

DRAFT BASIC ASSESSMENT REPORT (BAR)

14 November 2022

THE PROPOSED ADDITION TO THE DELTA SOLAR POWER PLANT NEAR BLOEMHOF, NORTH WEST PROVINCE





PROJECT DETAIL

DFFE Reference No.	:	To be confirmed
Project Title	:	The proposed addition to the Delta Solar Power Plant near Bloemhof, North West Province
Authors	:	Mrs Marelie Botha
Reviewer	:	Mrs. Carli van Niekerk
Client	:	Delta Solar Power Plant (RF) (Pty) Ltd
Report Status	:	Draft Basic Assessment Report
Report date	:	14 November 2022

When used as a reference this report should be cited as: Environamics (2022) Draft BAR: The proposed addition to the Delta Solar Power Plant near Bloemhof, North West Province.

COPYRIGHT RESERVED

This technical report has been produced for Delta Solar Power Plant (RF) (Pty) Ltd. The intellectual property contained in this report remains vested in Environamics and Delta Solar Power Plant (RF) (Pty) Ltd. No part of the report may be reproduced in any manner without written permission from Environamics or Delta Solar Power Plant (RF) (Pty) Ltd.

**TABLE OF CONTENTS**

1	INTRODUCTION.....	14
1.1	LEGAL MANDATE AND PURPOSE OF THE REPORT	14
1.2	DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP).....	16
1.3	DETAILS OF SPECIALISTS	17
1.4	STATUS OF THE BA PROCESS	19
1.5	STRUCTURE OF THE REPORT.....	19
2	ACTIVITY DESCRIPTION	24
2.1	THE LOCATION OF THE ACTIVITY AND PROPERTY DESCRIPTION	24
2.2	ACTIVITY DESCRIPTION	25
2.3	PHOTOVOLTAIC TECHNOLOGY	28
2.4	LAYOUT DESCRIPTION.....	29
2.5	SERVICES PROVISION	31
2.5.1	Water	31
2.5.2	Storm water	32
2.5.3	Sanitation and waste removal	33
2.5.4	Electricity.....	33
2.6	DECOMMISSIONING OF THE FACILITY	33
3	LEGISLATIVE AND POLICY CONTEXT	19
3.1	INTRODUCTION.....	19
3.2	LEGISLATIVE CONTEXT	21
3.3	POLICY CONTEXT.....	27
3.4	OTHER LEGISLATION	37
3.5	RELEVANT GUIDANCE	37
3.6	CONCLUSION	38
4	THE NEED AND DESIRABILITY	39
4.1	THE NEED FOR THE PROPOSED ACTIVITY	39
4.2	THE DESIRABILITY OF THE PROPOSED ACTIVITY.....	40
5	DESCRIPTION OF ENVIRONMENTAL ISSUES	43
5.1	CONSIDERATION OF ALTERNATIVES.....	43
5.1.1	No-go alternative	44
5.1.2	Location alternatives.....	44
5.1.3	Activity alternatives	45



5.1.4	Technical alternatives	47
5.1.5	Design and layout alternatives	47
5.1.6	Technology alternatives.....	47
5.2	PUBLIC PARTICIPATION PROCESS	49
5.2.1	General.....	50
5.2.2	Consultation process.....	52
5.2.3	Registered I&APs.....	52
5.2.4	Issues raised by I&APs and consultation bodies	52
6	THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PREFERRED ALTERNATIVE	53
6.1	Biophysical environment	53
6.1.1	Geotechnical Conditions	53
6.1.2	Ecological habitat and landscape features	53
6.2	Soil, land capability and agricultural potential	55
6.2.1	Climate and water availability	55
6.2.2	Terrain, topography and drainage	55
6.2.3	Soil.....	56
6.2.4	Agricultural capabilities	56
6.2.5	Land use and development on and surrounding the site	56
6.3	Watercourse Assessment	61
6.3.1	Climate and water availability	62
6.4	Biodiversity	62
6.5	Visual landscape	64
6.5.1	Visibility.....	65
6.5.2	Sensitive viewers and viewpoints	65
6.5.3	Visual exposure.....	67
6.5.4	Visual intrusion	67
6.5.5	Visual resource value	67
6.6	Description of the socio-economic environment	67
6.7	Cultural and heritage aspects	69
6.8	SITE SELECTION MATRIX	70
6.9	CONCLUDING STATEMENT ON ALTERNATIVES	71
7	DESCRIPTION OF THE IMPACTS AND RISKS	72
7.1	SCOPING METHODOLOGY	72



7.2	Checklist analysis	73
7.1.1	Matrix analysis	76
7.3	KEY ISSUES IDENTIFIED	92
7.3.1	Impacts during the construction phase	92
7.3.2	Impacts during the operational phase	118
7.3.3	Impacts during the decommissioning phase	138
7.4	SUMMARY OF RECOMMENDATIONS FROM SPECIALIST STUDIES	143
7.4.1	Issue 1: Geotechnical suitability	143
7.4.2	Issue 2: Heritage and archaeological impacts.....	144
7.4.3	Issue 3: Ecological Impacts.....	144
7.4.4	Issue 4: Wetland / Riparian Impacts	147
7.4.5	Issue 5: Avifaunal Impacts.....	150
7.4.6	Issue 6: Visual Impacts	151
7.4.7	Issue 7: Agricultural / impacts on the soil.....	151
7.4.8	Issue 8: Socio-economic impacts	152
7.4.9	Issue 9: Paleontological Impacts.....	154
7.4.10	Issue 10: Traffic Impacts	155
7.4.11	Risk Assessment for battery storage system	155
7.5	SENSITIVITY ANALYSIS.....	155
7.6	METHOD OF ENVIRONMENTAL ASSESSMENT	158
7.6.1	Impact Rating System	159
8	CUMULATIVE EFFECTS ASSESSMENT	163
8.1	INTRODUCTION.....	163
8.2	GEOGRAPHIC AREA OF EVALUATION	164
8.3	TEMPORAL BOUNDARY OF EVALUATION.....	166
8.4	OTHER PROJECTS IN THE AREA.....	166
8.4.1	Existing projects in the area.....	166
8.4.2	Projects in the foreseeable future	167
8.5	SPECIALIST INFORMATION ON CUMULATIVE EFFECTS	167
8.5.1	Soil, Land Capability and Agricultural Potential.....	167
8.5.2	Terrestrial Biodiversity, Plant and Animal Species Impact Assessment	168
8.5.3	Wetland Impact Assessment	169
8.5.4	Avifaunal Assessment	170



8.5.5 Social Impact Assessment 170

8.5.6 Visual Impact Assessment..... 171

8.5.7 Heritage Impact Assessment 171

8.5.8 Paleontological Impact Assessment 172

8.6 IMPACT ASSESSMENT 172

8.6.1 Potential Cumulative Effects..... 172

8.7 CONCLUSION 180

9 ENVIRONMENTAL IMPACT STATEMENT 182

9.1 SUMMARY OF KEY FINDINGS AND ASSESSMENT RESULTS 182

9.2 SENSITIVITY ANALYSIS SUMMARY AND SITE-SPECIFIC CONDITIONS 185

9.3 TECHNICAL DETAILS OF THE PROPOSED INFRASTRUCTURE TO BE AUTHORISED 185

9.4 RECOMMENDATION OF EAP..... 186

10 REFERENCE..... 189

LIST OF TABLES

Table 1.1: Listed activities..... 14

Table 1.2: Details of specialists..... 18

Table 1.3: Project schedule..... 19

Table 1.4: Structure of the report..... 20

Table 2.1: General site information..... 25

Table 2.2: Listed activities..... 26

Table 2.3: Technical details for the proposed facility..... 29

Table 2.4: Coordinates..... 30

Table 3.1: Legislative context for the construction of photovoltaic solar plants 21

Table 3.2: Policy context for the construction of solar PV plants..... 27

Table 4.1: Published Draft IRP 2018 (Approved by Cabinet for Consultation) 40

Table 6.1: Summary of the Vegetation units present at the Delta Solar Power Plant 57

Table 6.2: SCC mammal and amphibian species that may occur within the footprint 63

Table 7.1: Environmental checklist..... 73

Table 7.2: Reference to the sections in the respective specialist studies where the details of the in-depth assessment of potential environmental impacts can be obtained 78

Table 7.3: Matrix analysis 79



Table 7.4: Impacts and the mitigation measures during the construction phase 93

Table 7.5: Impacts and the mitigation measures during the operational phase..... 119

Table 7.6: Impacts and the mitigation measures during the decommissioning phase 139

Table 8.1: A summary of related facilities, that may have a cumulative impact, in a 3 km radius of the study area 166

LIST OF FIGURES

Figure A: Locality map

Figure B: Regional map

Figure C: Footprint map

Figure D: Renewable Energy Development Zone Map

Figure E: Land capability classification map

Figure F: Vegetation map

Figure G: Cumulative impacts map

Figure H1: Sensitivity and CBA map

Figure H2: Sensitivity and Layout map

Figure H3: Sensitivity, Layout and Sensitivity map

Figure I1: Layout map

Figure I2: Combined layout map

Figure J: South Africa Protected Areas Database (SAPAD) map

Figure 2.1: Map indicating the coordinate points of the proposed addition to the Delta Solar Power Plant 31

Figure 5.1: Location of the preferred alternative for the addition to the Delta Solar Power Plant development footprint 45

Figure 5.2: Global horizontal irradiation values for South Africa (SolarGIS, 2011) and the location of the Delta Solar Power Plant 46

Figure 5.4: Bifacial vs Monofacial Solar Panel absorption 49

Figure 5.1: Critical Biodiversity Map for the Delta Solar Power Plant 59



Figure 5.2: Wetland delineation map and locations of the different hydrogeomorphic (HGM) units identified within the 500 m regulated area of the Delta Solar Power Plant 61

Figure 6.3: Zone of Theoretical Visibility (ZTV) for the SPP, Satellite View. 66

Figure 7.1: Ecological sensitivity map of the development footprint..... 146

Figure 7.2: Wetland /riparian sensitivity map of the development footprint..... 149

Figure 8.1: Geographic area of evaluation with utility-scale renewable energy generation sites... 165

Figure 8.2: Process flow diagram for determining cumulative effects..... 167

PLATES

- Plate 1: The site (taken towards the north)
- Plate 2: The site (taken towards the north-east)
- Plate 3: The site (taken towards the east)
- Plate 4: The site (taken towards the south-east)
- Plate 5: The site (taken towards the south)
- Plate 6: The site (taken towards the south-west)
- Plate 7: The site (taken towards the west)
- Plate 8: The site (taken towards the north-west)
- Plate 9: Indication of the vegetation a geology on site.
- Plate 10: Access will be obtained from the Sterkfontein gravel road (taken in a southern direction).
- Plate 11: Access will be obtained from the Sterkfontein gravel road (taken in a northern direction).
- Plate 12: Access to the Sterkfontein gravel road will be obtained via the N12 (southwest).
- Plate 13: Access to the Sterkfontein gravel road will be obtained via the N12 (northeast).

APPENDICES

- Appendix A: Details of EAP
- Appendix B: Screening Report
- Appendix C: Public Participation



Appendix C1: Press advertisements

Appendix C2: On site notice

Appendix C3: List of I&AP's

Appendix C4: Proof of correspondence

Appendix C5: Written comments received

Appendix C6: Comments and Response Report

Appendix C7: Public Participation Plan

Appendix D: Specialist Reports

Appendix D1: Ecological and wetland Impact Assessments

Appendix D2: Avifaunal Assessment

Appendix D3: Visual Impact Assessment

Appendix D4: Soil study

Appendix D5: Heritage Impact Assessment

Appendix D6: Paleontological Impact Assessment

Appendix D7: Social Impact Assessment

Appendix D8: Stormwater management plan and hydrological Assessment

Appendix D9: Termite Assessment

Appendix E: Assessments

Appendix E: Developer site assessment for Delta SPP

Appendix F: Environmental Management Programme (EMPr)

Appendix F1: EMPr for the Delta Solar Power Plant

Appendix F2: Alien Invasive Plant Species Management and Rehabilitation Plan

Appendix G: Additional Information

Appendix H: Layout plan

GLOSSARY OF TERMS AND ACRONYMS

BA	Basic Assessment
BAR	Basic Assessment Report



BESS	Battery Energy Storage System
CEA	Cumulative Effects Assessment
DFFE	Department of Forestry, Fisheries and the Environment
DM	District Municipality
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EP	Equator Principles
EPFI	Equator Principles Financial Institutions
Environmental impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects.
GNR	Government Notice Regulation
I&AP	Interested and affected party
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
kV	Kilo Volt
Mitigate	Activities designed to compensate for unavoidable environmental damage.
MW	Megawatt
NEMA	National Environmental Management Act No. 107 of 1998
NERSA	National Energy Regulator of South Africa
NWA	National Water Act No. 36 of 1998
PPP	Public Participation Process
PV	Photovoltaic
REDZ	Renewable Energy Development Zone
REIPPP	Renewable Energy IPP Procurement Process
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SPP	Solar Power Plant
VU	Vegetation Unit



CONTEXT FOR THE DEVELOPMENT

According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fuelled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmentally responsible development, the impacts of climate change and the need for sustainable development. The use of renewable energy technologies, as one of a mix of technologies needed to meet future energy consumption requirements is being investigated as part of the national Department of Mineral Resources and Energy's (DMRE) (previously referred to as the Department of Energy) long-term strategic planning and research process.

The primary rationale for expanding the solar photovoltaic (PV) facility is to add more generation capacity from renewable energy to the national electricity mix and to aid in achieving the goal of 42% share of all new installed generating capacity being derived from renewable energy forms, as targeted by DMRE (2019 Integrated Resource Plan Update 2010-2030). The IRP also identifies the preferred generation technologies required to meet the expected demand growth up to 2030 and incorporates government objectives including affordable electricity, reduced greenhouse gas (GHG) emissions, reduced water consumption, diversified electricity generation sources and localisation and regional development. In terms of the Integrated Resource Plan Update (2019 IRP Update, 2010-2030), over the short term (of the next two or three years), clear guidelines arose; namely to continue with the current renewable bid programme with additional annual rounds of 1000MW PV, with approximately 8.4GW of the renewable energy capacity planned to be installed from PV technologies over the next twenty years.

The Delta Solar Power Project has been selected as the preferred bidder and will form part of the DMRE's Renewable Energy Independent Power Producer Procurement (REIPPP) Programme. The REIPPP Programme aims to secure 14 725 Megawatts (MW) of new generation capacity from renewable energy sources, while simultaneously diversifying South Africa's electricity mix. According to the 2021 State of the Nation Address, Government will soon be initiating the procurement of an additional 11 800 MW of power from renewable energy, natural gas, battery storage and coal in line with the Integrated Resource Plan 2019 and fulfilling their commitments under the United Nations Framework Convention on Climate Change and its Paris Agreement which include the reduction of greenhouse gas emissions. Eskom, the largest greenhouse gas emitter of South Africa, has committed in principle to net zero emissions by 2050 and to increase its renewable capacity.

In response to the above, Delta Solar Power Plant (RF) (Pty) Ltd is in the process of developing a photovoltaic solar facility and associated infrastructure for the purpose of commercial electricity generation on an identified site located near Bloemhof in the North West province (refer to Figure 1 for the locality map). An EIA for Delta SPP was conducted in 2014/15 and the project obtained an environmental authorisation on 19 June 2015. Delta SPP was selected as a preferred bidder by the Department of Energy early in 2022. Construction of the Solar plant is said to start early in 2023; however, in order to reach a generation capacity of 100MW the approved area of 171 hectares (the "Original Delta site") will have to be expanded. This application therefore relates to the addition to the Delta PV Solar Facility. From a regional site selection perspective, this region is preferred for solar energy generation due to its global horizontal irradiation value of 1790 kWh/m²/annum.



EXECUTIVE SUMMARY

The Lekwa-Teemane Local Municipality's Integrated Development Plan (IDP, 2012/17) reveals the following primary development objectives based on social and economic development challenges of the province: stimulate economic development; develop and enhance infrastructure for economic growth and social development; reduce poverty through human and social development; ensure a safe and secure environment for all people of the province and promote effective and efficient governance and administration. In order to give effect to these developmental objectives, the Province has identified the following issues that need to be addressed: to achieve an annual economic growth rate at least equal to the national average economic growth rate; reduce unemployment; to reduce the number of households living in poverty; to provide free basic services to all households and to provide adequate infrastructure for economic growth and development. The IDP encourages sustainable development and seeks economic approaches that benefit the local environment and quality of life, rather than undermining it (IDP 2012/17).

In response to the above, an 84 MW PV solar facility namely Delta Solar Power Plant was proposed and consequently approved on the Remaining Extent of the farm Kareefontein 340, Registration Division HO, North West situated within the Lekwa-Teemane Local Municipality area of jurisdiction (the "Original Delta Site"). This application relates to the addition to the approved project. The additional site will comprise an area of 19.9 hectares (including supporting infrastructure on site) to generate approximately 19.9 MW. The site proposed for the addition is located adjacent the eastern boundary of the original Delta SPP site.

The town of Bloemhof is located approximately 9 km east of the proposed development (refer to Figure A and B for the locality and regional map). The total footprint of the project will approximately be 200 hectares (including supporting infrastructure on site). The site was identified as being highly desirable due to its suitable climatic conditions, topography (i.e., in terms of slope), environmental conditions (i.e., agricultural potential, geology and archaeology), proximity to a grid connection point (i.e., for the purpose of electricity evacuation), as well as site access (i.e., to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase).

The Environmental Impact Assessment (EIA) Regulations, 2014 (Regulation 982) determine that an environmental authorisation is required for certain listed activities, which might have detrimental effects on the environment. The following listed activities have been identified with special reference to the proposed development and is listed in the EIA Regulations (as amended):

- Activity 1(i) (GNR. 327): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where (i) the electricity output is more than 10 megawatts but less than 20 megawatts."*
- Activity 11(i) (GNR. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*
- Activity 27 (GNR. 327): *"The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation."*



- Activity 28(ii) (GNR. 327): *“Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.”*
- Activity 24(ii) (GNR. 327): *“The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters”*
- Activity 56(ii) (GNR. 327): *“The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres...”*
- Activity 4(h)(iv) (GN.R. 324): *“The development of a road wider than 4 metres with a reserve less than 13.5 meters (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority and (vi) Areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a biosphere reserve;.”*
- Activity 12(h)(iv)(vi) (GNR. 324): *“The clearance of an area of 300 square metres or more of indigenous vegetation...(h) in the North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority and (vi) areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.”.*

Activities required for the development of the solar facility which are listed under Listing Notice 1 & 3 (GNR 323 & 327) implies that the development could potentially have an impact on the environment that will require mitigation. A Basic Assessment process is required to be followed as described in Regulations 19 and 20 of the EIA Regulations (as amended) for Delta Solar Power Plant (RF) (Pty) Ltd. Environamics has been appointed as the independent Environmental Assessment Practitioner to undertake the Basic Assessment (BA) Delta Solar Power Plant (RF) (Pty) Ltd.

Regulation 19 of the EIA Regulations (2017) requires that a Basic Assessment Report (BAR) must contain the information set out in Appendix 1 of the Regulations or comply with a protocol or minimum information requirements relevant to the application as identified and gazetted by the Minister in a government notice. Appendix 1 of GNR326 requires that the environmental outcomes, impacts and residual risks of the proposed activity be set out in the BAR. It has been determined through the BA process that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources and land. All negative environmental impacts can be effectively mitigated through the recommended mitigation measures and no residual negative impacts are foreseen. The potentially most significant environmental impacts associated with the development are briefly summarized below:

Impacts during the construction phase:

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of months. The potentially most significant impacts relate to the generation of waste, impacts on paleontological resources, visual intrusions, and socio-economic impacts such as the impact of construction workers on local communities, increased risk of veld fires, and the provision of temporary employment.

Impacts during the operational phase:



During the operational phase the study area will serve as a solar PV energy facility and the potential impacts will take place over a period of 20 – 25 years. The negative impacts are generally associated with soil erosion, increase in storm water runoff, the increased consumption of water, visual impacts, and the leakage of hazardous materials. The provision of sustainable services delivery also needs to be confirmed. The operational phase will have positive impacts through the provision of employment opportunities for its duration, the generation of additional electricity and the establishment of a community trust.

Impacts during the decommissioning phase:

The physical environment will benefit from the closure of the solar facility since the site will be restored to its natural state. The decommissioning phase will result in the loss of permanent employment. However, skilled staff will be eminently employable, and a number of temporary jobs will also be created in the process. The potential negative impacts relating to the generation of waste will also require certain management measures.

Cumulative impacts:

The potentially most significant cumulative impacts during the construction phase relate to the impacts to fauna, flora and wetland features, displacement of priority avifauna, loss of important avian habitats, loss of fossils, and the impact with large scale in-migration of people. The potential cumulative effects during the operational phase relate to collision of avifauna with power line infrastructure, electrocution of avifauna when perched on power line infrastructure and visual impacts. During the decommissioning phase, the generation of waste may result in cumulative impacts. These are further discussed in the BAR.

