province Regional SEA for Wind Energy facility developments

Etc. *(a comprehensive list of general projects can be provided upon request)*

Visual Impact Assessments (VIA), viewshed analyses and visual assessments

- Coal strip mining in Zimbabwe viewshed analyses
- Viewshed analyses and sensitivity mapping for telecommunication masts in the northern provinces (Limpopo, Mpumalanga and North-West)
- Siemens 3rd license cellular communications infrastructure EIAs. Viewshed analyses and sensitivity mapping for over 4,000 telecommunication mast sites in all major metropolitan areas of South Africa.
- CSIR high mast viewshed analysis and sensitivity mapping
- Atlantis Open Cycle Gas Turbine power station VIA
- Kynoch Gypsum Tailings dam extension VIA
- N1 Western Bypass Shell service station VIA
- Coega regional hazardous waste processing facility VIA
- Robinson Deep landfill extension VIA
- Hazardous waste blending platform VIA
- Mercury-Ferrum-Garona transmission line integration VIA
- Matimba B (Medupi) coal-fired power station VIA
- Concentrating Solar Power (CSP) plant in Upington VIA
- Zeus to Mercury transmission line (comparative viewshed analyses)
- Mmamabula (Botswana) transmission line and power station viewshed analyses
- Petronet new multi-products pipeline VIA
- Wind energy facility (Sere) in the Western Cape province VIA
- Ankerlig power station conversion and transmission line VIA
- Gourikwa power station conversion and transmission line VIA
- Kyalami strengthening project VIA
- Steelpoort integration project VIA
- Medupi reservoir and telecommunication mast VIA
- VIA's for Basic Assessment Reports (wind monitoring masts)
  - Cookhouse, Hopefield, Amakhala, Caledon, Worcester, Tulbach, Overberg, Britannia Bay, Brand-se-Baai, Deep River, Happy Valley, River Bank, Uiekraal, Beaufort West, Laingsburg, Rheboksfontein, Suurplaat and West Coast
- Cookhouse wind energy facility VIA
- Hopefield wind energy facility VIA
- Mokopane Integration Project VIA
- Cradle of Humankind World Heritage Site (WHS) viewshed protection zone, visual character assessment and visual zonation plan
- Indwe wind energy facility VIA
- Amakhala wind energy facility VIA
- Boontjieskraal wind energy facility VIA
- Britannia Bay wind energy facility VIA
- Brand-se-Baai wind energy facility VIA
- Upington and Pofadder solar thermal facilities VIAs

- Dorper wind energy facility VIA
- Flagging Trees wind energy facility VIA
- Rheboksfontein, Suurplaat and West Coast wind energy facilities VIAs
- Riverbank wind energy facility VIA
- Waterberg photovoltaic plant VIA
- Eskom wind intergration projects VIAs
- Welgedacht water care works VIA
- Aberdeen wind energy facility
- Aggeneis-Oranjemund power line intergration
- Project Blue wind energy facility
- Inca De Aar solar energy facility
- Aced De Aar solar energy facility
- Exxaro Lephalale solar energy facility
- Happy Valley wind energy facility
- Hendrina power station ash dam extension
- Hidden Valley wind energy facility
- Kakamas photovoltaic plant
- Karoo renewable energy facility
- Ilanga (Karoskraal) solar thermal power plant
- Keimoes photovoltaic plants (Sonnenberg, Ofir and Geelkop)
- Kimberley photovoltaic solar plant
- Kleinbegin photovoltaic plant
- Kleinzee wind energy facility
- Koingnaas wind energy facility
- Oyster Bay wind energy facility
- Ilanga Lethemba (Paardevlei) PV solar energy facility
- Upington photovoltaic solar facility
- Ramphele (Ritchie) PV solar energy facility
- Ruukie (Mpumalanga) coal fired power station
- Saldanha Steel wind energy facility
- Spitskop wind energy facility
- Tsitsikamma community wind energy facility
- Uyekraal wind energy facility
- Veldrift and Saldanha wind energy facilities
- Vredendal photovoltaic solar energy facility
- Wag'nBiekiespan solar energy facility
- Walker Bay wind energy facility
- Etc. *(a comprehensive list can be provided upon request)*

Professional History

4/2017: Professional GISc and VIA Practitioner (sole proprietor/self employed)

1/2016 – 3/2017: SMEC South Africa, Pretoria – Technical Specialist

11/1999 – 12/2015: MetroGIS (Pty) Ltd, Pretoria – Director

10/1997 – 10/1999: GISBS (GIS Business Solutions - Q Data Consulting) – Project Manager

4/1990 - 9/1997: GisLAB CC (GIS Laboratory - University of Pretoria) – Member / Project Manager

Courses & Conferences attended

1997 ESRI International User Conference – United States of America

Publications & Papers presented

Name: Gateway to Kruger Map and Guide
Authors: Andy Tinker Photography
Publisher: ATP Publishing
Date: 2010

Name: Kruger National Park Map and Photographic Guide
Authors: Andy Tinker Photography
Publisher: ATP Publishing
Date: 2007

Name: Lowveld and Kruger Guide
Authors: High Branching Team
Publisher: Jacana Media (Pty) Ltd
Date: 2004

Name: Heights to Homes to Oceans (H2O) Water Wise information poster
Authors: Rand Water
Publisher: Rand Water
Date: 2004

Name: Garden Route - Still Bay to Storms River (Discover the Magic)
Authors: Jacana
Publisher: Jacana Media (Pty) Ltd
Date: 2003

Name: KwaZulu-Natal - A celebration of biodiversity
Authors: Jacana
Publisher: Jacana Media (Pty) Ltd
Date: 2001

Name: Pilanesberg Official Map and Park Guide
Authors: North-West Parks & Tourism Board and Jacana
Publisher: Jacana Media (Pty) Ltd
Date: 2001

Name: ESRI Map Book (Volume 13)
Authors: Various
Publisher: Environmental Systems Research Institute (ESRI)
Date: 1998

Name: Environmental Potential Atlas for South Africa
Authors: W. van Riet, J. van Rensburg, P. Claassen, L. du Plessis and T. van Viegen
Publisher: J.L. van Schaik
Date: 1997

Awards

Award: Best South African Environmental Technical Paper
Awarded for: Environmental Potential Atlas for South Africa (Publication)
Awarded by: Environmental Planning Professions Interdisciplinary Committee (EPPIC)
Date: 1998

Award: QDC Performance Award
Awarded for: ENPAT Development
Awarded by: Q Data Consulting
Date: 1998

Award: Best Cartographic Map Gallery Competition - 3rd Place
Awarded for: Environmental Potential Atlas for South Africa (Publication)
Awarded by: Environmental Systems Research Institute (ESRI)
Date: 1998 International ESRI User Conference

Award: Map Gallery Most Analytical Competition - 3rd Place
Awarded for: Environmental Potential Atlas for South Africa
Awarded by: Environmental Systems Research Institute (ESRI)
Date: 1997 International ESRI User Conference

Award: Best South African Environmental Technical Paper
Awarded for: National Environmental Potential Atlas (ENPAT National)
Awarded by: Environmental Planning Professions Interdisciplinary Committee (EPPIC)
Date: 1995

Language Skills

Mother Tongue: Afrikaans

Languages	**Speak**	**Read**	**Write**
English	Good	Good	Good
Afrikaans	Good	Good	Good