In accordance with the EIA Regulations, this draft BAR evaluates and rates each identified potential impact and identifies and recommends mitigation measures which will be required in order to ensure the reduction of the impact significance of negative impacts to acceptable levels and the avoidance of negative residual risks. This draft BAR also contains information that is required by the competent authority (Department of Forestry, Fisheries and the Environment (DFFE) to consider the Application for Environmental Authorisation and to reach a decision contemplated in Regulation 20 of GNR 326. No fatal flaws or impacts with unacceptable levels of significance were identified and the impacts from the proposed development are expected to be at an acceptable level with the implementation of mitigation measures and therefore the project can be authorised subject to the implementation of the recommended mitigation measures.

1 INTRODUCTION

This section aims to introduce the Basic Assessment Report (BAR) and specifically to address the following requirements of the regulations:

Appendix 1. (3) A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include- (a) details of:

- (i) the EAP who prepared the report; and
- (ii) the expertise of the EAP, including a curriculum vitae.

1.1 LEGAL MANDATE AND PURPOSE OF THE REPORT

The National Environmental Management Act identifies listed activities (in terms of Section 24) which are likely to have an impact on the environment. These activities cannot commence without obtaining an EA from the relevant competent authority. Sufficient information is required by the competent authority to make an informed decision and the project is therefore subject to an environmental assessment process which can be either a Basic Assessment Process or a full Scoping and Environmental Impact Assessment process.

The EIA Regulations No. 324 and 327 outline the activities that may be triggered and therefore require EA. The following listed activities with special reference to the proposed development is triggered:

Table 1.1: Listed activities

Relevant notice:	Activity No (s)	Description of each listed activity as per project description:
GNR. 327 (as amended in 2017)	Activity 1	<ul style="list-style-type: none">• <i>“The development of facilities or infrastructure for the generation of electricity-(i) from a renewable resource where the electricity output is more than 10 megawatts but less than 20 megawatts.”</i>• Activity 1 will be triggered since an additional 19.9MW will be generated.
GNR. 327 (as amended in 2017)	Activity 11(i)	<ul style="list-style-type: none">• <i>“The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.”</i>• Activity 11(i) is triggered as the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area.



GNR. 327 (as amended in 2017)	Activity 28(ii)	<ul style="list-style-type: none"> • <i>“Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.”</i> • Activity 28(ii) is triggered as portions of the affected farm has been previously used for grazing and the property will be re-zoned to “special” use.
GNR. 327 (as amended in 2017)	Activity 24(ii)	<ul style="list-style-type: none"> • <i>“The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters”</i> • Activity 24(ii) is triggered as the internal roads will vary between 6 and 12 meters in width and a new access road will be constructed.
GNR. 327 (as amended in 2017)	Activity 27	<ul style="list-style-type: none"> • <i>“The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation.”</i> • 19.9 hectares of indigenous vegetation will be cleared.
GNR. 324 (as amended in 2017)	Activity 4(h)(iv)(vi)	<ul style="list-style-type: none"> • <i>“The development of a road wider than 4 metres with a reserve less than 13.5 meters (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority and (vi) Areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a biosphere reserve.”</i> • Activity 4(h)(iv) is triggered as the internal roads will vary between 6 and 12 meters in width and a new access road will be constructed.
GNR. 324 (as amended in 2017)	Activity 12(h)(iv)	<ul style="list-style-type: none"> • <i>“The clearance of an area of 300 square metres or more of indigenous vegetation...(h) in the North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority and (vi) areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.”</i> • 19.9 hectares of indigenous vegetation will be cleared.

The activities triggered under Listing Notice 1 and 3 (Regulations 327 and 324) for the project implies that the development is considered as potentially having an impact on the environment and therefore require the implementation of appropriate mitigation measures. The activities triggered under Listing Notice 1 and 3 (Regulations 327 and 324) for the project implies that the development is considered as potentially having an impact on the environment and therefore require the implementation of appropriate mitigation measures. The project is subject to a Basic Assessment



process, for Environmental Authorisation by the Department of Forestry, Fisheries and the Environment (DFFE). The Basic Assessment must be undertaken in line with the requirements stipulated under Regulations 19 – 20 of the EIA Regulations. According to Appendix 1 of Regulation 326, the objective of the basic assessment process is to, through a consultative process:

1. Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
2. Identify the alternatives considered, including the activity, location, and technology alternatives;
3. Describe the need and desirability of the proposed alternatives;
4. Through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine
 - The nature, significance, consequence, extent, duration and probability of the impacts occurring; and
 - degree to which these impacts-
 - can be reversed;
 - may cause irreplaceable loss of resources, and
 - can be avoided, managed or mitigated; and
5. Through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to
 - Identify and motivate a preferred site, activity and technology alternative;
 - Identify suitable measures to avoid, manage or mitigate identified impacts; and
 - Identify residual risks that need to be managed and monitored.

This report is the draft Basic Assessment Report (BAR) that will be submitted to the Department of Forestry, Fisheries and the Environment (DFFE) for review and comment. According to GNR 326 all registered interested and affected parties (I&APs) and relevant State Departments (including Organs of State) must be allowed the opportunity to review and provide comment on the report. The draft BAR will be made available to registered I&APs and all relevant State Departments for a 30-day review and comment period from 14 November – 14 December 2022. They have been requested to provide written comments on the BAR within 30 days of receiving it. All issues identified during the review period will be documented and compiled into a Comments and Response Report (Appendix C6) to be submitted as part of the Final BAR to DFFE for decision-making.

1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Environamics was appointed by the applicant as the independent EAP to conduct the BA and prepare all required reports. All correspondence to the EAP can be directed to:



Contact person: Marélie Botha
EAPASA Registration: 2021/3834
Postal Address: 14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531
Telephone: 082 493 5166 (Cell)
Electronic Mail: marelie@environamics.co.za

And/or

Contact person: Lisa Opperman
EAPASA Registration: 2020/2150
Postal Address: 14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531
Telephone: 084 920 3111 (Cell)
Electronic Mail: lisa@environamics.co.za

Regulation 13(1)(a) and (b) determines that an independent and suitably qualified and experienced EAP should conduct the BA. In terms of the independent status of the EAP, a declaration is attached as Appendix A to this report. The expertise of the EAP responsible for conducting the BA is also summarized in the curriculum vitae included as part of Appendix A.

1.3 DETAILS OF SPECIALISTS

Table 1.2 provides information of the independent specialists that have been appointed as part of the Basic Assessment process. Regulation 13(1)(a) and (b) determines that an independent and suitably qualified and experienced specialist should conduct the specialist study. In the event where the specialist is not independent, a specialist should be appointed to externally review the work of the specialist as contemplated in sub regulation (2), which must comply with sub regulation 1. In terms of the independent status of the specialists, their declarations are attached as Appendix D to this report. The expertise of the specialists is also summarised in their respective curriculum vitae's.

**Table 1.2:** Details of specialists

Study	Prepared by	Contact Person	Postal Address	Tel	e-mail
Heritage Impact Assessment	J van Schalkwyk Heritage Consultant	J van Schalkwyk	62 Coetzer Avenue, Monument Park, 0181	Cell: 076 790 6777	jvschalkwyk@mweb.co.za
Paleontological Study	Banzai Environmental	Elize Butler	PO Box 2644, Montana Park, 0159	Cell: 084 920 3111	info@banzai-group.com
Ecological, wetland, avifauna, agricultural, and soils Impact Assessment	The Biodiversity Company	Andrew Husted	777 Peridot Street, Jukskei Park, 2188	Cell: 081 319 1225	info@thebiodiversitycompany.com andrew@thebiodiversitycompany.com
Visual Impact Assessment	Donaway Environmental Consultants	Johan Botha	30 Fouche Street Steynsrus, 9515	Tel: 082 316 7749	johan@donaway.co.za
Social Impact Assessment	Donaway Environmental Consultants	Johan Botha	30 Fouche Street Steynsrus, 9515	Cell: 082 316 7749	johan@donaway.co.za
Stormwater Management Plan and Hydrogeological Assessment	Geostratum Water Management Consulting	Kobus Troskie	Unit 25 The Willows Office Park 559 Farm Road, The Willows Pretoria, Gauteng 0181	Cell: 082 821 4841	kobus@geostratum.co.za



1.4 STATUS OF THE BA PROCESS

The BA process is conducted strictly in accordance with the stipulations set out in Regulations 19 – 20 and Annexure 1 of Regulation No. 326. Table 1.3 provides a summary of the BA process and future steps to be taken. It can be confirmed that to date:

- A site visit was conducted on 26 May 2022 and site notices were erected.
- A pre-application meeting request and public participation plan was submitted to DFFE on 14 July 2022.
- A newspaper advertisement was placed in the Stellalander on 14 July 2022 for the initial public participation.
- An application for Environmental Authorisation and the draft BAR was submitted to the DFFE on 14 November 2022.
- The Basic Assessment report will be made available for a 30-day review and comment period from 14 November – 14 December 2022.

It is envisaged that the BA process should be completed within approximately five months of submitting the Application for EA and the BAR, i.e., by March 2023 – see Table 1.3.

Table 1.3: Project schedule

Activity	Prescribed timeframe	Timeframe
Submit public participation plan	-	14 July 2022
Public Participation Plan Approval	-	22 July 2022
Site visits	-	26 May 2022
Specialist studies	-	June 2022
Submit the application form and DBAR	-	14 November 2022
Public participation (DBAR)	30 Days	Nov. – Dec. 2022
Submit FBAR	90 Days	January 2023
Department acknowledges receipt	10 Days	January 2023
Decision	57 Days	By March 2023
Department notifies of decision	5 Days	By March 2023

1.5 STRUCTURE OF THE REPORT

This report is structured in accordance with the prescribed contents stipulated in Appendix 1 of Regulation No.326. It consists of seven sections demonstrating compliance to the specifications of the regulations as illustrated in Table 1.4.



Table 1.4: Structure of the report

Requirements for the contents of a BAR as specified in the Regulations		Section in report
Appendix 1. (3) - A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-		
(a)	details of - (i) the EAP who prepared the report; and ii) the expertise of the EAP, including a curriculum vitae.	1
(b)	the location of the activity, including- (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	
(c)	a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	2
(d)	a description of the scope of the proposed activity, including- (i) all listed and specified activities triggered and being applied for; and (ii) a description of the activities to be undertaken including associated structures and infrastructure.	
(e)	a description of the policy and legislative context within which the development is proposed including: (i) An identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and (ii) How the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks and instruments;	3



(f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	4
(g)	A motivation for the preferred site, activity and technology alternative.	
(h)	a full description of the process followed to reach the preferred alternative within the site including –	
	(i) details of all the alternatives considered;	
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	5
	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	
	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	6 & 7
	(viii) the possible mitigation measures that could be applied and level of residual risk;	
	(ix) the outcomes of the site selection matrix;	
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	
	(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	



(i)	<p>a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including -</p> <p>(i) a description of all environmental issues and risks that were identified during the EIA process; and</p> <p>(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.</p>	
(j)	<p>an assessment of each identified potentially significant impact and risk, including-</p> <p>(i) cumulative impacts;</p> <p>(ii) the nature, significance and consequences of the impact and risk;</p> <p>(iii) the extent and duration of the impact and risk;</p> <p>(iv) the probability of the impact and risk occurring;</p> <p>(v) the degree to which the impact and risk can be reversed;</p> <p>(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and</p> <p>(vii) the degree to which the impact and risk can be mitigated;</p>	
(k)	<p>where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;</p>	6
(l)	<p>an environmental impact statement which contains-</p> <p>(i) a summary of the key findings of the environmental impact assessment;</p> <p>(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and</p> <p>(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;</p>	8
(m)	<p>based on the assessment, and where applicable, impact management measures from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;</p>	



(n)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Not applicable
(o)	a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	8
(p)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	
(q)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	Not applicable
(r)	an undertaking under oath or affirmation by the EAP in relation to- (i) the correctness of the information provided in the report; (ii) the inclusion of comments and inputs from stakeholders and interested and affected parties (I&APs); (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs; and	Appendix A to the report
(s)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Not applicable
(t)	any specific information that may be required by the CA; and	Not applicable
(u)	any other matters required in terms of section 24(4)(a) and (b) of the Act.	Not applicable



2 ACTIVITY DESCRIPTION

This section aims to address the following requirements of the regulations:

Appendix 1. (3) A BAR (...) must include-

(b) the location of the activity, including-

- (i) the 21-digit Surveyor General code of each cadastral land parcel;
- (ii) where available, the physical address and farm name;
- (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;

(c) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is-

- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or
- (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;

(d) a description of the scope of the proposed activity, including-

- (i) all listed and specified activities triggered and being applied for;
- (ii) a description of the associated structures and infrastructure related to the development.

2.1 THE LOCATION OF THE ACTIVITY AND PROPERTY DESCRIPTION

The activity entails the addition of an area to the approved Delta photovoltaic solar energy facility on the Remaining Extent of the farm Kareefontein No. 340, Registration Division HO, North West Province situated within the Lekwa-Teemane Local Municipality area of jurisdiction (refer to Figure B for the regional map). The town of Bloemhof is located approximately 9km east of the proposed development (refer to Figure A for the locality map).

The project area entails the generation of approximately 19.9MW electrical power through the operation of photovoltaic (PV) panels and up to 100MW, including the authorised footprint. The total development footprint of the project will approximately be 19.9 hectares (including supporting infrastructure on site) – refer to table 2.1 for general site information. The property on which the facility is to be constructed will be leased by Delta Solar Power Plant (RF) (Pty) Ltd. from the property owner, which is Mr. Jacobus Gerhardus Eduard Van Zyl, for the life span of the project (minimum of 20 years).

**Table 2.1:** General site information

Description of affected farm portion	The Remaining Extent of the farm Kareefontein 340, Registration Division HO, North West
Province	North West
District Municipality	Dr. Ruth Segomotsi Mompati District Municipality
Local Municipality	Lekwa-Teemane Local Municipality
Ward numbers	22
Closest towns	Bloemhof, 9km east of site
21 Digit Surveyor General codes	TOHO0000000034000000
Type of technology	Photovoltaic solar facility
Structure Height	Panels ~6m, buildings ~ 6m, power line ~32m
Surface area to be covered (Development footprint)	Approximately 19.9 hectares
Laydown area dimensions (EIA footprint)	Approximately 3.30 hectares (falls within authorised footprint (Delta Original Site))
Structure orientation	The panels will either be fixed to a single-axis horizontal tracking structure where the orientation of the panel varies according to the time of the day, as the sun moves from east to west or tilted at a fixed angle equivalent to the latitude at which the site is located in order to capture the most sun.
Generation capacity	Up to 19.9MW
Expected production	230-280 GWh per annum (Expected production by 100MWdc modules Considering Bifacial and one-axis tracker) including the entire site

Over the property an area of 80ha has been assessed and a preferred additional development footprint of 19.9ha has been identified.

The site is located in a rural area and is bordered by farms where mainly agricultural activities are undertaken. The site survey revealed that the affected properties currently consist of grazing cattle – refer to plates 1-12 for photographs of the development area.

2.2 ACTIVITY DESCRIPTION

The proposed development will trigger the following activity:

**Table 2.2:** Listed activities

Relevant notice:	Activity No (s)	Description of each listed activity as per project description:
GNR. 327 (as amended in 2017)	Activity 1	<ul style="list-style-type: none"> • <i>“The development of facilities or infrastructure for the generation of electricity-(i) from a renewable resource where the electricity output is more than 10 megawatts but less than 20 megawatts.”</i> • Activity 1 will be triggered since an additional 19.9MW will be generated.
GNR. 327 (as amended in 2017)	Activity 11(i)	<ul style="list-style-type: none"> • <i>“The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.”</i> • Activity 11(i) is triggered as the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area.
GNR. 327 (as amended in 2017)	Activity 28(ii)	<ul style="list-style-type: none"> • <i>“Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.”</i> • Activity 28(ii) is triggered as portions of the affected farm has been previously used for grazing and the property will be re-zoned to “special” use.
GNR. 327 (as amended in 2017)	Activity 24(ii)	<ul style="list-style-type: none"> • <i>“The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters”</i> • Activity 24(ii) is triggered as the internal roads will vary between 6 and 12 meters in width and a new access road will be constructed.
GNR. 327 (as amended in 2017)	Activity 27	<ul style="list-style-type: none"> • <i>“The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation.”</i> • 19.9 hectares of indigenous vegetation will be cleared.



GNR. 324 (as amended in 2017)	Activity 4(h)(iv)(vi)	<ul style="list-style-type: none"> • <i>“The development of a road wider than 4 metres with a reserve less than 13.5 meters (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority and (vi) Areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a biosphere reserve.”</i> • Activity 4(h)(iv) is triggered as the internal roads will vary between 6 and 12 meters in width and a new access road will be constructed.
GNR. 324 (as amended in 2017)	Activity 12(h)(iv)(vi)	<ul style="list-style-type: none"> • <i>“The clearance of an area of 300 square metres or more of indigenous vegetation...(h) in the North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority and (vi) areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.”</i> • 19.9 hectares of indigenous vegetation will be cleared.

The potentially most significant impacts will occur during the construction phase of the development, which will include the following activities:

- Site clearing and preparation: Certain areas of the site will need to be cleared of vegetation and access to the site will need to be confirmed.
- Civil works to be conducted:
 - Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat.
 - Laying foundation- The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis.
 - Construction of access roads/paths – existing paths will be used where reasonably possible.
 - Trenching – all Direct Current (DC) and Alternating Current (AC) wiring within the PV plant will be buried underground. Trenches will have a river sand base, space for pipes, backfill of sifted soil and soft sand and concrete layering where vehicles will pass.



2.3 PHOTOVOLTAIC TECHNOLOGY

The term photovoltaic describes a solid-state electronic cell that produces direct current electrical energy from the radiant energy of the sun through a process known as the Photovoltaic Effect. This refers to light energy placing electrons into a higher state of energy to create electricity. Each PV cell is made of silicon (i.e., semiconductors), which is positively and negatively charged on either side, with electrical conductors attached to both sides to form a circuit. This circuit captures the released electrons in the form of an electric current (direct current). The key components of the proposed project are described below:

- PV Panel Array - To produce up to 100MW (original and additional site), the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun or using one-axis tracker structures to follow the sun to increase the yield.
- Wiring to Central Inverters - Sections of the PV array will be wired to inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency. The maximum voltage from the PV arrays to the inverters will be 1500V. The inverter will then convert the 1500Vdc to 600Vac 50Hz.
- Connection to the grid - Connecting the array to the electrical grid requires transformation of the PV Plant inverter voltage from 600V to 33kV and a further step-up to Eskom's 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 600V and this is fed into 0.6/33kV 50Hz step up transformer, the 33kV output from the transformer goes to a 33/132kV 50Hz Transformer whose output goes to Eskom's 132kV power line. An onsite substation will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid via the proposed Bloemhof-Wildhoeven 132kV power line. The Project will inject up to 75MWac into the National Grid and the installed capacity will be approximately 100MWdc. It is expected that generation from the facility will tie into the Eskom network via the Bloemhof-Wildhoeven 132kV power line via a Loop-in-loop-out (LILIO) connection.
- Electrical reticulation network – An internal electrical reticulation network will be required and will be laid ~2-4 m underground as far as practically possible.
- Roads – Access will be obtained from the Sterkfontein gravel road traversing the site which is accessed from the N12 national road. An internal site road network will also be required to provide access to the solar field and associated infrastructure. The access and internal roads will be constructed within a 25-meter corridor.



- **Fencing** - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm. Fencing with a height of 2.5 meters will be used.

2.4 LAYOUT DESCRIPTION

The layout plan will follow the limitations of the site and aspects such as environmentally sensitive areas, roads, fencing and servitudes will be considered – refer to the Figure I. The total surface area proposed for layout options include the PV panel arrays spaced to avoid shadowing, access and maintenance roads and associated infrastructure (buildings, power inverters, transmission lines and perimeter fences) – refer to table 2.2 for the areas to be occupied by the proposed land uses.

Table 2.3: Technical details for the proposed facility

Component	Description / dimensions
Height of PV panels	6 meters
Area of PV Array	19.9 hectares (Development footprint) ~ 16 hectares (area occupied by PV Array) 219.9 hectares (Development footprint including Original Delta Site footprint)
Number of inverters required	Minimum 50 (Development footprint)
Area occupied by inverter / transformer stations / substations / BESS	Central inverters+ LV/MV trafo: 750 m ² HV/MV substation with switching station: 15 000 m ²
Area occupied by both permanent and construction laydown areas	On the Original Delta Site
Area occupied by buildings	Security Room: ~60 m ²
Length of internal roads	Approximately 15 km
Width of internal roads	Between 6 & 12 meters
Proximity to grid connection	Approximately 1.6 kilometres
Grid connection corridor width	Between 100 and 600m
Grid connection corridor length	Option 1: 575m
Power servitude width	32m
Height of fencing	Approximately 2.5 meters



Table 2.4 provides the coordinate points for the proposed project site, associated infrastructure and grid connection corridor alternatives.

Table 2.4: Coordinates

Coordinates			
Project Site	A	27°38'43.68"S	25°30'36.66"E
	B	27°38'42.26"S	25°30'40.10"E
	C	27°38'45.52"S	25°30'41.89"E
	D	27°38'43.94"S	25°30'45.49"E
	E	27°38'45.24"S	25°30'46.35"E
	F	27°38'45.24"S	25°30'55.75"E
	G	27°38'57.61"S	25°30'58.24"E
	H	27°39'2.28"S	25°30'48.12"E
Proposed Access Point	A	27°38'36.15"S	25°30'54.24"E
Substation	A	27°38'43.77"S	25°30'37.03"E
	B	27°38'42.41"S	25°30'40.16"E
	C	27°38'45.82"S	25°30'42.03"E
	D	27°38'47.16"S	25°30'38.93"E

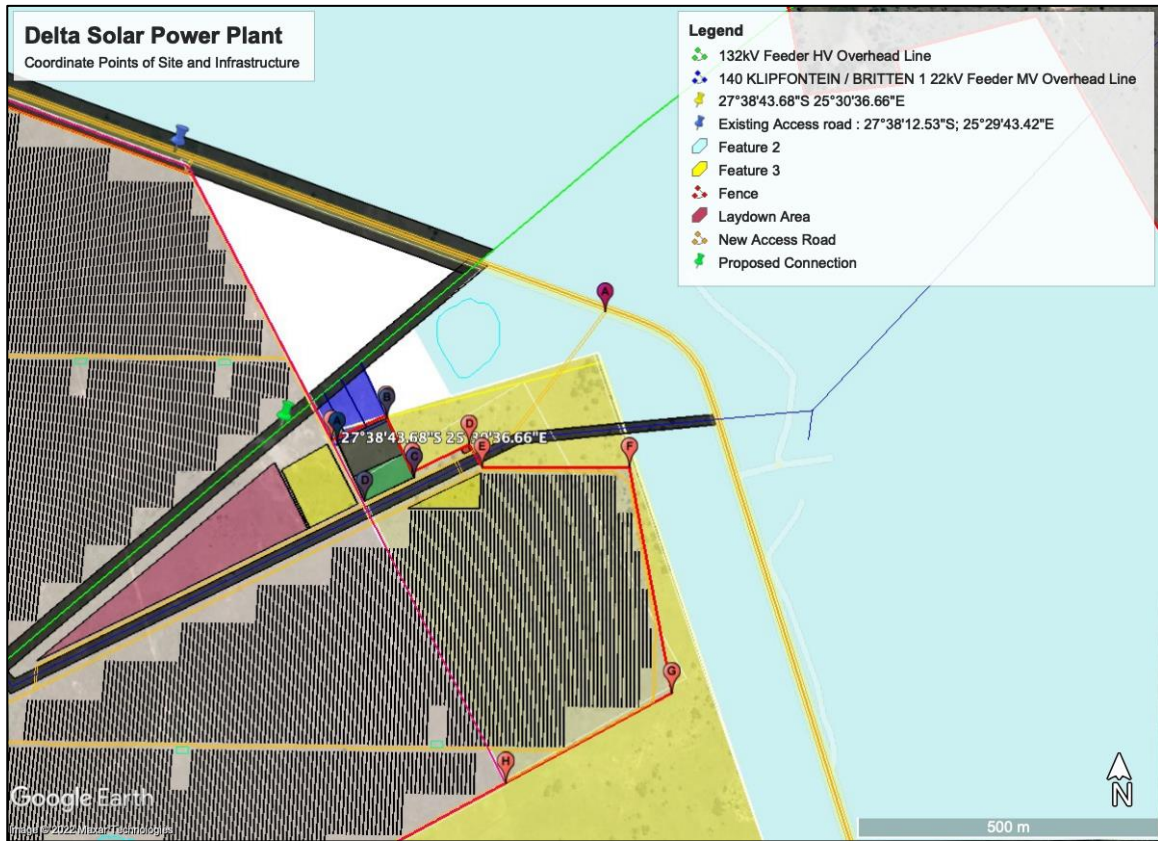


Figure 2.1: Map indicating the coordinate points of the proposed addition to the Delta Solar Power Plant.

2.5 SERVICES PROVISION

The following sections provides information on services required on the site e.g., water, sewage, refuse removal, and electricity.

2.5.1 Water

Adequate provision of water will be a prerequisite for the development. Water for the proposed development will most likely be obtained from groundwater sources. A full assessment of the application for water use authorisation will only be undertaken in the event that the project proponent has been appointed as a preferred bidder by the Department of Mineral Resources and Energy.

The estimated maximum amount of water required during construction is 200m³ per month during the 12 months of construction. The estimated maximum amount of water required during the facility's 20 years of production is 3 000m³ per annum for the whole development including Delta Original Site. The majority of this usage is for the cleaning of the solar panels. Since each panel requires approximately 2 litres of water for cleaning, the total amount of 350 000 panels will require 700 000 litres per wash for the entire facility. It is estimated that the panels may only



need to be washed twice per annum, but provision is made for quaternary cleaning (March, May, July, and September). This totals approximately 2,800,000 liters per annum for washing, and allows 200,000 liters per annum (or 548 liter per day) for toilet use, drinking water, etc. This totals to approximately 3,000,000 liters of water required per annum. Drinking water supplied will comply with the SANS:241 quality requirements and it is noted that the Lekwa-Teemane Local Municipality remains the Water Service Authority in that area of jurisdiction.

Generally, the water supply does not require the construction of a reverse osmosis plant. This is however dependant on the quality of the water, or what the mineral content is. Should a reverse osmosis plant be required, brine (the excess minerals) will be formed during the filtration process that will be stored and then removed. Determining baseline water quality conditions is important in order to appropriately manage incidents in the future. These estimations are based on the addition and the Original Delta SPP Site.

Water saving devices and technologies such as the use of dual flush toilets and low-flow taps, the management of storm water, the capture and use of rainwater from gutters and roofs should be considered by the developer. Furthermore, indigenous vegetation will be used during landscaping and the staff will be trained to implement good housekeeping techniques.

Portable chemical toilets will be utilized, that will be serviced privately. Waste will be disposed at a licensed waste site (such as Hoopstad, Vryburg, Wolmaranstad, Wesselsbron, Warrenton or Welkom). The construction and hazardous waste will be removed to licensed landfill sites accepting such kinds of wastes. During the operational phase household waste will be removed to a licensed landfill site by a private contractor. The relevant Local Municipality was asked in a letter dated 25 August 2014, to formally confirm that it has the capacity to provide the proposed development with these services for the lifetime of the project (20 years). In a letter dated 4 November 2014 the Lekwa-Teemane Local Municipality confirmed that there aren't any water or sewer networks in the vicinity of the area and that the remote location of the development doesn't make it feasible to provide water and sewer services that form part of the existing reticulation. They suggest that water tankers be used during the construction phase of the project and boreholes during the operational phase and regarding sanitation, making use of mobile lavatories during construction and onsite sanitation during operations.

2.5.2 Storm water

To avoid soil erosion, it is recommended that the clearing of vegetation be limited. It will also be good practice to design storm water canals into which the water from the panels can be channelled. These canals should reduce the speed of the water and allow the water to drain slowly onto the land. Storm water management and mitigation measures are included in the Environmental Management Programme (EMPr) – refer to Appendix F, section 2.5.4 amongst others.



2.5.3 Sanitation and waste removal

A closed septic (conservancy) tank will be installed on site to accommodate the sewerage from the office ablution facilities.

Construction waste will most likely consist of concrete, scrap metal and general waste (cardboard packaging, wood, etc). The waste will be collected and stored in suitable receptacles where after it will be transported to the nearest registered landfill. During the operational phase sources of general waste will be waste food, packaging, paper, etc. which will be stored on the site and removed on a weekly basis. Waste will be disposed at a licensed waste site (such as Hoopstad, Vryburg, Wolmaranstad, Wesselsbron, Warrenton or Welkom). If possible and feasible, all waste generated on site during the construction and operational phases must be separated into glass, plastic, paper, metal and wood to be recycled.

The relevant Local Municipality(s) was asked in a letter dated 30 June 2014 to formally confirm that it has the capacity to provide the Delta Power Plant with these services for the lifetime of the project (20 years). The municipality will not be held responsible for the removal of construction waste and will be taken to the suggested waste sites by the contractor. The contractor is also encouraged to separate waste at the source to ease the process of recycling. The municipality will also not be responsible for the removal of general household waste, the contractor, together with the Waste Management Officer should agree on an onsite disposal of general waste which will be monitored by the municipality on an ongoing basis.

2.5.4 Electricity

Electricity use will be limited and will primarily be related to the lighting of the facility and domestic use. Design measures such as the use of energy saving light bulbs would be considered by the developer. During the day, electricity will be sourced by the photovoltaic plant, and from the electricity connection at night.

2.6 DECOMMISSIONING OF THE FACILITY

The operating period will be 20 years from the commencement date. Thereafter two rights of renewal periods of 40 years and 20 years will be relevant. It is anticipated that new technologies and equipment will be implemented, within the scope of the Environmental Authorisation, when influencing the profitability of the solar facility.

A likely extension of the plant's lifetime would involve putting new, more efficient, solar panels on the existing structures. The specifications of these new panels will be the same as the current one, but for that the conversion efficiency of sunlight to energy will be greater (comparable to new computer chips, that the same, but faster and more efficient). If, for whatever reason the plant halts operations, the Environmental Authorisation and contract with the landowner will be respected during the decommissioning phase



3 LEGISLATIVE AND POLICY CONTEXT

This section aims to address the following requirements of the regulations:

Appendix 1. (3) A BAR (...) must include-

(e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context.

3.1 INTRODUCTION

Environmental decision making with regards to solar PV plants and associated infrastructure is based on numerous policy and legislative documents. These documents inform decisions on project level environmental authorisations issued by the National Department of Forestry, Fisheries and the Environment (DFFE) as well as comments from local and district authorities. Moreover, it is significant to note that they also inform strategic decision making reflected in IDPs and SDFs. Therefore, to ensure streamlining of environmental authorisations it is imperative for the proposed activity to align with the principles and objectives of key national, provincial and local development policies and legislation. The following acts and policies and their applicability to the proposed development are briefly summarised:

- The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)
- National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA]
- The National Energy Act, 2008 (Act 34 of 2008)
- National Water Act, 1998 (Act No. 36 of 1998)
- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
- The National Heritage Resources Act, 1999 (Act No. 25 of 1999)
- Conservation of Agricultural Resources Act, 1983 (Act No. 85 of 1983)
- The National Forests Act, 1998 (Act 84 of 1998)
- The White Paper on the Energy Policy of the Republic of South Africa (1998)
- The White Paper on Renewable Energy (2003)
- Integrated Resource Plan (IRP) for South Africa (2010-2030)
- National Development Plan of 2030
- National Infrastructure Plan of South Africa
- New Growth Path Framework



- Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa (2014)
- North West Province Growth and Development Strategy (2004-2014)
- North West Provincial Spatial Development Framework (PSDF) (2016)
- Dr. Ruth Segomotsi Mompati District Municipality Integrated Development Plan (IDP) 2020 – 2021 (2020)
- Lekwa-Teemane Local Municipality Integrated Development Plan 2020/2021 (2020)
- Lekwa-Teemane Spatial Development Framework Review 2013 (SDF) (2013)

The key principles and objectives of each of the legislative and policy documents are briefly summarised in Tables 3.1 and 3.2 to provide a reference framework for the implications for the proposed activity.



3.2 LEGISLATIVE CONTEXT

Table 3.1: Legislative context for the construction of photovoltaic solar plants

LEGISLATION	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
The Constitution of South Africa (Act No. 108 of 1996)	National Government	1996	<p>The Constitution is the supreme law of the Republic and all law and conduct must be consistent with the Constitution. The Chapter on the Bill of Rights contains a number of provisions, which are relevant to securing the protection of the environment. Section 24 states that “everyone has the right to (a) an environment that is not harmful to their health or well-being and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that – (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. The Constitution therefore, compels government to give effect to the people’s environmental right and places government under a legal duty to act as a responsible custodian of the country’s environment. It compels government to pass legislation and use other measures to protect the environment, to prevent pollution and ecological degradation, promote conservation and secure sustainable development.</p> <p>The addition to the Delta Solar Power Plant and the aspects related thereto considers the creation of an environment which is not harmful or degraded through the implementation of appropriate mitigation measures.</p>
The National Environmental Management Act	National Department of Forestry, Fisheries and the Environment (DFFE) and the North West Province	1998	NEMA provides for co-operative governance by establishing principles and procedures for decision-makers on matters affecting the environment. An important function of the Act is to serve as an enabling Act for the promulgation of legislation to effectively address integrated environmental management. Some of the principles in the Act are accountability; affordability; cradle to grave management; equity; integration; open information; polluter pays; subsidiary;



(Act No. 107 of 1998)	Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)	waste avoidance and minimisation; co-operative governance; sustainable development; and environmental protection and justice.	The mandate for EIA lays with the National Environmental Management Act (107 of 1998) and the EIA Regulations No. 324, 325, 326, and 327 promulgated in terms of Section 24 of NEMA. The EIA Regulations determine that an Environmental Authorisation is required for certain listed activities, which might have a detrimental effect on the environment.
		The BA process undertaken for the Delta Solar Power Plant is in-line with the requirements of NEMA for the Application for Environmental Authorisation.	
The National Energy Act (Act No. 34 of 2008)	Department of Mineral Resources and Energy	2008	One of the objectives of the National Energy Act was to promote diversity of supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources, including solar: “To ensure that diverse energy resources are available, in sustainable quantities, and at affordable prices, to the South African economy, in support of economic growth and poverty alleviation, taking into account environmental management requirements (...); to provide for (...) increased generation and consumption of renewable energies...” (Preamble).
		Considering that the Delta Solar Power Plant makes use of PV technology and solar resource for the generation of electricity, the proposed addition to the original plant plan is and will continue to be in-line with the Act.	
The National Water Act (Act No. 36 of 1998)	Department of Water and Sanitation (DWS)	1998	Sustainability and equity are identified as central guiding principles in the protection, use, development, conservation, management and control of water resources. The intention of the Act is to promote the equitable access to water and the sustainable use of water, redress past racial and gender discrimination, and facilitate economic and social development. The Act provides the rights of access to basic water supply and sanitation, and environmentally, it



provides for the protection of aquatic and associated ecosystems, the reduction and prevention of pollution and degradation of water resources.

As this Act is founded on the principle that National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, a person can only be entitled to use water if the use is permissible under the Act. Chapter 4 of the Act lays the basis for regulating water use.

Should a water use license be required for the project, the National Water Act will be applicable in terms of obtaining the relevant license.

<p>National Environmental Management: Waste Act (Act No. 59 of 2008)</p>	<p>National Department of Forestry, Fisheries and the Environment (DFFE)</p>	<p>2008</p>	<p>NEMWA has been developed as part of the law reform process enacted through the White Paper on Integrated Pollution and Waste Management and the National Waste Management Strategy (NWMS). The objectives of the Act relate to the provision of measures to protect health, well-being and the environment, to ensure that people are aware of the impact of waste on their health, well-being and the environment, to provide for compliance with the measures, and to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being.</p>
<p>National Environment</p>	<p>National Department of Forestry, Fisheries</p>	<p>2004</p>	<p>Regulations No. R921 (of 2013) promulgated in terms of Section 19(1) of the National Environmental Management: Waste Act (59 of 2008) determines that no person may commence, undertake or conduct a waste management activity listed in this schedule unless a license is issued in respect of that activity. It is not envisaged that a waste permit will be required for the proposed development as no listed activities in terms of waste management are expected to be triggered. .</p> <p>The objective of this Act is to protect the environment by providing reasonable measures for the protection and enhancement of the quality of air in the Republic; the prevention of air</p>



Management: Air Quality Act (Act No. 39 of 2004)	and the Environment (DFFE)	pollution and ecological degradation; and securing ecologically sustainable development while promoting justifiable economic and social development.
The National Heritage Resources Act (Act No. 25 of 1999)	South African Heritage Resources Agency (SAHRA)	<p>Regulations No. R248 (of 31 March 2010) promulgated in terms of Section 21(1)(a) of the National Environmental Management Act: Air Quality Act (39 of 2004) determine that an Atmospheric Emission License (AEL) is required for certain listed activities, which result in atmospheric emissions which have or may have a detrimental effect on the environment. The Regulation also sets out the minimum emission standards for the listed activities. It is not envisaged that an Atmospheric Emission License will be required for the proposed development.</p> <p>The Act aims to introduce an integrated and interactive system for the management of heritage resources, to promote good governance at all levels, and empower civil society to nurture and conserve heritage resources so that they may be bequeathed to future generations and to lay down principles for governing heritage resources management throughout the Republic. It also aims to establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management of heritage resources, to set norms and maintain essential national standards and to protect heritage resources, to provide for the protection and management of conservation-worthy places and areas by local authorities, and to provide for matters connected therewith.</p> <p>The Act protects and manages certain categories of heritage resources in South Africa. For the purposes of the Heritage Resources Act, a “heritage resource” includes any place or object of cultural significance. In this regard the Act makes provision for a person undertaking an activity listed in Section 28 of the Act to notify the resources authority. The resources authority may request that a heritage impact assessment be conducted if there is reason to believe that heritage resources will be affected. A case file has been opened on SAHRIS for the Delta Solar Power Plant and all relevant documents were submitted for their comments and approval. The</p>



				Heritage Impact Assessment undertaken for the solar power plant is included as Appendix D2 and the Paleontological Impact Assessment report is included as Appendix D8 to this draft BAR.
Conservation of Agricultural Resources Act (Act No. 85 of 1983)	National and Provincial Government	and	1983	<p>The objective of the Act is to provide control over the utilisation of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith.</p> <p>Consent will be required from the Department of Rural Development and Land Reform in order to confirm that the proposed development is not located on high potential agricultural land and to approve the long -term lease agreement.</p> <p>An Agricultural or Oil Compliance Statement has been undertaken for the Delta Solar Power Plant and is included as Appendix D5 of this draft BAR.</p>
The National Forests Act, 1998 (Act 84 of 1998)	Department of Forestry, Fisheries and the Environment (DFFE)	of	1998	<p>The purposes of this Act are to:</p> <ul style="list-style-type: none">(a) promote the sustainable management and development of forests for the benefit of all;(b) create the conditions necessary to restructure forestry in State forests;(c) provide special measures for the protection of certain forests and trees:(d) promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes.(e) promote community forestry;(f) promote greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination.



Section 12(1) read with s15(1) of the NFA stated that the Minister may declare a particular tree, group of trees, woodland; or trees belonging to a particular species, to be a protected tree, group of trees, woodland or species. A list of protected tree species was gazetted in GN 635 of 6 December 2019. The effect of the declaration is that no person may (a) cut, disturb, damage or destroy; or (b) possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, or any forest product derived from a protected tree, except under a license granted by the Minister; or in terms of an exemption published by the Minister in the Gazette.

An Ecological Fauna and Flora Habitat survey has been undertaken for the Delta Solar Power Plant and is included in Appendix D3 of this draft BAR.

National Veld and Forest Fire Act (Act 101 of 1998) Department of Agriculture, Forestry and Fisheries 1998

This Act provides requirements for veldfire prevention through firebreaks and required measures for fire-fighting. Chapter 4 places a duty on landowners to prepare and maintain firebreaks, and Chapter 5 places a duty on all landowners to acquire equipment and have available personnel to fight fires.

In terms of S12 the landowner would be obliged to burn firebreaks to ensure that should a veldfire occur on the property, that it does not spread to adjoining land. In terms of S12 the firebreaks would need to be wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of flammable material. In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.



While no permitting or licensing requirements arise from this legislation, this Act will find application during the operational phase of the project in terms of fire prevention and management.

3.3 POLICY CONTEXT

Table 3.2: Policy context for the construction of solar PV plants

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
The White Paper on the Energy Policy of the Republic of South Africa	Department of Mineral Resources and Energy	1998	<p>The White Paper on the Energy Policy of the Republic of South Africa establishes the international and national policy context for the energy sector, and identifies the following energy policy objectives:</p> <ul style="list-style-type: none"> • Increasing access to affordable energy services • Improving energy governance • Stimulating economic development • Managing energy-related environmental and health impacts • Securing supply through diversity • Energy policy priorities <p>The White Paper sets out the advantages of renewable energy and states that Government believes that renewables can in many cases provide the least cost energy service, particularly when social and environmental costs are included. The White Paper acknowledges that South Africa has neglected the</p>



development and implementation of renewable energy applications, despite the fact that the country's renewable energy resource base is extensive, and many appropriate applications exist.

The White Paper notes that renewable energy applications have specific characteristics that need to be considered. Advantages include:

- Minimal environmental impacts in operation in comparison with traditional supply technologies; and
- Generally lower running costs, and high labour intensities.

Disadvantages include:

- Higher capital costs in some cases;
- Lower energy densities; and
- Lower levels of availability, depending on specific conditions, especially with sun and wind-based systems.

The proposed addition to the Delta solar power plant is in line with this policy as it proposes the generation of renewable energy from the solar resource.

The White Paper on Renewable Energy	Department of 2003 Mineral Resources and Energy	This White Paper on Renewable Energy supplements the <i>White Paper on Energy Policy</i> , which recognises that the medium and long-term potential of renewable energy is significant. This Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa.
--	--	---

The White Paper notes that while South Africa is well-endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these have thus far remained largely untapped. Government's long-term goal is the establishment of a renewable energy industry producing modern energy carriers that will offer in future years a sustainable, fully non-subsidised alternative to fossil fuels. The medium-term (10-year) target set in the White Paper is: *10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro. The renewable energy is to be utilised for power generation and non-electric*



technologies such as solar water heating and bio-fuels. This is approximately 4% (1667 MW) of the projected electricity demand for 2013 (41539 MW) (Executive Summary, ix).

The proposed addition to the Delta Solar Power Plant is in line with this policy as it proposes the generation of renewable energy from the solar resource.

Integrated Resource Plan (IRP) for South Africa	Department of Mineral Resources and Energy	2010-2030	<p>The Integrated Resource Plan for Electricity for South Africa of 2010–2030 (further referred to as the IRP) is a “living plan” which is expected to be revised and updated continuously as necessary due to changing circumstances. According to the Summary of the plan the current IRP for South Africa, which was originally initiated by the Department of Energy (DoE) in June 2010 (the Department is now known as Department of Mineral Resources and Energy), led to the Revised Balanced Scenarios (RBS) for the period 2010–2030.</p> <p><i>“This scenario was derived based on the cost-optimal solution for new build options (considering the direct costs of new build power plants), which was then “balanced” in accordance with qualitative measures such as local job creation”.</i> In addition to all existing and committed power plants, the RBS included 11,4 GW of renewables, which relates to the proposed addition to the Delta SPP. In 2010 several changes were made to the IRP model. The main changes in the IRP were the disaggregation of renewable energy technologies <i>to explicitly display solar photovoltaic (PV), concentrated solar power (CSP), and wind options”</i> (RSA, 2011a).</p> <p>The summary of the IRP further explains that traditional cost-optimal scenarios were developed based on the previously mentioned changes in the IRP. This resulted in the Policy-Adjusted IRP, which stated that:</p> <p><i>“The installation of renewables (solar PV, CSP and wind) have been brought forward in order to accelerate a local industry;</i></p> <p><i>To account for the uncertainties associated with the costs of renewables and fuels, a nuclear fleet of 9,6 GW is included in the IRP;</i></p> <p><i>The emission constraint of the RBS (275 million tons of carbon dioxide per year after 2024) is maintained; and Energy efficiency demand-side management (EEDSM) measures are maintained at the level of the RBS”</i> (RSA, 2011a:6).</p>
--	--	-----------	---



“The Policy-Adjusted IRP includes the same amount of coal and nuclear new builds as the RBS, while reflecting recent developments with respect to prices for renewables. In addition to all existing and committed power plants (including 10 GW committed coal), the plan includes 9,6 GW of nuclear; 6,3 GW of coal; 17,8 GW of renewables; and 8,9 GW of other generation sources” (RSA, 2011a:6).

The IRP highlights the commitments before the next IRP. The commitments pertaining to the purpose of the proposed project in renewable energy is:

“Solar PV programme 2012-2015: In order to facilitate the connection of the first solar PV units to the grid in 2012 a firm commitment to this capacity is necessary. Furthermore, to provide the security of investment to ramp up a sustainable local industry cluster, the first four years from 2012 to 2015 require firm commitment.”

“Solar PV 2016 to 2019: As with wind, grid upgrades might become necessary for the second round of solar PV installations from 2016 to 2019, depending on their location. To trigger the associated tasks in a timely manner, a firm commitment to these capacities is necessary in the next round of the IRP at the latest. By then, the assumed cost decreases for solar PV will be confirmed” (IRP, 2011a:17).

In conclusion the IRP recommends that an accelerated roll-out in renewable energy options should be allowed with regards to the benefits of the localization in renewable energy technologies (RSA, 2011a). It is however important to take note that since the release of the IRP in 2011 there has been a number of developments in the energy sector of South Africa. Therefore, the IRP has been updated and were open for comments until March of 2017. The new IRP of 2019 was formally published in October 2019. The draft IRP of 2018 was open for comments until the end of October 2018. For the revision scenario analysis were conducted and the results thereof are included in the draft IRP of 2018. The results revealed that for the period ending 2030 that: *“The committed Renewable Energy Independent Power Producers Programme, including the 27 signed projects and Eskom capacity rollout ending with the last unit of Kusile in 2022, will provide more than sufficient capacity to cover the projected demand and decommissioning of plants up to approximately 2025”; “Imposing annual build limits on renewable energy will not affect the total cumulative capacity and the energy mix for the period up to 2030”; and “the scenario without renewable energy annual build limits provides the least-cost option by 2030” (RSA, 2018:34).*



Lastly, the draft IRP of 2018 also included the scenario analysis for the period post 2030. Here it was observed that: *“Imposing annual build limits on renewable energy will restrict the cumulative renewable installed capacity and the energy mix for this period; adopting no annual build limits on renewables or imposing a more stringent strategy to reduce greenhouse gas emissions implies that no new coal power plants will be built in the future unless affordable cleaner forms of coal-to-power are available; and the scenario without renewable energy annual build limits provides the least-cost option by 2050”* (RSA, 2018:34–35).

In the final IRP of 2019 key considerations were taken into consideration together with required actions to be taken for the IRP of 2019 to be credible. In terms of renewable energy technologies like solar and wind, the IRP stated that *“The application of renewable build limits ‘smoothes out’ the capacity allocations for wind and solar PV which provides a constant pipeline of projects to investment; this addresses investor confidence”*. The decision stated against this key consideration is to *“retain the current annual build limits on renewables (wind and PV) pending the finalization of a just transition plan”* (RSA, 2019:46). Hereby the IRP also recognises renewable technologies’ potential to diversify the electricity mix, create new industries and job opportunities and localize across the value chain (RSA, 2019:13).

The proposed addition to the Delta Solar Power Plant is in line with this plan as it proposes the generation of renewable energy from the solar resource and will contribute to the energy mix of the country as set out in this plan.

National Development Plan of 2030

The Presidency: -
National
Planning
Commission

The National Development Plan aims to “eliminate poverty and reduce inequality by 2030” (RSA, undated). In order to eliminate or reduce inequality, the economy of South Africa need to grow faster in order to benefit all South Africans. In May 2010 a draft national development plan was drafted, which highlighted the nine (9) key challenges for South Africa. The highest priority areas according to the plan are considered to be the creation of employment opportunities and to improve the quality of national education. In this regard, the plan sets out three (3) priority areas, namely to raise employment by a faster growing economy, improve the quality of education, and to build the capability of the state in order to play a more developmental and transformative role. One of the key challenges identified was that the economy is



unsustainably resource intensive and the acceleration and expansion of renewable energy was identified as a key intervention strategy to address this challenge.

The proposed addition to the Delta Solar Power Plant will contribute to the intervention strategy as identified within the plan.

National Infrastructure Plan of South Africa	Presidential Infrastructure Coordinating Commission	2012	<p>In the year 2012 the South African Government adopted a National Infrastructure Plan (hereafter referred to as the Plan). The aim of this Plan is to transform the economic landscape, while strengthening the delivery of basic services and creating new employment opportunities. This Plan also supports the integration of African communities, and also sets out the challenges and enablers that our country needs in order to respond to the planning and development of infrastructure with regards to fostering economic growth (RSA, 2012). The Plan has developed eighteen (18) strategic integrated projects (further referred to as SIPs). These SIPs stretch over all nine (9) provinces, covering social and economic infrastructure, and projects that enhances development and growth. Of the eighteen (18), five (5) are geographically focused, three (3) spatial, three (3) energy, three (3) social infrastructure, two (2) knowledge, one (1) regional integration, and one (1) water and sanitation focussed. The three (3) SIPs according to the Plan, which are energy focused and correlate to the proposed project are as follow:</p> <ul style="list-style-type: none">- SIP 8: Green energy in support of the South African economy;- SIP 9: Electricity generation to support socio-economic development; and- SIP 10: Electricity transmission and distribution for all. <p>SIP 8 according to the Plan “<i>support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the IRP 2010 and support bio-fuel production facilities</i>”. The purpose of SIP 9 according to the Plan is to “<i>accelerate the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances</i>”. SIP 9 should also monitor the implementation of major projects such as new power stations like Medupi, Kusile and Ingula. Lastly, SIP 10 aims to “<i>expand the transmission and distribution</i></p>
---	---	------	--



network to address historical imbalances, provide access to electricity for all and support economic development” (RSA, 2012:20).

The addition to the Delta Solar Power Plant is in line with SIP 8 and SIP 9 as it will provide “Green” energy in support of the South African Economy and will generate electricity which supports socio-economic development. The proposed power line associated with the proposed addition to the Delta Solar Power Plant is in line with SIP 10 as it will facilitate electricity transmission and distribution for all.

New Growth Path Framework Department of Economic Development -

The New Growth Path was developed after 16 years of South Africa’s democracy, to respond to emerging opportunities and risks while building on policies. This framework provides a dynamic vision on how to collectively achieve a more developed, equitable and democratic society and economy. This framework mainly reflects the commitment of the South African Government to create employment opportunities for its people in all economic policies (RSA, 2011b).

This framework sets out the markers for job creation and growth and also identify where there are viable changes in the character and structure of production, in order to create a more inclusive, greener economy on the long-term. It is stated in the framework that in order for this framework to reach its objectives, the Government is committed to:

- Identify the possible areas of employment creation; and
- Develop a policy to facilitate employment creation especially with regards to social equity, sustainable employment and growth in the creation of employment activities (RSA, 2011b).

This framework also identifies investments in five key areas, one of which is energy. This framework also states that the green economy is a priority area, which includes the construction of and investment in renewable energy technologies like solar (RSA, 2011b). In this regard it will also assist creating employment opportunities over the medium- and long-term.

Considering that the construction of and investment in renewable energy is a key area identified within the framework, the addition to the Delta Solar Power Plant is considered to be in-line with the framework.



Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa	National Department of Forestry, Fisheries and the Environment (DFFE)	2014	<p>The then Department of Environmental Affairs (DEA) has committed to contribute to the implementation of the National Development Plan and National Infrastructure Plan by undertaking Strategic Environmental Assessments (SEAs) to identify adaptive processes that integrate the regulatory environmental requirements for Strategic Integrated Projects (SIPs) while safeguarding the environment. The wind and solar photovoltaic (PV) SEA were accordingly commissioned by DEA in support of SIP 8, which aims to facilitate the implementation of sustainable green energy initiatives.</p> <p>This SEA identifies areas where large scale wind and solar PV energy facilities can be developed in terms of SIP 8 and in a manner that limits significant negative impacts on the environment, while yielding the highest possible socio-economic benefits to the country. These areas are referred to as Renewable Energy Development Zones (REDZs).</p> <p>The REDZs also provide priority areas for investment into the electricity grid. Currently one of the greatest challenges to renewable energy development in South Africa is the saturation of existing grid infrastructure and the difficulties in expanding the grid. Proactive investment in grid infrastructure is likely to be the most important factor determining the success of REDZs.</p> <p>Although it is intended for the SEA to facilitate proactive grid investment in REDZs, such investment should not be limited to these areas. Suitable wind and solar PV development should still be promoted across the country and any proposed development must be evaluated on its own merit.</p>
North West Province Growth and Development Strategy	North West Provincial Government	2004 - 2014	<p>The Strategy (PGDS) provides a framework for integrated and sustainable growth and economic development for the province and its people over the next ten years. It addresses the formulation of a common vision, goals and objectives of what should be achieved and how the provincial government and its social partners should achieve its objectives.</p> <p>The PGDS notes that the NWP is a medium-size province, covering ~10% of the total national surface area, accounting for ~8% of the national population, and contributing ~7% to the national economy. With the exception of the mining sector (~23.5% of provincial GDP in 2002), private sector activity in the NWP is very modest. Other development challenges include low population densities; inadequate infrastructure, and enormous service delivery backlogs; a predominantly poor population with high levels of illiteracy and</p>



dependency; great inequalities between rich and poor, and disparities between urban and rural; and the HIV/Aids pandemic.

Both the primary immediate and long-term objectives of the PGDS are therefore to address poverty and unemployment, while simultaneously improving the low level of expertise and skills. Additional objectives include promoting equal and fair access to opportunities and assets; enhancing competitiveness, profitability and SMME development; and ensuring sustainable development

<p>Dr. Ruth Segomotsi Mompati District Municipality Integrated Development Plan (IDP)</p>	<p>Dr. Ruth Segomotsi Mompati District Municipality</p>	<p>2020 - 2021</p>	<p>The IDP serves as the basic developmental framework and the basis for annual reviews of municipal performance for the period up to 2021. The IDP is explicitly aligned with the requirements of the Municipal Systems Act (2000) and the developmental objectives outlined in the National Priority Outcomes, and the National Medium Term Strategic Framework (2009). Identified key intervention priority areas include:</p> <ul style="list-style-type: none"> • More inclusive economic growth, decent work and sustainable livelihoods; • Developing economic and social infrastructure; • Rural development, food security and land reform; • Improving access to quality education; • Improved health care; • Fighting crime and corruption; • Sustainable resource management and use. <p>A situation analysis of the DM indicates, amongst others, the following key developmental challenges:</p> <ul style="list-style-type: none"> • The DM’s largely African population generally suffers from low education, low income and high unemployment levels, and many have minimal access to water and sanitation; • A mainly youthful African population, with a correspondingly small labour force cohort, and hence high levels of youthful dependency; • High functional illiteracy amongst the African population group;
--	---	--------------------	---



- Great dependency upon government as employer in the DM, and therefore the crucial need to develop the private sector (mainly in agriculture and mining), and develop the Small Medium Micro Enterprise (SMME) sector both in the formal and informal sectors.

Renewable energy is not directly addressed, but the IDP does indicate the transition to a low carbon economy as a DM goal, and recommends that the DM speeds up and expands renewable energy (generation).

3.4 OTHER LEGISLATION

Other legislation mainly refers to the following:

- Planning legislation governing the rezoning process and approval of the layout plan.
- Design standards and legislation for services provision such as water, sewerage, electricity, etc.
- Municipal bylaws related to building plans, building regulations, etc.

3.5 RELEVANT GUIDANCE

The following guidance was considered in conducting the BA:

- The Equator principles III (2013)¹
- World Bank Group Environmental, Health and Safety General Guidelines (EHS Guidelines) (2007)
- Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution (2007)
- International Finance Corporation's Policy on Environmental and Social Sustainability (2012)
- DEA. (2013). Draft National Renewable Energy Guideline. Department of Environmental Affairs, Pretoria, South Africa
- DEA, (2012), Guideline 5 – Final companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010
- DEA, (2012), Guideline 7 – Public participation in the Environmental Impact Assessment process
- DEA, (2012), Guideline 9 – Need and desirability
- DEAT, (2006), Guideline 3 – General guide to the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 4 – Public participation in support of the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 5 – Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations
- BirdLife, (2017). Best Practise Guidelines Birds & Solar Energy: Guidelines for assessing and monitoring the impact of solar power generating facilities on bird in southern Africa.

¹ Although this report is not written in terms of the Equator Principles (EPs), it fully acknowledges that the EPs will need to be complied with should funding for the project be required.

- North West Province Spatial Development Framework (2012)
- North West Biodiversity Conservation Assessment

3.6 CONCLUSION

The Basic Assessment was undertaken in accordance with the EIA Regulations (2017) published in GNR 326, in terms of Section 24(5) and 44 of the NEMA as amended as well as all relevant National legislation, policy documents, national guidelines, the World Bank EHS Guidelines, the IFC Performance Standards, and the Equator Principles.

The legislative and policy context plays an important role in identifying and assessing the potential social impacts associated with the proposed development. For this reason, the proposed development project will be assessed and has been considered in terms of its fit with the key legislative, policy and planning documents discussed above.

The main findings of the review of the policy documents on all spheres of Government indicated that strong support was given towards renewable energy, specifically PV solar energy and therefore it is concluded that there is support for the addition to the Delta Solar Power Plant. The White Paper on the Energy Policy of the Republic of South Africa of 1998 stated that due to the fact that renewable energy resources operate from an unlimited resource base, i.e., the sun, renewable energy can increasingly contribute towards a long-term sustainable energy supply for future generations. This policy further highlights that due to the unlimited resources base of renewable energy in South Africa, renewable energy applications like PV solar energy and associated infrastructure are more sustainable in terms of social and environmental costs. The Integrated Resource Planning for Electricity for South Africa of 2010–2030, the National Infrastructure Plan of South Africa and the New Growth Path Framework all support the development of the renewable energy sector. In particular, the IRP also indicated that 43% of the energy generations in South Africa is allocated to renewable energy applications. On a District and Local level limited attention is given explicitly to renewable sources like PV solar energy, however the documents reviewed do make provision for increase energy supply and efficiency in improving the quality of lives in terms of efficient physical infrastructure as well as socio-economic growth. At Provincial, District and Local level the policy documents indirectly support the applications of renewables as it will contribute to surety of electricity supply and improving the lives of the community.

The review of the relevant policies and documents related to the energy sector therefore indicate that renewables, like solar energy and the establishment of solar energy facilities and associated infrastructure, are supported on all spheres of Government. The proposed addition to the Delta Solar Power Plant is therefore supported by the related policy and planning documents reviewed in this section of the report.

4 THE NEED AND DESIRABILITY

This section aims to address the following requirements of the regulations:

Appendix 1. (3) A BAR (...) must include-

(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;

4.1 THE NEED FOR THE PROPOSED ACTIVITY

The proposed activity is a direct result of the growing demand for electricity and the need for renewable energy in South Africa. According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fuelled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmentally responsible development, the impacts of climate change and the need for sustainable development.

Over 90% of South Africa's electricity generation is coal based, the World bank estimates that this results in an annual, per capita carbon emission of ~8.9 tons per person. Based on 2008 fossil-fuel CO₂ emissions statistics released by the Carbon Dioxide Information Analysis Centre, South Africa is the 13th largest carbon dioxide emitting country in the world and the largest emitter in Africa (Boden, et al. 2011). In August 2021 article confirmed that South Africa is the 12th highest greenhouse gas emitter in the world (Mashego, 2021).

The proposed project is intended to form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or any other appropriate energy generation programmes / opportunities. The REIPPP Programme aims to secure 14 725 Megawatts (MW) of new generation capacity from renewable energy sources, while simultaneously diversifying South Africa's electricity mix. According to the 2021 State of the Nation Address, Government will soon be initiating the procurement of an additional 11 800 MW of power from renewable energy, natural gas, battery storage and coal in line with the Integrated Resource Plan 2019 and fulfilling their commitments under the United Nations Framework Convention on Climate Change and its Paris Agreement which include the reduction of greenhouse gas emissions. Eskom, the largest greenhouse gas emitter of South Africa, has committed in principle to net zero emission by 2050 and to increase its renewable capacity. During the 2022 State of the Nation Address it was indicated that during the past year the government had taken "firm steps" to bring additional generation capacity online as quickly as possible to close the shortfall in terms of electricity. As a result, it was confirmed that several new generation projects will be coming online over the next few years.

Besides capacity additions, several assumptions have changed since the promulgation of the IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant performance, as well as new technology costs. These changes necessitated the review and update of the IRP which resulted in the draft IRP 2018 as per table 4.1 below:

Table 4.1: Published Draft IRP 2018 (Approved by Cabinet for Consultation)

	Coal	Nuclear	Hydro	Storage (Pumped Storage)	PV	Wind	CSP	Gas / Diesel	Other (CoGen, Biomass, Landfill)	Embedded Generation						
2018	39 126	1 860	2 196	2 912	1 474	1 980	300	3 830	499	Unknown						
2019	2 155					244	300			200						
2020	1 433				114	300				200						
2021	1 433				300	818				200						
2022	711				400					200						
2023	500									200						
2024	500									200						
2025					670	200				200						
2026					1 000	1 500		2 250		200						
2027					1 000	1 600		1 200		200						
2028					1 000	1 600		1 800		200						
2029					1 000	1 600		2 850		200						
2030			2 500		1 000	1 600				200						
TOTAL INSTALLED	33 847	1 860	4 696	2 912	7 958	11 442	600	11 930	499	2600						
Installed Capacity Mix (%)	44.6	2.5	6.2	3.8	10.5	15.1	0.9	15.7	0.7							
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; height: 10px; background-color: #cccccc; border: 1px solid black;"></td> <td>Installed Capacity</td> </tr> <tr> <td style="width: 20px; height: 10px; background-color: #ffff00; border: 1px solid black;"></td> <td>Committed / Already Contracted Capacity</td> </tr> <tr> <td style="width: 20px; height: 10px; background-color: #90ee90; border: 1px solid black;"></td> <td>New Additional Capacity (IRP Update)</td> </tr> </table>												Installed Capacity		Committed / Already Contracted Capacity		New Additional Capacity (IRP Update)
	Installed Capacity															
	Committed / Already Contracted Capacity															
	New Additional Capacity (IRP Update)															

According to the South African Energy Sector Overview (2021), there is currently 1 723MW of installed PV capacity, while an additional 2 600MW from wind and solar has been rewarded as part of Bid Window 5.

The south African National Government announced the amended Request for Proposal (RFP) to increase the MW allocation under the REIPPPP Bid Window (BW) 6 on 11 September 2022, in response to the announcement by the President on 25 July 2022. The capacity to be procured currently under BW 6 will now increase from 2600MW to 4200MW. This follows the conclusion of all required governance approvals, including Eskom approval.

To clarify the procurement process currently underway, due to the urgency required to resolve the electricity supply crisis, the government decided to proceed with increasing Wind allocation from 2600 MW to 3200MW at this stage, in line with the Second Determination of 2020. Rather than delay this RFP for all requests to be approved, government opted to issue the current RFP for 4200 MW as opposed to delaying the entire Bid Window. A further announcement regarding the remaining 1000 MW of Solar PV, will be made following the conclusion of the NERSA process regarding the concurrence of the new determination. At the end of this process, they aim to be adding a total of 5200 MW under BW 6 to the Grid.

Government, through the ongoing urgent work of the National Energy Crisis Committee, remains on track to end load-shedding and achieve energy security.

4.2 THE DESIRABILITY OF THE PROPOSED ACTIVITY

The contribution of the expansion of the facility towards sustainable development and the associated benefits to society in general is discussed below:

- Lesser dependence on fossil fuel generated power - The deployment of the facility will have a positive macro-economic impact by reducing South Africa's dependence on fossil fuel generated power and assisting the country in meeting its growing electricity demand.
- Increased surety of supply - By diversifying the sources of power in the country, the surety of supply will increase. The power demands of South Africa are ever increasing and by adding solar power this demand can be met, even exceeded without increasing pollution in relation to the use of fossil fuels. The project has the potential of "securing" economic activity by assisting in removing supply constraints if Eskom generation activities result in a supply shortfall. When supply is constrained, it represents a limitation to economic growth. When a supply reserve is available, it represents an opportunity for economic growth.
- Local economic growth - The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the North West Province. The project will likely encounter widespread support from government, civil society and businesses, all of whom see potential opportunities for revenues, employment and business opportunities locally. The proposed addition to the photovoltaic solar facility will in turn lead to growth in tax revenues for local municipalities and sales of carbon credits, resulting in increased foreign direct investment.
- Lower costs of alternative energy – The addition to the Delta SPP and increase in the number of solar facilities commissioned will eventually reduce the cost of the power generated through solar facilities. This will contribute to the country's objective of utilising more renewable energy and less fossil fuel-based power sources. It will assist in achieving the goal to generate 14 725 MW of electricity from renewable energy as per the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme of the Department of Mineral Resources and Energy. The Government will be initiating the procurement of an additional 11 800 MW of renewable energy as stated during the 2021 State of the Nation Address.
- Reduction in greenhouse gas emissions - The additional power supplied through solar energy will reduce the reliance on the combustion of fossil fuels to produce power. The South African electricity grid is predominantly coal-fired and therefore Greenhouse Gas (GHG) emissions intensive (coal accounts for more than 92% of the fuel used in South Africa's electricity generation). The reduction of GHG emissions as a result of the project implementation will be achieved due to reduction of CO₂ emissions from combustion of fossil fuels at the existing grid-connected power plants and plants which would likely be built in the absence of the project activity.
- CDM Project - A solar energy facility also qualifies as a Clean Development Mechanism (CDM) project (i.e., a financial mechanism developed to encourage the development of renewable technologies).
- Climate change mitigation - On a global scale, the project makes a contribution to greenhouse gas emission reduction and therefore contributes toward climate change mitigation.

- Reduced environmental impacts - The reduction in electricity consumed from the grid will not only result in a reduction in greenhouse gas emissions, but also the prevention of negative impacts associated with coal mining. For example, coal power requires high volumes of water, in areas of South Africa where water supply is already overstretched and water availability is highly variable. Photovoltaic solar energy technology also does not produce the sulphur emissions, ash or coal mining concerns associated with conventional coal fired electricity generation technologies resulting in a relatively low level of environmental impacts. It is a clean technology which contributes toward a better-quality environment for employees and nearby communities.
- Social benefits - The project activity is likely to have significant long-term, indirect positive social impacts that may extend to a regional and even national scale. The larger scale impacts are to be derived in the utilisation of solar power and the experience gained through the construction, expansion, and operation of the power plant. In future, this experience can be employed at other similar solar installations in South Africa.
- Provision of job opportunities - The main benefit of the proposed development operating in the area is that local companies or contractors will be hired for the duration of the construction period. The operational phase will provide permanent job opportunities to the local communities from the surrounding area since security guards and general labourers will be required on a full-time basis. Approximately 800 employment opportunities will be created during the construction and 15 - 70 operational phases for the entire Delta SPP.
- Indirect socio-economic benefits - The increase in the demand for services such as accommodation, transportation, security, general maintenance and catering will generate additional indirect socio-economic benefits for the local community members.
- Effective use of resources - Because of predominantly the climate and soil limitations (shallow soils), the site has limited suitability for cultivated crops, and viable agricultural land use is limited to grazing only, with limited areas under pivot irrigation. The proposed addition to the Delta SPP in this specific area will generate alternative land use income through rental for the energy facility, which will have a positive impact on agriculture. It will provide the farming enterprise with increased cash flow and rural livelihood, and thereby improve the financial sustainability of agricultural activities by the landowner.
- Cumulative impacts of low to medium significance —No cumulative impacts with a high residual risk have been identified. In terms of the desirability of the development of sources of renewable energy therefore, it may be preferable to incur a higher cumulative loss in such a region as this one, than to lose land with a higher environmental value elsewhere in the country.

5 DESCRIPTION OF ENVIRONMENTAL ISSUES

This section aims to address the following requirements of the regulations:

Appendix 1. (3) A BAR (...) must include-

- (g) A motivation for the preferred site, activity and technology alternative;
- (h) a full description of the process followed to reach the proposed preferred alternative, within the site, including –
 - (i) details of all the alternatives considered;
 - (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;
 - (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;
 - (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
 - (viii) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;
 - (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and
 - (xi) a concluding statement indicating the preferred alternative development location within the approved site.

5.1 CONSIDERATION OF ALTERNATIVES

The DFFE 2006 guidelines on ‘assessment of alternatives and impacts’ proposes the consideration of four types of alternatives namely, the no-go, location, activity, and design alternatives. It is, however, important to note that the regulation and guidelines specifically state that only ‘feasible’ and ‘reasonable’ alternatives should be explored. It also recognizes that the consideration of alternatives is an iterative process of feedback between the developer and EAP, which in some instances culminates in a single preferred project proposal.

An initial site assessment (refer to Appendix E) was conducted by the developer on the Remaining Extent of the farm Kareefontein No. 340, Registration Division H.O., North West and the project site was found to be favourable due to its proximity to grid connections, environmental conditions, relatively flat terrain, high solar radiation values and adequate site access. Some areas of the farm have been deemed less suitable for the proposed development such as areas close to wetlands. These factors were taken into consideration and avoided as far as possible. The site selection also took the site geology, terrain, conservation planning, land capability, grazing capability, water availability and land use into consideration before deciding the specific site.

The following sections explore different types of alternatives in relation to the proposed project in more detail.

5.1.1 No-go alternative

This alternative considers the option of ‘do nothing’ and maintaining the status quo. The baseline conditions (status quo) would entail a solar power plant with the capacity to generate up to 100MW electrical power through photovoltaic (PV) panels as approved on the Original Delta Site. The total footprint of the project will also be limited to approximately be 171 hectares. If the addition is not granted the project will be less desirable and less efficient and the advantages associated with the increase in capacity will be lost.

According to the Social Impact Assessment (2014 and 2022) the no-go alternative “would represent a lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. Given South Africa’s position as one of the highest per capita producers of carbon emissions in the world, this would represent a High negative social cost. The no-go alternative also represents a lost opportunity in terms of the employment and business opportunities associated with the proposed development, and the benefits associated with the establishment of a Community Trust. This also represents a negative social cost.

The Social Impact Assessment (2014) further states that “at a provincial and national level, it should be noted that the proposed development is not unique. In that regard, a significant number of renewable energy developments, are currently proposed in the North West Province and South Africa. Foregoing the proposed development would therefore not necessarily compromise the development of renewable energy facilities in the North West Province or South Africa. However, the socio-economic benefits of the local communities in the Lekwa-Teemane Local Municipality would be foregone.

5.1.2 Location alternatives

This alternative asks the question, if whether there is not, from an environmental perspective, a more suitable location for the proposed activity. From a local perspective, the area chosen for the proposed addition to the Delta SPP on the Remaining Extent of the farm Kareefontein No. 340, is preferred due to its suitable climatic conditions, topography (i.e. in terms of slope), environmental conditions (i.e. agricultural potential, geology, and archaeology), proximity to a grid connection point (i.e. for the purpose of electricity evacuation), as well as site access (i.e., to facilitate the movement of machinery, equipment, infrastructure, and people during the construction phase).

The proposed development falls within an area used for grazing and the site is therefore considered to have limited environmental sensitivity as a result. The assessment area is associated with non-arable lands, due to the type of soils in the area. The available climate limits crop production significantly. The harsh climatic conditions are associated with low annual rainfall and high evapotranspiration potential demands of the area, which consequently result into a very restricted choice of crops due to the heat and moisture stress.

The area is not favourable for most cropping practices, which corresponds to the current livestock and game farming activities in the area.

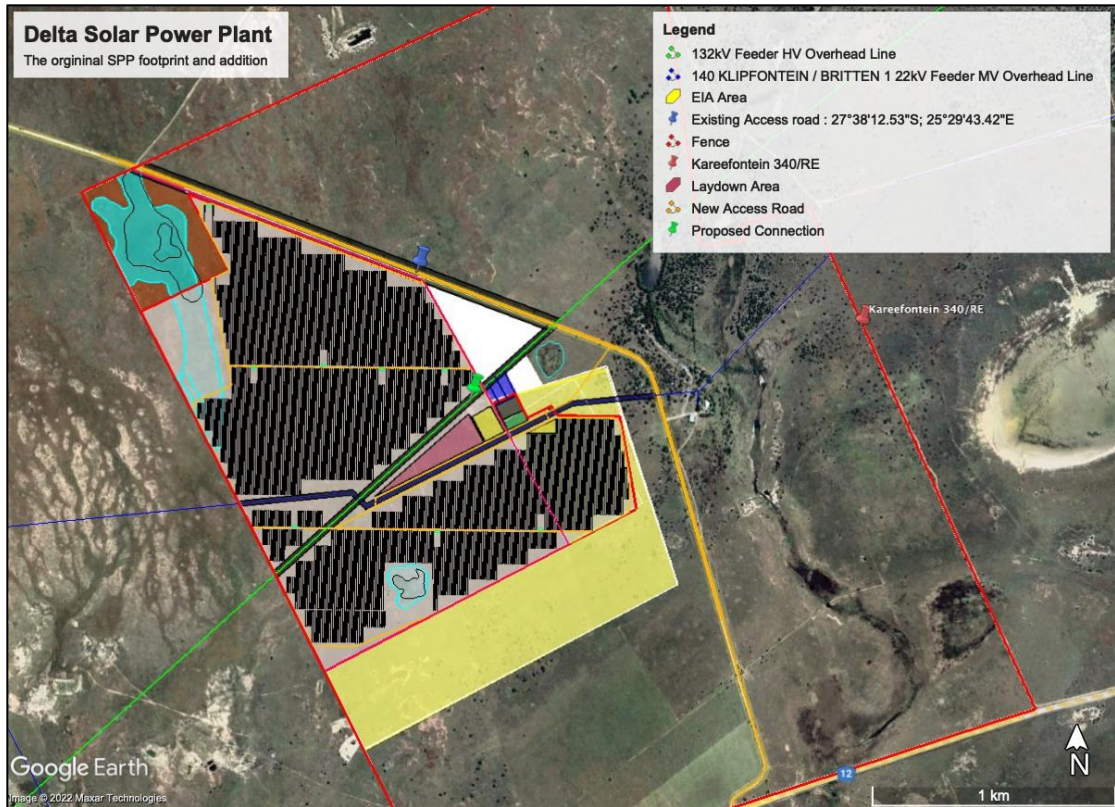


Figure 5.1: Location of the preferred alternative for the addition to the Delta Solar Power Plant development footprint

5.1.3 Activity alternatives

The scoping process also needs to consider if the expansion of the solar PV facility would be the most appropriate land use for the particular site.

Photovoltaic (PV) solar facility – Delta Solar Power Plant is part of a portfolio of solar PV projects throughout South Africa, focussing on the Northern Cape, North West and Free State Provinces. Delta Solar Power Plant is of the opinion that solar PV technology is perfectly suited to the site, given the high irradiation values for the Bloemhof area – refer to figure 5.2

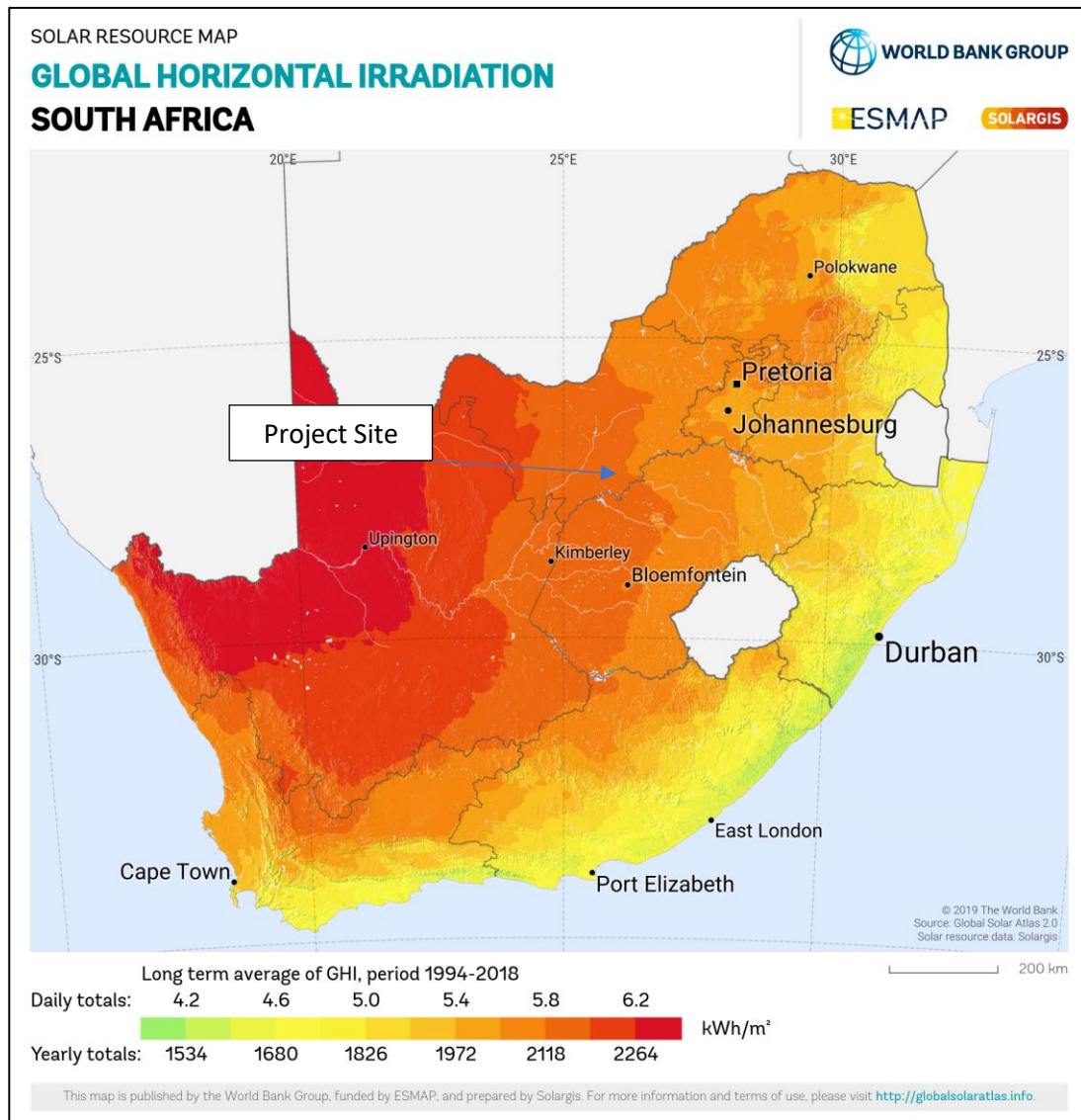


Figure 5.2: Global horizontal irradiation values for South Africa (SolarGIS, 2011) and the location of the Delta Solar Power Plant.

The technology furthermore entails low visual impacts, has relatively low water requirements, is a simple and reliable type of technology and all of the components can be recycled.

- **Wind energy facility** - Due to the local climatic conditions a wind energy facility is not considered suitable as the area does not have the required wind resource. Furthermore, the applicant has opted for the generation of electricity via solar power rather than the use of wind turbines. This alternative is therefore regarded as not feasible and will not be evaluated further in this report.
- **Concentrated solar power (CSP) technology** - CSP technology requires large volumes of water, and this is a major constraint for this type of technology. While the irradiation values are high enough to generate sufficient solar power, the water constraints render this alternative not feasible. Therefore, this alternative will not be considered further in this report.

5.1.4 Technical alternatives

It is expected that generation from the facility will tie in with the Bloemhof-Wildhoeven 132.0 [kV] power line. The transmission line will be constructed within 36m wide servitude. The 132kV overhead transmission line is the only preferred alternative for the applicant.

5.1.5 Design and layout alternatives

Design alternatives were considered throughout the planning and design phase (i.e., what would be the best design option for the development?). In this regard discussions on the design were held between the EAP and the developer. The layout follows the limitations of the site and aspects such as environmental sensitive areas, roads, fencing and servitudes are considered – refer to figure I. The total surface area proposed for layout options include the PV panel arrays spaced to avoid shadowing, access and maintenance roads and associated infrastructure (buildings, power inverters, transmission lines and perimeter fences).

With regards to the structure orientation, the panels will either be fixed to a single axis horizontal tracking structure where the orientation of the panel varies according to the time of the day, as the sun moves from east to west or tilted at a fixed angle equivalent to the latitude at which the site is located in order to capture the most sun.

5.1.6 Technology alternatives

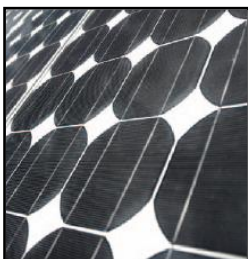
There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon and thin film. These technologies are discussed in more detail below:

- **Photovoltaic solar panels**

There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon, thin film or bifacial PV panels. These technologies are discussed in more detail below:

- **Crystalline (high efficiency technology at higher cost)**

Crystalline silicon panels are constructed by first putting a single slice of silicon through a series of processing steps, creating one solar cell. These cells are then assembled together in multiples to make a solar panel. Crystalline silicon, also called wafer silicon, is the oldest and the most widely used material in commercial solar panels. Crystalline silicon modules represent 85-90% of the global annual market today. There are two main types of crystalline silicon panels that can be considered for the solar facility:



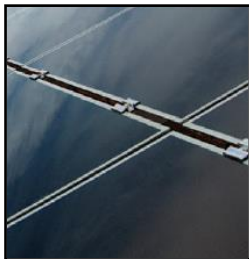
- ***Mono-crystalline Silicon*** - mono-crystalline (also called single crystal) panels use solar cells that are cut from a piece of silicon grown from a single, uniform crystal. Mono-crystalline panels are among the most efficient yet most expensive on the market. They require the highest purity silicon and have the most involved manufacturing process.



- **Poly-crystalline Silicon** – poly-crystalline panels use solar cells that are cut from multifaceted silicon crystals. They are less uniform in appearance than mono-crystalline cells, resembling pieces of shattered glass. These are the most common solar panels on the market, being less expensive than mono-crystalline silicon. They are also less efficient, though the performance gap has begun to close in recent years (First Solar, 2011).

- **Thin film (low-cost technology with lower efficiency)**

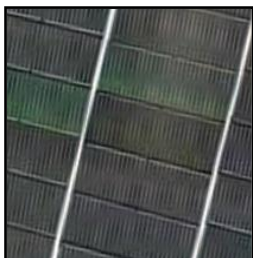
Thin film solar panels are made by placing thin layers of semiconductor material onto various surfaces, usually on glass. The term *thin film* refers to the amount of semiconductor material used. It is applied in a thin film to a surface structure, such as a sheet of glass. Contrary to popular belief, most thin film panels are not flexible. Overall, thin film solar panels offer the lowest manufacturing costs, and are becoming more prevalent in the industry. Thin films currently account for 10-15% of global PV module sales. There are three main types of thin film used:



- **Cadmium Telluride (CdTe)** - CdTe is a semiconductor compound formed from cadmium and tellurium. CdTe solar panels are manufactured on glass. They are the most common type of thin film solar panel on the market and the most cost-effective to manufacture. CdTe panels perform significantly better in high temperatures and in low-light conditions.



- **Amorphous Silicon** - Amorphous silicon is the non-crystalline form of silicon and was the first thin film material to yield a commercial product, first used in consumer items such as calculators. It can be deposited in thin layers onto a variety of surfaces and offers lower costs than traditional crystalline silicon, though it is less efficient at converting sunlight into electricity.



- **Copper, Indium, Gallium, Selenide (CIGS)** - CIGS is a compound semiconductor that can be deposited onto many different materials. CIGS has only recently become available for small commercial applications and is considered a developing PV technology (First Solar, 2011).

- **Bifacial panels:**

As the name suggests, bifacial solar panels have two faces, or rather, they can absorb light from both sides of the panel. A lot of potential energy transfer is lost in traditional solar cells when the light hits the back of a solar panel. Most bifacial solar panels use monocrystalline cells, whereas traditional cells use polycrystalline materials. The monocrystalline materials, alongside the clear light pathway on both sides of the panel, enable the light to be absorbed from either side of the cell, and it is thought that, that the overall efficiency of these cells can be up to 30% greater in commercial applications. Although, the exact amount is variable depending on the surface that they are installed on. The front side of the solar panel still absorbs most of the solar light, but the back side of the solar panel can absorb between 5-90% of the light absorbed by the front of the solar panel.

Traditional solar panels use an opaque back sheet. By comparison, bifacial solar panels either have a clear/reflective back sheet or have dual panes of glass. Most of these solar panels are frameless so any issues with potential-induced degradation (PID) are reduced. To efficiently convert light into electricity from both sides, bifacial solar cells have selective-area metallization schemes that enable light to pass between the metallized areas, rather than the conventional thick metal collectors as seen with monofacial solar panels.

The technology that (at this stage) proves more feasible and reasonable with respect to the proposed solar facility is crystalline silicon panels, due to it being non-reflective, more efficient, and with a higher durability. However, due to the rapid technological advances being made in the field of solar technology the exact type of technology to be used, such as bifacial panels, will only be confirmed at the onset of the project.

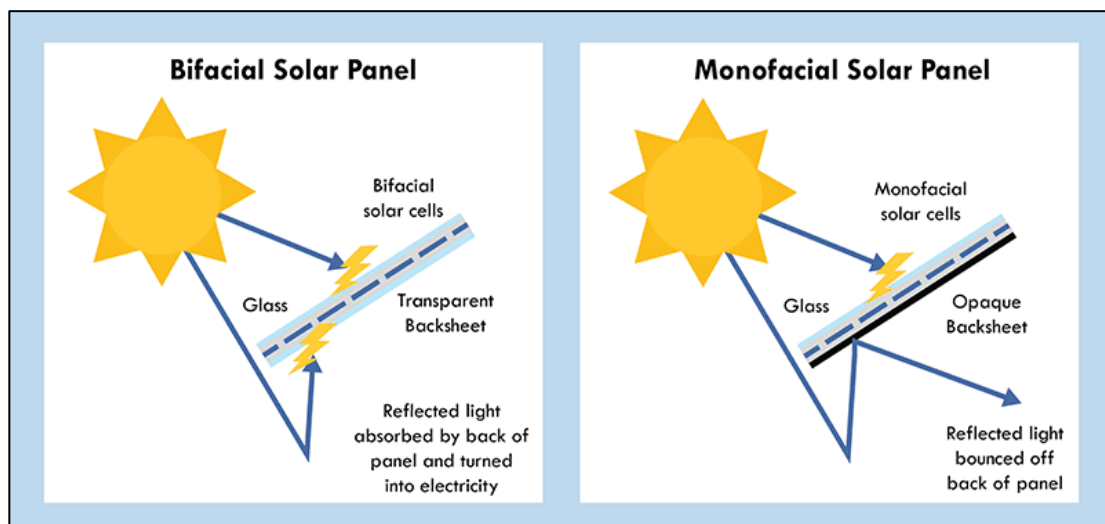


Figure 5.3: Bifacial vs Monofacial Solar Panel absorption

5.2 PUBLIC PARTICIPATION PROCESS

The following sections provide detailed information on the public participation process conducted in terms of Regulations 39 to 44.

5.2.1 General

The public participation process will be conducted strictly in accordance with Regulations 39 to 44. The following three categories of variables will be taken into account when deciding the required level of public participation:

- The scale of anticipated impacts
- The sensitivity of the affected environment and the degree of controversy of the project
- The characteristics of the potentially affected parties

Since the scale of anticipated impacts is low, the low environmental sensitivity of the site (i.e., used for grazing) and the fact that no conflict was foreseen between potentially affected parties, no additional public participation mechanisms were considered at this stage of the process. The following actions have already been taken:

➤ Newspaper advertisement

Newspaper advertisement: Since the proposed development is unlikely to result in any impacts that extend beyond the municipal area where it is located, it is deemed sufficient to advertise in a local newspaper. An advertisement was placed in English in the Stellalander local newspaper on 14 September 2022, notifying the public of the BA process and requesting Interested and Affected Parties (I&APs) to register with and submit their comments to Environamics Environmental Consultants. I&APs were given the opportunity to raise comments within 30 days. The public was informed that copies of the report will be made available to all registered I&AP's and relevant State Departments. The report will be made available through an online document sharing platform (Company website, Dropbox, Google Drive etc.) and the link will be included in the notification of the availability of the report to ensure the I&AP's have immediate access to the report and the full advantage of the 30-day commenting period. The public can register as I&APs and raise comments via post, email, WhatsApp or SMS.

➤ Site notices

Site notices were placed on site (coordinates provided in Appendix C2) in English and Afrikaans on 27 May 2022, to inform surrounding communities and immediately adjacent landowners of the proposed development. I&APs were given the opportunity to raise comments within 30 days. The public were informed that copies of the report will be made available to all registered I&AP's and relevant State Departments. The report will be made available through an online document sharing platform (Company website, Dropbox, Google Drive etc.) and the link will be included in the notification of the availability of the report to ensure the I&AP's have immediate access to the report and the full advantage of the 30-day commenting period. The public can register as I&APs and raise comments via post, email, WhatsApp or SMS.

➤ Direct notification of identified I&APs

Written notices were not provided prior to the DBAR to all surrounding landowners, occupiers and other stakeholders due to extensive public participation since 2014 on the original EIA and amendments.

➤ Circulation of the Draft BAR

The registered I&APs were notified of the availability of the draft BAR at the commencement of the 30-day review and comment period. This included the details of where the report can be accessed. They were requested to provide their comments on the report within 30days (14 November – 14 December). All issues that are identified, raised and recorded will be documented and compiled into a Comments and Responses Report (Appendix C6) and included as part of the Final Basic Assessment Report. The following Registered I&APs and key stakeholders will be provided with a copy of the Draft BAR (refer to Appendix G4):

- The Department of Water Affairs
- The Department of Water Affairs– North West Regional Office
- The National Department of Agriculture
- The Department of Mineral Resources and Energy
- The South African Heritage Resources Agency (SAHRA) The Provincial Heritage Resources Agency (PHRA), North West
- ESKOM
- The Civil Aviation Authority (CAA)
- The Department of Mineral Resources
- Department of Communications (DoC)
- Dr Ruth Segomotsi Mompati District Municipality
- Lekwa-Teemane Local Municipality
- SENTECH
- Square Kilometre Array (SKA)
- Mr. Barry Wentzel
- Mr. Ian Wentzel

5.2.2 Consultation process

Regulation 41 requires that the landowner, surrounding landowners, municipality, relevant ward councillor, any organ of state having jurisdiction in respect of any aspect of the activity and any other party as required by the competent authority should be given written notice of the activity. A complete list of all the consultees who received written notice as well as proof of correspondence is attached as Appendices C.

5.2.3 Registered I&APs

I&APs include all stakeholders who deem themselves affected by the proposed activity. According to Regulation 43(1) *“A registered interested and affected party is entitled to comment, in writing, on all reports or plans submitted to such party during the public participation process contemplated in these Regulations and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to the consideration of the application, provided that the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application.”*

This report is the Draft Basic Assessment Report which will be made available to all potential and/or registered I&APs and State Departments. They will be provided with a copy of the Draft BAR and have been requested to provide written comments on the report within 30 days. All issues identified during this review period will be documented and compiled into a Comments and Response Report to be included as part of the Final BAR (Appendix C6).

All comments received prior to the release of the Draft BAR for the 30-day review and comment period have been included in this report as Appendix C5 and Appendix C6 to provide I&APs an opportunity to confirm that their comments raised during the initial public participation phase have been included and considered.

5.2.4 Issues raised by I&APs and consultation bodies

To date no comments have been received from any consultation bodies, including the interim comment from SAHRA, but will be summarised in the Comments and Response Report included in Appendix C6. Any comments received during the circulation of the Draft BAR will be summarised in the Final BAR. The full wording and original correspondence will be included in Appendix C5 and Appendix C6.

6 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PREFERRED ALTERNATIVE

The following sections provide general information on the biophysical and socio-economic attributed associated with the preferred location alternative.

6.1 Biophysical environment

The biophysical environment is described with specific reference to geology and soils, vegetation and landscape features, climate and the visual landscape. However, due to the fact that the area proposed for development exclusively consists of land used for grazing, nothing of note was identified from an ecological or conservation point of view apart from the wetlands and/or pans in close proximity to the site

6.1.1 Geotechnical Conditions

According to the land type database (Land Type Survey Staff, 1972 - 2006) the assessment corridor to be focused on falls within the Ae 36 land type. The Ae 36 land type is mostly predominated by Hutton, Rensburg, Mispah and Katspruit soil forms with also the occurrence of bare rocks and the possibility of other soils occurring throughout, following the South African soil classification working group (1990). The Ae land types are characterised with shallow profiles and occurrence of rocky areas. Furthermore, they are characterised with red to yellow-brown apedal and freely drained soils.

The geology of the area is made up of sand, with andesite occurring to the east and west. The original vegetation is classified as Dry Sandy Highveld Grassland. The topography is described as plains and pans and the Vaal River occur about to 5 km to the south of the site. The study area is currently used for grazing purposes.

The geology of the region consists of the andesitic lavas of the Allanridge Formation as well as the fine-grained sediments of the Karoo Supergroup. It consists of deep sandy to loamy soils from the Hutton soil form (Ae and Ah land types) on top of undulating sandy plains (Mucina and Rutherford, 2006).

6.1.2 Ecological habitat and landscape features

In terms of vegetation type the site falls within the Kimberley Thornveld of the Eastern Kalahari Bushveld Bioregion, which is identified as a 'Least Threatened' ecosystem with the national target for conservation protection for Kimberley Thornveld being 16%, and is therefore not included in the list of threatened ecosystems. Kimberley Thornveld extends throughout most of the Kimberley, Hartswater, Bloemhof and Hoopstad Districts and is characterised by plains that are often slightly irregular with a well-developed tree and shrub layer with occasional dense stands of *Tarchonanthus camphoratus* and *Senegalia mellifera*. The grass layer is open with much uncovered soil. Only 2% is statutorily conserved in Vaalbos National Park as well as in Sandveld, Bloemhof Dam and S.A. Lombard Nature Reserves. Some 18% has been transformed, mostly by cultivation. The area is mostly used for cattle farming or game

ranching, and it is noted that overgrazing leads to the encroachment of *Senegalia mellifera* subsp. *detinens*.

The Terrestrial Ecology Assessment (refer to Appendix D3) indicated that the vegetation profile of the landscape was composed of large areas of open grassland, dominated by *Eragrostis* spp., *Aristida* spp., and patches of *Themeda triandra*, and smaller areas of woodland defined by *Searsia lancea*, *Hertia pallens*, *Asparagus laricinus*, *A. suaveolens*, and *Tarchonanthus camphoratus* trees and shrubs – with occurrences of *Lasiosiphon polycephalus*, *Vachellia karroo* and *Gymnosporia buxifolia*. A diversity of shrublets were found throughout the area in varying densities, including *Pentzia calcarea*, *Ruschia* spp., *Melolobium canescens*, *Rosenia humilis*, and *Felicia hirsuta*. The geophyte *Albuca setosa* was also found to be widespread across the site.

No Species of Conservation Concern (SCC) flora species were recorded, however ten (10) individual *Vachellia erioloba* (Camel Thorn) trees were observed south of the site, six (6) of which were found within the site boundary. *Vachellia erioloba* is listed as a nationally protected tree in terms of the National Forests Act, No. 84 of 1998, and no individual may be disturbed without the appropriate permit.

Due to the effects of the dry season on the vegetation of the region many indigenous plants occurring in the area may not have been observable or identifiable. Therefore, it is recommended that a wet season walkthrough of the site be conducted prior to the commencement of the project construction phase.

Modified Grassland was the most dominant habitat type within the site and is characterised by open savannah impacted by heavy overgrazing which has resulted in extensive portions of low grasses and sections of bare land with high erosion potential. The habitat has a low level of functionality in its current state and is likely to only support the occasional foraging of regional SCC fauna species. The occurrence of flora SCC in these areas is regarded as highly unlikely.

Portions towards the southern half of the site were found to be representative of Modified Thornveld habitat, which encompasses areas with a higher diversity of herbaceous species and a greater density of large shrubs and trees. This habitat unit has a higher level of functionality than the Modified Grassland and local SCC fauna species may occasionally forage and nest in these areas. A number of protected *Vachellia erioloba* trees were observed within the Modified Thornveld and this adds to the habitat's importance.

The watercourse areas include those portions of land which have been confirmed as seasonally or temporarily wet, such as wetland depressions and drainage features, by the most recent wetland study. Although no clear signs of hydrophytic vegetation were observed, in the wet season these areas are likely to serve as an important foraging resource for local fauna, including the numerous avifaunal species that are confirmed to occur within the nearby IBA. It is also likely that the 'Near Threatened' *Pyxicephalus adspersus* (Giant Bull Frog) utilises the seasonally wet areas as breeding habitat.

The footprint occurs within CBA2 areas according to the provincial conservation plan, however, following the findings of this assessment most of the local habitat is considered to exist in a degraded state with only a low level of functionality. Ecologically the proposed footprint is of 'Low' to 'Medium' sensitivity, owing to the secondary state of much of the area

and the obvious disturbances. It is noted that certain sections of the site represent more intact areas of habitat (the watercourse and Modified Thornveld areas), and these are considered to be more functional with regards to the CBA status of the footprint, whereby they should be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems, and land uses should maximise the retention of biodiversity pattern and ecological process (READ, 2015). No flora SCC are expected, however numerous *Vachellia erioloba* (Camel Thorn) trees were recorded.

It is unlikely that there would be a threat to any threatened animal species or any other animal species of particular conservation concern.

The completion of the terrestrial desktop and field studies disputes the 'Very High' sensitivity presented by the screening report. As discussed above, most of the area represents Modified Grassland habitat which has been exposed to significant levels of historical disturbance and is thus assigned a 'Low' sensitivity. Portions of land within the PAOI, namely the Modified Thornveld and Watercourse habitats, maintain a higher level of functionality and are assigned a 'Medium' sensitivity.

6.2 Soil, land capability and agricultural potential

The Biodiversity Company (TBC) was appointed by Delta Solar Power Plant (Pty) Ltd. to conduct an Agricultural and Soils Impact Assessment for the proposed development (refer to Appendix D5). The findings of the study are summarized below:

6.2.1 Climate and water availability

According to Mucina and Rutherford (2006) the site falls within a vegetation type is characterised by a summer rainfall with a Mean Annual Precipitation (MAP) that ranges between 300 mm and 500 mm. Frost frequently occurs during the winter. Temperatures ranges from 37.5°C in the summer to -4.1°C in the winter. Most of the rainfall is of convectonal origin and peaks in late summer. The overall Mean Annual Temperature is within warm-temperate ranges (nearly 18.7°C). January is the hottest month of the year with an average temperature of 24.3°C and the lowest average temperature occurs in July at 10.9°C. One of the most important climate parameter for agriculture in a South African context is moisture availability, which is the ratio of rainfall to evapotranspiration.

6.2.2 Terrain, topography and drainage

The topography of the site is relative stable with elevations ranging between approximately 1235 mamsl and 1237mamsl. Coinciding with the farm topography, surface drainage across the farm is directed towards the south and towards the Vaal River. Most of the regulated area is characterised by a slope percentage between 0 to 6% with some irregularities in areas with slopes reaching 10%. This site has a non-uniform topography with occurrence of some steep sloping areas being present. The Digital Elevation Model (DEM) of the project area indicates an elevation of 1218 to 1236 Metres Above Sea Level (MASL). There are no drainage courses on the site. During the hydrocensus, a total of 7 privately owned boreholes was identified within an 2km radius of the site. Only one borehole located on site.

6.2.3 Soil

The land type classification is a nationwide survey that groups areas of similar soil, terrain and climate conditions into different land types. According to the land type database (Land Type Survey Staff, 1972 - 2006) the assessment corridor to be focused on falls within the Ae 36 land type. The Ae 36 land type is mostly predominated by Hutton, Rensburg, Mispah and Katspruit soil forms with also the occurrence of bare rocks and the possibility of other soils occurring throughout, following the South African soil classification working group (1990). The Ae land types are characterised with shallow profiles and occurrence of rocky areas. Furthermore, they are characterised with red to yellow-brown apedal and freely drained soils. The soils have a high base status with profiles deeper than 300 mm without any occurrence of dunes. The geology of the Ae 36 land type includes andesitic to basaltic lava of the Ventersdorp Supergroup, sometimes overlain by calcrete. It also includes Dwyka tillite geology that occurs in some places however, in the north-west Black Reef quartzite may occur sporadically.

The soil was hand augured to the first restricting layer or 1,5 m. Soil survey positions were recorded as waypoints using a handheld GPS. Landscape features such as existing open trenches were also helpful in determining soil types and depth.

The most sensitive soil forms identified within the assessment area are the Nkonkoni, Hutton, Ermelo and Clovelly soil forms. The land capability sensitivities (DAFF, 2017) indicate land capabilities with “Very low to Moderate High” sensitivities. The assessment area is associated with non-arable lands, due to the type of soils in the area.

6.2.4 Agricultural capabilities



Land capability is the combination of soil suitability and climate factors. The assessment area is associated with non-arable lands, due to the type of soils in the area. The available climate limits crop production significantly. The harsh climatic conditions are associated with low annual rainfall and high evapotranspiration potential demands of the area, which consequently result into a very restricted choice of crops due to the heat and moisture stress. The area is not favourable for most cropping practices, which corresponds to the current livestock and game farming activities in the area.


The limitations to agriculture are the low moisture availability with high variability of rainfall. As a result of these limitations, cultivated crops are not viable.

6.2.5 Land use and development on and surrounding the site

The project area is located south east of the SA Lombard Nature Reserve and west of the Sandveld Nature Reserve. The surrounding land use includes, residential, commercial, recreational, watercourses, livestock and crop production.

Table 6.1: Summary of the Vegetation units present at the Delta Solar Power Plant

Vegetation Unit	Description	Characteristics & Dominant Flora	Photograph
Modified Grassland	Gently undulating open savannah habitat of a low functionality, impacted by heavy grazing and weedy annuals in many areas.	<p>Open savannah impacted by heavy overgrazing which has resulted in extensive portions of low grasses and sections of bare land with high erosion potential.</p> <p><i>Themeda triandra</i>, <i>Aristida</i> spp. and <i>Eragrostis</i> spp. grasses with a strong population of shrublets such as <i>Pentzia calcarea</i> and <i>Rosenia humilis</i>.</p>	
Modified Thornveld	Wooded savannah habitat with a low-moderate functionality and a higher diversity of flora species than the Modified Grassland areas.	<p>Areas with a higher diversity of herbaceous species and a greater density of large shrubs and trees.</p> <p><i>Searsia lancea</i>, <i>Tarchonanthus camphoratus</i>, and <i>Asparagus</i> spp. trees and shrubs. <i>Vachellia erioloba</i> trees (protected) were recorded in this habitat. Shrublets were noted throughout the area.</p>	

<p>Watercourse</p>	<p>Seasonally wet portions of land as delineated by the wetland specialist. Important foraging resource for local fauna.</p>	<p>Portions of land which have been confirmed as seasonally or temporarily wet, such as wetland depressions and drainage features, by the most recent wetland study.</p> <p><i>Aristida</i> spp. and <i>Eragrostis</i> spp. grasses. <i>Persicaria</i> species have been recorded in the past (typical of wet areas).</p>	
--------------------	--	---	---

Protected Areas, Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA)

The footprint occurs within CBA2 areas according to the provincial conservation plan, however, following the findings of this assessment most of the local habitat is considered to exist in a degraded state with only a low level of functionality. It is noted that certain sections of the footprint represent more intact areas of habitat (the watercourse and Modified Thornveld areas), and these are considered to be more functional with regards to the CBA status of the site, whereby they should be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems, and land uses should maximise the retention of biodiversity pattern and ecological process (READ, 2015). To ensure this, it is important that the management outcomes presented above be adhered to, in order to properly mitigate the negative environmental impacts that will stem from the project activities.

Several fauna SCC are expected to occur within the site (considering findings from the avifaunal study), including the regionally ‘Near Threatened’ *Pyxicephalus adspersus* (Giant Bull Frog) and *Parahyaena brunnea* (Brown Hyena). No flora SCC are expected, however numerous *Vachellia erioloba* (Camel Thorn) trees were recorded. These are listed as nationally protected trees and a permit must be obtained should any specimen need to be disturbed in any way (in terms of Section 12 of the National Forests Act, No. 84 of 1998).

Completion of the terrestrial biodiversity assessment led to a disputing of the ‘Very High’ classification for the terrestrial biodiversity theme sensitivity as allocated by the National Environmental Screening Tool. The site is instead assigned an overall sensitivity of ‘Low’ to ‘Medium’. Refer to Figure 5.9.

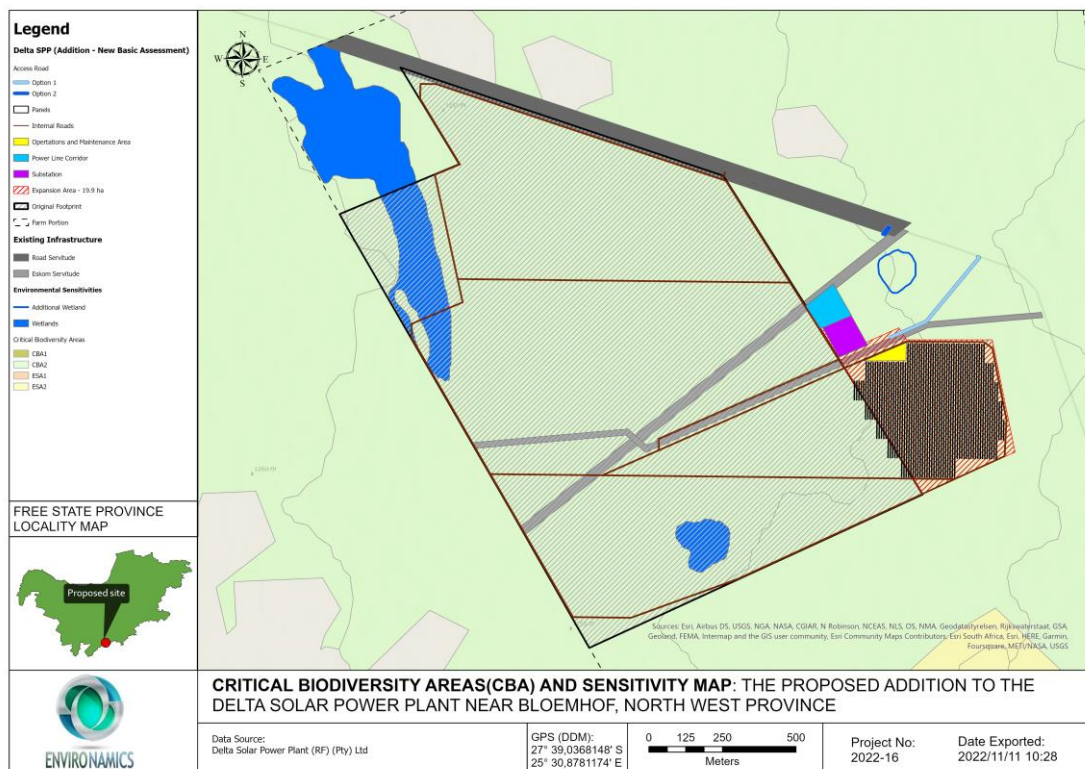


Figure 6.1: Critical Biodiversity Map for the Delta Solar Power Plant

Species of Conservation Concern

There appears to be no threat to any protected tree species at the site, however, numerous *Vachellia erioloba* (Camel Thorn) trees were recorded on site. These are listed as nationally protected trees and a permit must be obtained should any specimen need to be disturbed in any way (in terms of Section 12 of the National Forests Act, No. 84 of 1998). It is unlikely that there will be a loss of any plant species of particular high conservation priority, i.e., threatened or near threatened species, if the site is developed. It is unlikely that there would be a serious threat to any threatened animal species or any other animal species of particular conservation concern.

Ecological monitoring should still be implemented during the construction phase and specific sensitive habitats (riparian) needs to be avoided to ensure that any potential red data species potentially missed during the field surveys are preserved and not potentially impacted on.

The DFFE Screening Report also did not highlight any red listed flora (Appendix B).

Declared Invasive Alien Species

The Alien and Invasive Species Regulations (GNR 599 of 2014) are stipulated as part of the National Environmental Management: Biodiversity Act (10/2004). The regulation listed a total of 559 alien species as invasive and further 560 species are listed as prohibited and may not be introduced into South Africa. Below is a brief explanation of the four categories of Invasive Alien Plants as per the regulation.

Category 1 plants are prohibited plants which must be controlled or eradicated. These plants serve no economic purpose and possess characteristics that are harmful to humans, animals or the environment.

- Category 1a: Plants are high-priority emerging species requiring compulsory control. All breeding, growing, moving and selling are banned
- Category 1b: Plants are widespread invasive species controlled by a management program.

Category 2 plants are invaders with certain useful qualities, such as commercial use or for woodlots, animal fodder, soil stabilisation, etc. These plants are allowed in demarcated areas under controlled conditions and in biocontrol reserves.

Category 3 plants are alien plants that are currently growing in, or have escaped from areas such as gardens, but that are proven invaders. No further planting is allowed (except with special permission), nor trade in propagative material. Existing plants may remain but must be prevented from spreading. Plants within the flood line and watercourses must be removed (Bromilow, 2010).

Note that according to the regulations, any person who has under his or her control a category 1b listed invasive species must immediately:

- Notify the competent authority in writing;
- Take steps to manage the listed invasive species in compliance with:

- Section 75 of the NEM:BA;
- The relevant local invasive species management programme developed in terms of regulation 4; and
- Any directive issued in terms of section 73(3) of the NEMBA.

The following alien invasive and exotic plant species were recorded on site during the surveys as stipulated in the Alien and Invasive Species Regulations (GNR 599 of 2014):

- *Opuntia stricta*
- *O. ficus-indica*

These are Category 1b species which must be controlled through the implementation of an Invasive Alien Plant Management Programme.

- Common weeds such as *Tagetes minuta* and *Bidens pilosa* were observed invading certain sections.

6.3 Watercourse Assessment

The watercourse areas include those portions of land which have been confirmed as seasonally or temporarily wet, such as wetland depressions and drainage features, by the most recent wetland study.

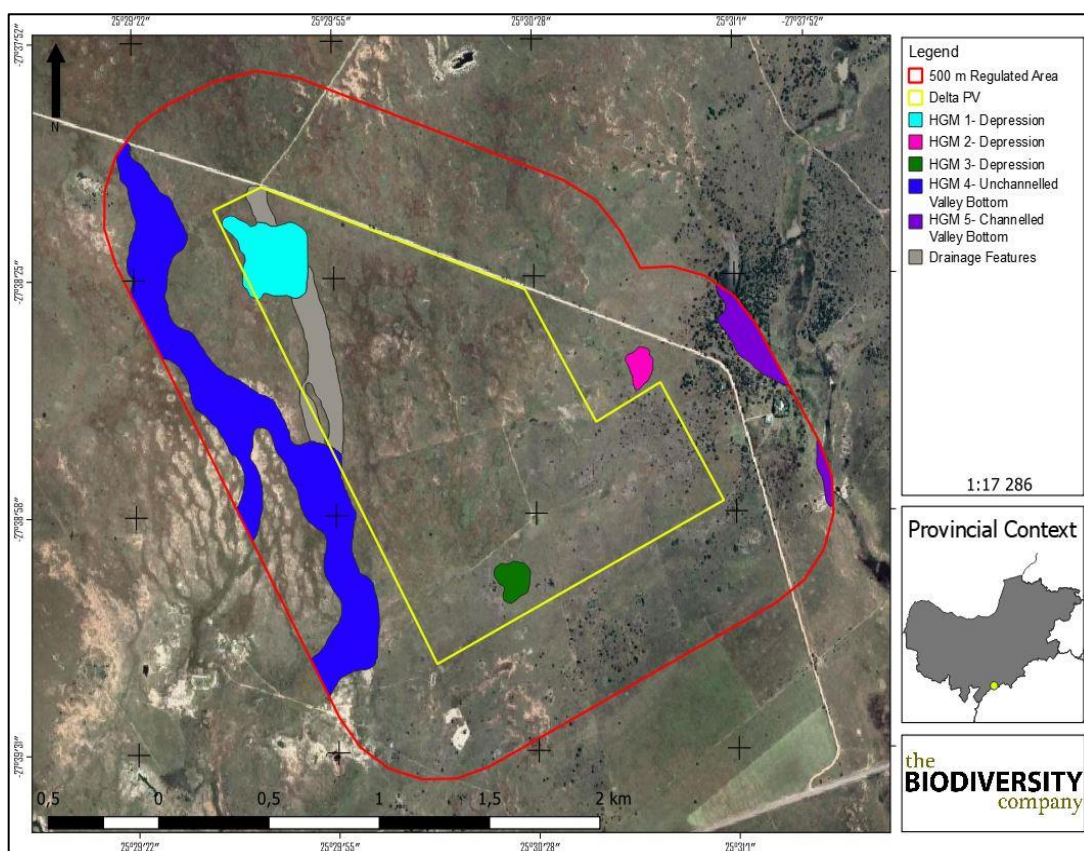


Figure 6.2: Wetland delineation map and locations of the different hydrogeomorphic (HGM) units identified within the 500 m regulated area of the Delta Solar Power Plant

6.3.1 Climate and water availability

According to Mucina and Rutherford (2006) the site falls within a summer-rainfall region, with Mean Annual Precipitation of around 450mm. Most of the rainfall is of convective origin and peaks in late summer. The overall Mean Annual Temperature is within warm-temperate ranges (nearly 16°C), with high incidence of frost in winter. One of the most important climate parameters for agriculture in a South African context is moisture availability, which is the ratio of rainfall to evapotranspiration. Moisture availability is classified into 6 categories across the country. The site falls on the boundary between the 4th and 5th categories, which are labelled as a moderate to severe and a severe limitation to agriculture, respectively.

There are no stock watering points on the site.

6.4 Biodiversity

The primary cause of loss of biological diversity is habitat degradation and loss (IUCN, 2004; Primack, 2006). In the case of this study special attention was given to the identification of sensitive species or animal life and birds on site. The following section will discuss the state of biodiversity on the site in more detail.

Avifaunal

A single field survey was undertaken during on the 4th -5th of July 2022 (Winter). The site was observed to support a relatively diverse assemblage of avifauna species with 54 species recorded during the field survey, accounting for approximately 23% of the total number of expected species. It is postulated that more species will be recorded during the wet season as the study was conducted during July which resulted in a dry-season survey. In addition, the footprint was determined to support a diverse assemblage of Functional Feeding Guilds (FFGs), especially for an arid to semi-arid region. This is attributed to the water resources within the region. The dominant species comprised of those that are typically considered to be 'tolerant' or non-sensitive species.

A single SCC on a global scale, *Gyps africanus* (White-backed Vulture), was observed in close proximity to the site, with no evidence of nesting sites. Although not observed within the footprint, the species exhibits extensive foraging areas and will therefore utilise the footprint. Moreover, there are several SCC that have a high likelihood of occurrence within the footprint, albeit a large proportion of these will not utilise the habitats within the footprint but will fly over to access suitable habitat within the proximal landscape. This suggests that the 'Lake Effect' of solar panels and collisions with overhead cables area of concern.

Fauna

The following Species of Conservation Concern can potentially be found:

Table 6.2: SCC mammal and amphibian species that may occur within the footprint

Species	Common Name	Conservation Status		Likelihood of Occurrence
		SANBI (2022)	IUCN (2021)	
<i>Aonyx capensis</i>	African Clawless Otter	NT	NT	Low
<i>Crocidura mariquensis</i>	Swamp Musk Shrew	NT	LC	Low
<i>Eidolon helvum</i>	African Straw-coloured Fruit Bat	LC	NT	Low
<i>Felis nigripes</i>	Black-footed Cat	VU	VU	Moderate
<i>Leptailurus serval</i>	Serval	NT	LC	Low
<i>Mystromys albicaudatus</i>	African White-tailed Rat	VU	VU	Moderate
<i>Otomys auratus</i>	Southern African Vlei Rat (Grassland type)	NT	NT	Moderate
<i>Parahyaena brunnea</i>	Brown Hyena	NT	NT	High
<i>Smutsia temminckii</i>	Ground Pangolin	VU	VU	Low
<i>Pyxicephalus adspersus</i>	Giant Bull Frog	NT	LC	High

The IUCN Red List spatial database, in addition to the Mammal Map database, lists over 90 mammal species that could be expected to occur within and around the site. This includes medium-large mammal species that are typically limited to reserves due to the fact that the site occurs nearby to the SA Lombard Reserve and game farming is considered a common activity in the region. Nine (9) of these expected species are regarded as SCC (Table 5.3.1.6), and of these SCC four (4) have a moderate-high likelihood of occurrence based on the presence of suitable habitat and food sources in the area.

According to the Terrestrial Biodiversity, Plant and Animal Species Assessment (Appendix D1), *Felis nigripes* (Black-footed cat) is endemic to the arid regions of southern Africa. This species is naturally rare, has cryptic colouring, is small in size and is nocturnal. These factors have contributed to a lack of information on this species. Given that the highest densities of this species have been recorded in the more arid Karoo region of South Africa, the habitat in the

area may be considered sub-optimal for the species and the likelihood of occurrence is therefore only rated as moderate.

Myodomys albicaudatus (White-tailed Rat) is listed as 'Vulnerable' (VU) on a regional basis as well as on a global scale. It is relatively widespread across South Africa and Lesotho and the species is known to occur in shrubland and grassland areas. A known requirement of the species is black loam soils with good vegetation cover. Although the vegetation type may be considered suitable, no black loam seems to be present in the area, therefore the likelihood of occurrence of this species is only rated as moderate.

Otomys auratus (Vlei Rat) is categorised as 'Near Threatened' (NT) on a regional and global scale. This near-endemic grassland species is becoming increasingly threatened by grassland contraction and wetland loss, with niche modelling showing that it will undergo a 47-61% reduction in suitable habitat between 1975 and 2050 from climate change. The likelihood of finding this species in the footprint is rated as moderate.

Parahyaena brunnea (Brown Hyaena) is endemic to southern Africa. This species occurs in dry areas, generally with annual rainfall less than 100 mm, particularly along the coast, semi-desert, open scrub and open woodland savanna. Given its known ability to persist outside of formally protected areas the likelihood of occurrence of this species in the site is high. The presence of medium to large herbivores on nearby land increases the likelihood of occurrence of this species.

Based on the IUCN Red List spatial database and FrogMap, over 10 amphibian species may be expected to occur within and nearby to the PAOI. One (1) of these is regarded as an SCC and it is assigned a high likelihood of occurrence due to the presence of suitable wetland habitat (Table 5.3.1.6).

Pyxicephalus adspersus (Giant Bullfrog) is listed as 'Near Threatened' (NT) on a regional scale. It is a species that inhabits drier savannahs where it is fossorial for most of the year, remaining buried in cocoons. They emerge at the start of the rain season and breed in shallow, temporary waters in pools, pans and ditches (IUCN, 2017). The presence of a wide variety of aquatic habitat within and nearby to the site means that this species has a high likelihood of occurrence.

6.5 Visual landscape

The visual impact of photovoltaic facility depends on the complex relationship between the visual environment (landscape), the development (object), and the observer/receptor (e.g. farmer). The establishment of a solar facility on the site is not expected to have a significant visual effect, given that the number of sensitive receptors is very low, electrical infrastructure are already located in close proximity to the site and the polycrystalline panels considered for this development are non-reflective. However due to the extent of the proposed development (19.9 hectares) the potential visual impact of the proposed PV plant was assessed using the following criteria which provide the means to measure the magnitude and determine the significance of the potential impact, namely: visibility, viewer sensitivity, visual exposure, visual intrusion, and the value of the visual resource (refer to Appendix D4 for the visual impact assessment). Each of these criteria is described in more detail below:

6.5.1 Visibility

The viewshed covers a large area, which indicates a high visibility. Much or all of the PV plant will be visible from areas within and beyond the site, but due to the low population density of the area, there are very few visual receptors that may be affected by the development

The Visual Impact Assessment confirms that the site will be visible within (but not restricted to) a 5km radius of the proposed SPP. The only receptors likely to be impacted by the proposed development are the nearby property owners and nearby roads. However, a large part of the visual landscape is still reflecting a farming landscape with a better visual appearance.

6.5.2 Sensitive viewers and viewpoints

The following viewers and viewpoints were identified (Figure 5.11 gives a visual representation of the visual receptors in the Zone of Theoretical Visibility (ZTV)).

- Area Receptors which include the towns of:
 - Bloemhof.
 - Boitumelong.
 - Bloemhof Dam.
 - Bloemhof Dam Nature Reserve.
 - Sandveld Nature Reserve.
 - SA Lombard Nature Reserve.
- Linear Receptors which include:
 - N12 National Road.
 - R34 road.
 - Sterkfontein gravel road (D997) adjacent to site.
 - Gravel Roads in the area.
 - Vaal River.
- Point Receptors which include:
 - Farmsteads.
 - Smallholdings.
 - River Homes.
 - Sports and Recreational facilities.
 - Tourism and lodging facilities.

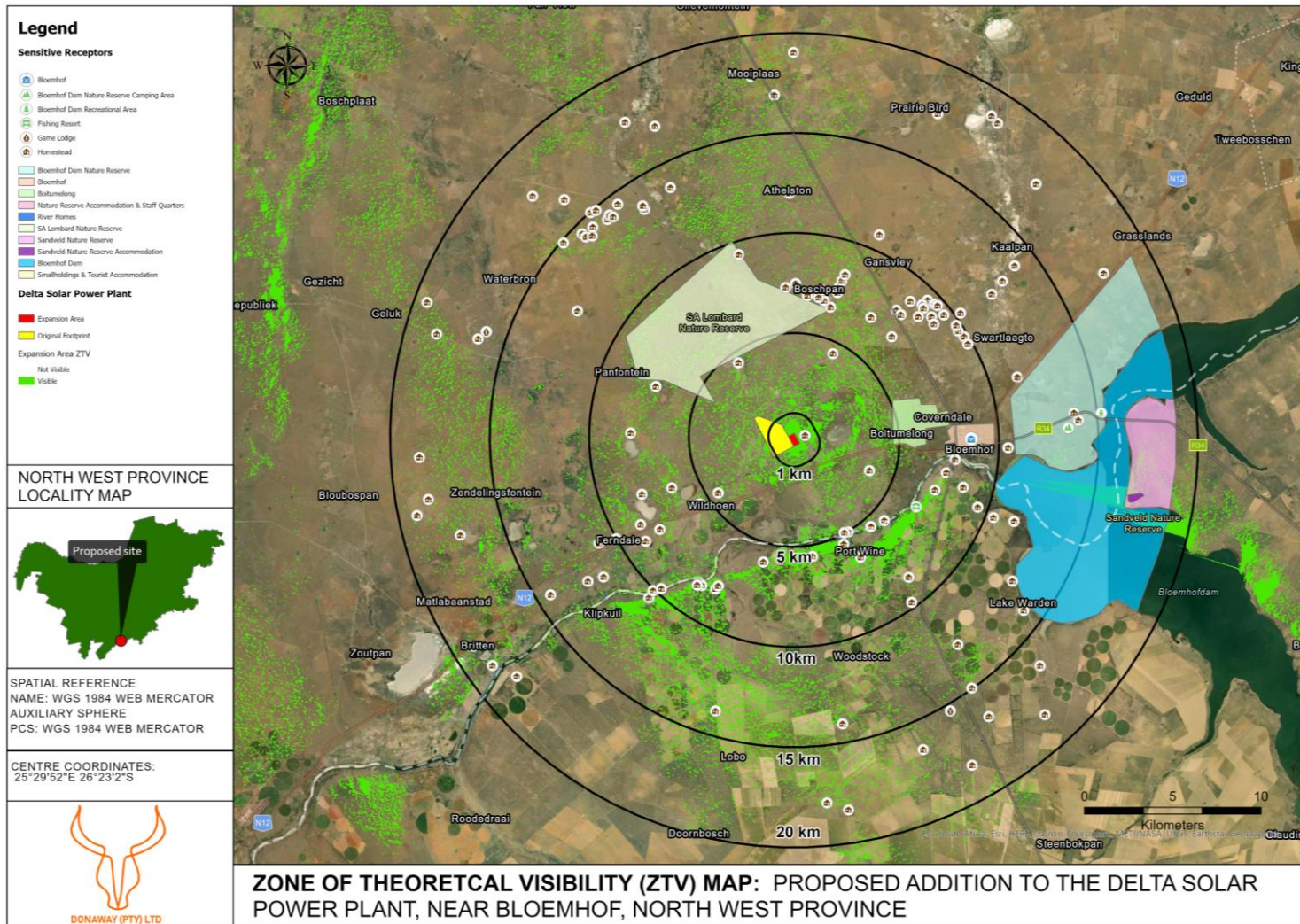


Figure 6.3: Zone of Theoretical Visibility (ZTV) for the SPP, Satellite View.

6.5.3 Visual exposure

The majority of visual impacts associated with the project are anticipated to occur during the operational phase of the development. Impacts during the construction phase of the SPP are typical of the type of visual impacts generally associated with construction activities. Impacts associated with the design and construction phase of a project are usually of a short duration and temporary in nature but could have long-term effects on the surrounding visual environment if not planned or managed appropriately. It is therefore necessary that the design phase be conducted in such a manner so as not to result in permanent impacts associated with the ill placement of project components or associated infrastructure.

6.5.4 Visual intrusion

The SPP is expected to have a definite impact on visual receptors located within a 1km radius of the proposed project. The most sensitive of these visual receptors are the residence of the landowner and the Sterkfontein gravel road (D997). The SPP is expected to have a low impact on visual receptors located between a 1km and 5km radius of the proposed project. The most sensitive of these visual receptors are homesteads on farms and passing motorists on the N12 National Road. The SPP is expected to have a low visual impact on observers located between 5-10km from the proposed SPP. Potential visual impacts of the operational, safety and security lighting of the facility at night on observers in close proximity to the proposed SPP. The only receptors likely to be impacted by the proposed development are the nearby property owners and nearby roads.

6.5.5 Visual resource value

The site falls very clearly “Negative Low Impact” i.e., it is improvable. It is therefore of low visual quality and hence of low value as a visual resource, to all of the potentially affected visual receptors i.e., the occupants of surrounding farms, and motorists making use of the ro

6.6 Description of the socio-economic environment

The North West Province of South Africa is bounded on the north by Botswana, on the south by the provinces of Free State and the Northern Cape, and on the northeast and east by the Limpopo Province and Gauteng. Covering 118,797km². The North West Province was created in 1994 by the merger of Bophuthatswana, one of the former Bantustans (or black homelands), and the western part of Transvaal, one of the four former South African provinces. In 2011 the population of the North West Province was estimated to be 3 509 953 in 2011 and 3 748 435 in 2016. 65% of the people in the North West Province live in the rural areas. The majority of the province's residents are the Tswana people who speak Setswana. Smaller groups include Afrikaans, Sotho, and Xhosa speaking people. English is spoken primarily as a second language. Most of the population belong to Christian denominations.

The Dr Ruth Segomotsi Mompati District Municipality (previously Bophirima District Municipality) is a Category C municipality located in the North West Province. It is bordered

by Ngaka Modiri Molema and Dr Kenneth Kaunda in the north, and John Taolo Gaetsewe in the south, which is a cross-boundary within the Northern Cape.

Lekwa-Teemane Local Municipality demographics

The Lekwa-Teemane Local Municipality is a Category B municipality situated in the Dr Ruth Segomotsi Mompati District Municipality in the North West Province. It neighbours the following municipalities: Maquassi Hills, Mamusa, the Frances Baard District and Magareng. It is one of five municipalities in the district. Lekwa-Teemane was established on 6 December 2000. Christiana is an agricultural town situated on the banks of the Vaal River. The town was established in 1870, when diamonds were discovered in the riverbanks. Not far from Christiana is the agricultural town of Bloemhof. It was founded in 1864 and established on the farm owned by John Barclay, who survived the HMS Birkenhead shipwreck in 1852. The place became known as Bloemhof (flower court) because of the lovely gardens that were planted there by Barclay's daughter. There are no formally protected areas in this local municipality and Game farming seems to be most present in this area that supports conservation in a meaningful manner. The SA Lombard Nature Reserve can be found in this local municipality which is also close to the proposed development site.

Population

Lekwa-Teemane Local Municipality has a total population of 53248 and makes up 62.6% of the total population for the North West Province. A Community survey was conducted in 2016 which indicated that Lekwa-Teemane Local Municipality had a population increase between 2011 and 2016 to 56 025, which makes up 62.6% of the North West Province's population. The Lekwa-Teemane local municipality's population has also increased for the same period from 53 248 in 2011 to 56 025 in 2016.

According to the 2016 Community Survey and 2011 Census data, the Lekwa-Teemane local municipality had a population group dynamic of Africans 81.2%, whites 10.4%, Indians/ Asians 0.6%, coloured 7.4% and the other population groups making up the remaining 0.4%. The Lekwa-Teemane Local Municipality's Male population is 50% of the total population of the Municipality. The sex ratio for the Dr Ruth Segomotsi Mompati District Municipality is almost consistent with that of Lekwa-Teemane Local Municipality, with a female population of 53.6%. The data from local municipality does coincide with that of the province since 51% of the population are male and 49% are female. The national average in 2016 was 50,65% female and 49,35% male.

Education

The Lekwa-Teemane Local Municipality has a youth population (0-14 years) of 31.8%, working age population (15-64 years) of 62.1% and an elderly population (65+ years) 6.1%. Of the total number of people in the Lekwa-Teemane Local Municipality, those aged 20 years and older ,9.6% has no form of schooling, 28.1% has completed matric and 4.8% has completed higher education. In the Lekwa-Teemane Local Municipality a total of 16351 people is economically active (employed or unemployed but looking for work), and of these 4982 are unemployed. The dependency ratio of the Lekwa-Teemane Local Municipality was 59.2% in 2016, which is lower than the North West Province (52.9%) and higher than the National average of 34.5%.

In the Lekwa-Teemane Local Municipality a total of 11369 people is employed while 2855 are discouraged work-seekers and 4982 are unemployed and a further 13 846 are not economically active.

Households

The Lekwa-Teemane Local Municipality has a large portion of households live within the poverty level (70.4%) which has an annual income of less than R38 200. Only 20.1% of the households have an annual income of more than R307 201. The livestock, Pivot crop farming and game farming industry as well as poultry production can be seen as the leading economic activity in the Lekwa-Teemane Local Municipality. Most households within the Lekwa-Teemane Local Municipality are well serviced with regards to electricity, water, sanitation and refuse removal, but there is still room for improvement especially in waste removal activities.

6.7 Cultural and heritage aspects

Special attention was given to the identification of possible cultural or heritage resources on site. The initial site investigation concluded that there are no obvious heritage resources located on the site earmarked for development. However, a Heritage Impact Assessment has been conducted to ensure that there would be no impact on cultural or historical features as a result of the proposed development (refer to Appendix D2).

A section of the area has been subjected to excavations, probably as part of former alluvial diamond diggings. From a review of the available old maps and aerial photographs it can be seen that the project area has always been open space, with the main activity being grazing or the making of agricultural fields. One of the biggest changes is the alignment of what is now known as the N12 a few hundred metres to the south, in the direction of the railway line.

Stone Age: No sites, features or objects of cultural significance dating to the Stone Age were identified in the project area.

Iron Age: No sites, features or objects of cultural significance dating to the Iron Age were identified in the project area.

Historic period: No sites, features or objects of cultural significance dating to the historic period were identified in the project area.

The town of Bloemhof was established in 1866 on the farm Klipfontein, which belonged to a certain John Barclay. The Bloemhof Dam was completed in 1970. The dam changed the flow of the river, covering long stretches of the riverbanks. It also covered the original crossing point of the Vaal River on the farms Kalkfontein 346 (North West Province) and Bultfontein 34 (Free State). This change in flow brought about the deposition of large amounts of silt.

The last chapter in the history of the region was its incorporation under the policy of homeland development, into the Republic of Bophuthatswana. This was a very fragmented 'State' and it would have needed permanent support by the central government to keep it in place. Since 1994, this has fallen away, and the people and the region were reincorporated into the larger Republic of South Africa.

6.8 SITE SELECTION MATRIX

Due to the nature of the proposed development, the location of the facility is largely dependent on technical and environmental factors such as solar irradiation, climatic conditions, topography of the site, access to the grid and capacity of the grid. Studies of solar irradiation worldwide indicate that the North West Province has a huge potential for the generation of power from solar.

The receptiveness of the site to PV development includes the presence of optimal conditions for the siting of a solar energy facility due to high irradiation values and optimum grid connection opportunities. The site where the project is proposed to be located is considered favourable and suitable from a technical perspective due to the following characteristics:

- **Climatic conditions:** Climatic conditions determine if the project will be viable from an economic perspective as the solar energy facility is directly dependent on the annual direct solar irradiation values of a particular area. The North West receives a high average of direct normal and global horizontal irradiation daily. This is an indication that the regional location of the project includes a low number of rainy days and a high number of daylight hours experienced in the region. Global Horizontal Radiation of 2118 kwh/m² per year is relevant in the area.
- **Site availability and access:** The land is available for lease by the developer and consent has been provided by the affected landowner for the undertaking of the BA process on the three affected properties. Direct access to the site can be gained from the tarred N12 via an access road.
- **Grid connection:** Connecting the array to the electrical grid requires transformation of the PV Plant inverter voltage from 600V to 33kV and a further step-up to Eskom's 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 600V and this is fed into 0.6/33kV 50Hz step up transformer, the 33kV output from the transformer goes to a 33/132kV 50Hz Transformer whose output goes to Eskom's 132kV power line. An onsite substation will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid via the proposed Bloemhof-Wildhoeven 132kV power line. The Project will inject up to 75MW into the National Grid and the installed capacity will be approximately 100MW with the authorised footprint included. It is expected that generation from the facility will tie into the Eskom network via the Bloemhof-Wildhoeven 132kV power line via a LILLO connection.
- **Environmental sensitivities:** From an environmental perspective the proposed site/development footprint is considered desirable due to limited environmental sensitivities in terms of geology, and soils, agricultural potential, vegetation and landscape features, climate, biodiversity and ecological features and the visual landscape – refer to Section 5.3.1 of this report. Where ecological features and habitats have been identified and considered the relevant ecological specialist has advised that development within these areas are appropriate subject to the implementation of strict mitigation measures. Wetland areas have been avoided and

demarcated as no-go to development by the developer from the onset of the process. Important features of note were identified from an ecological, avifaunal and conservation point of view.

It is evident from the discussion above that the area and development footprint under assessment may be considered favourable and suitable in terms of these site characteristics. As mentioned previously, no alternative areas within the affected properties have been considered. However, provision was made for the avoidance of wetlands.

6.9 CONCLUDING STATEMENT ON ALTERNATIVES

When considering the information provided by the specialists with regards to the site selection criteria and the comparison, the site is identified as preferred due to the fact that the opportunities presented on the site to develop the project in such a way which avoids the areas and features of environmental sensitivity.

Therefore, the addition to the Delta Solar Power Plant to add 19.9MW of additional generational capacity and increase the site's footprint by 19.9 hectares on the Remaining Extent of the farm Kareefontein No. 340, Registration Division H.O., North West situated within the Lekwa-Teemane Local Municipality area of jurisdiction, is the preferred option. The preferred layout included in the attached Appendix H. It is therefore concluded that no other alternatives are considered as part of the BA process.

7 DESCRIPTION OF THE IMPACTS AND RISKS

This section aims to address the following requirements of the regulations:

Appendix 1. (3)(i) A BAR (...) must include-

(i) a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including-

(i) a description of all environmental issues and risks that were identified during the EIA process; and

(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.

(j) an assessment of each identified potentially significant impact and risk, including-

(i) cumulative impacts;

(ii) the nature, significance and consequences of the impact and risk;

(iii) the extent and duration of the impact and risk;

(iv) the probability of the impact and risk occurring;

(v) the degree to which the impact and risk can be reversed;

(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and

(vii) the degree to which the impact and risk can be mitigated;

(k) where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;

7.1 SCOPING METHODOLOGY

The contents and methodology of the basic assessment report aimed to provide, as far as possible, a user-friendly analysis of information to allow for easy interpretation.

- Checklist (see section 6.1.1): The checklist consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts.
- Matrix (see section 6.1.2): The matrix analysis provides a holistic indication of the relationship and interaction between the various activities, development phases and the impact thereof on the environment. The method aims at providing a first order cause and effect relationship between the environment and the proposed activity.

The matrix is designed to indicate the relationship between the different stressors and receptors which leads to specific impacts. The matrix also indicates the specialist studies that have been conducted to address the potentially most significant impacts.

7.2 Checklist analysis

The independent consultant conducted a site visit on 26 May 2022. The site visit was conducted to ensure a proper analysis of the specific characteristics of the study area. Table 7.1 provides a checklist, which is designed to stimulate thought regarding possible consequences of specific actions and so assist scoping of key issues. It consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts. The table highlights certain issues, which are further analysed in matrix format in section 6.2

Table 7.1: Environmental checklist

QUESTION	YES	NO	Un-sure	Description
1. Are any of the following located on the site earmarked for the development?				
I. A river, stream, dam or wetland	X			The hydrological study (refer to Appendix D7) confirmed that the wetland and buffer areas must be avoided, and it is expected that the proposed activities will have low impacts on the wetlands and thus no fatal flaws were identified for the project.
II. A conservation or open space area		X		None.
III. An area that is of cultural importance		X		The initial site investigation concluded that there are no obvious heritage resources located on the site earmarked for development. The Heritage Impact Assessment (refer to Appendix D2) concluded that there are no sites, features or objects of cultural significance found in the study area, and that there would be no impact as a result of the proposed development. However, the palaeontological impact assessment (refer to Appendix D8) confirmed that the Tertiary to Quaternary calcrete has a High Palaeontological Sensitivity.

IV. Site of geological significance		×		The geotechnical study (refer to Appendix D5) confirmed that the study area is deemed suitable for the proposed development.
V. Areas of outstanding natural beauty		×		None.
VI. Highly productive agricultural land		×		The Agricultural and Soils Impact Assessment (refer to Appendix D5) confirmed that the proposed development will have a low negative impact on agricultural potential in terms of cattle production in the area, and no negative impact on crop production.
VII. Floodplain		×		None
VIII. Indigenous Forest		×		None.
IX. Grass land		×		In terms of vegetation type the site falls within the Kimberly Thornveld which extends throughout most of the Kimberley, Hartswater, Bloemhof and Hoopstad Districts and is characterised by plains that are often slightly irregular with a well-developed tree and shrub layer with occasional dense stands of <i>Tarchonanthus camphoratus</i> and <i>Senegalia mellifera</i> . The grass layer is open with much uncovered soil (Mucina & Rutherford, 2006).
X. Bird nesting sites		×		None.
XI. Red data species		×		None.
XII. Tourist resort		×		None.
2. Will the project potentially result in potential?				
I. Removal of people		×		None.
II. Visual Impacts	×			The Visual Impact Assessment (Refer to Appendix D4) concluded that the proposed development will have a limited visual impact on the visual environment within 5 km of the proposed facility.

III. Noise pollution	×			Construction activities will result in the generation of noise over a period of months. The noise impact is unlikely to be significant.
IV. Construction of an access road	×			An access point/road will be required from the Sterkfontein gravel road (D997) access point: 27°38'36.05"S; 25°30'54.30"E. An internal site road network will also be required to provide access to the solar field and associated infrastructure. All site roads will require a width of approximately 4m.
V. Risk to human or valuable ecosystems due to explosion/fire/ discharge of waste into water or air.		×		None.
VI. Accumulation of large workforce (>50 manual workers) into the site.	×			Approximately 885 employment opportunities will be created during the construction and 15 - 70 employment opportunities during the operational phases for the SPP.
VII. Utilisation of significant volumes of local raw materials such as water, wood etc.	×			Approximately 885 employment opportunities will be created during the construction and 15 - 70 employment opportunities during the operational phases for the SPP.
VIII. Job creation	×			Approximately 885 employment opportunities will be created during the construction and 15 - 70 employment opportunities during the operational phases for the SPP.
IX. Traffic generation		×		Construction Traffic will be generated during the construction phase of the project.

X. Soil erosion		×		The site will need to be cleared or graded to a limited extent, which may potentially result in a degree of dust being created, increased runoff and potentially soil erosion. The time that these areas are left bare will be limited to the construction phase, since vegetation will be allowed to grow back after construction. The Agricultural and Soils Impact Assessment (refer to Appendix D5) confirmed that the erosion risk is low due to the low slope gradients and low to moderate erodibility of the soils.
XI. Installation of additional bulk telecommunication, transmission lines or facilities		×		None
3. Is the proposed project located near the following?				
I. A river, stream, dam or wetland	×			Wetland areas found on original Delta site.
II. A conservation or open space area	×			SA Lombard Nature Reserve and the Sandveld Nature Reserve.
III. An area that is of cultural importance		×		None.
IV. A site of geological significance		×		None.
V. An area of outstanding natural beauty		×		None.
VI. Highly productive agricultural land		×		None.
VII. A tourist resort		×		None.
VIII. A formal or informal settlement	×			Delta SPP is located 7 km west of the town Bloemhof and suburb Boitumelong

7.1.1 Matrix analysis

The matrix describes the relevant listed activities, the aspects of the development that will apply to the specific listed activity, a description of the environmental issues and potential impacts, the significance and magnitude of the potential impacts and possible mitigation measures. The matrix also highlights areas of particular concern (see Table 6.3) for more in-depth assessment. An indication is provided of the specialist studies which were conducted and that informed the initial assessment. Each cell is evaluated individually in terms of the nature of the impact, duration and its significance – should no mitigation measures be applied. This is important since many impacts would not be considered insignificant if proper mitigation measures were implemented.

In order to conceptualise the different impacts, the matrix specify the following:

- **Stressor:** Indicates the aspect of the proposed activity, which initiates and cause impacts on elements of the environment.
- **Receptor:** Highlights the recipient and most important components of the environment affected by the stressor.
- **Impacts:** Indicates the net result of the cause-effect between the stressor and receptor.
- **Mitigation:** Impacts need to be mitigated to minimise the effect on the environment.

Detailed impact assessments have been undertaken by each of the respective specialists which has informed the matrix analysis as included in Table 6.3, as well as the key issues identified as included in sections 6.2.1-6.2.3. The Table 6.2 includes reference to the sections in the respective specialist studies where the details of the in-depth assessment of potential environmental impacts can be obtained.

Table 7.2: Reference to the sections in the respective specialist studies where the details of the in-depth assessment of potential environmental impacts can be obtained

Specialist Study	Impact Assessment (pg.)	Cumulative Impacts (pg.)	Mitigation Measures (pg.)
Ecological and wetland Impact Assessment (Appendix D1)	22	22	27
Avifauna Assessment (Appendix D2)	40	66	70
Visual Impact Assessment (Appendix D3)	36	49	53
Soil Impact Assessment (Appendix D4)	10	10	15
Heritage Impact Assessment (Appendix D5)	15	15	32
Paleontological Study (Appendix D6)	19	19	25
Social Impact Assessment (Appendix D7)	63	86	95
Stormwater Management Plan and Hydrological Assessment (Appendix D8)	19	19	19

Table 7.3: Matrix analysis

For ease of reference the significance of the impacts is colour-coded as follow:



LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS		SPECIALIST STUDIES / INFORMATION		
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures		Level of residual risk	
CONSTRUCTION PHASE															
<p><u>Activity 1(i) (GNR 327):</u> "The development of facilities or infrastructure for the generation of electricity from renewable resource where (i) the electricity output is more than 10 megawatts but less than 20 megawatts"</p> <p><u>Activity 24 (ii) (GNR 327):</u> "The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters"</p> <p><u>Activity 27 (GNR 327):</u> "The clearance of an area of 1 hectare or more, but less than 20</p>	<p>Site clearing and preparation</p> <p>Certain areas of the site will need to be cleared of vegetation and some areas may need to be levelled.</p> <p><u>Civil works</u></p> <p>The main civil works are:</p> <ul style="list-style-type: none"> Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat. Laying foundation- The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on 	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	<ul style="list-style-type: none"> Direct habitat destruction – loss and damage to natural habitats, impact/changes on vegetation & fauna communities, loss of threatened / near-threatened taxa, impact to fauna Habitat fragmentation – disruption of natural movement patterns Increased soil erosion and fragmentation – terrestrial ecological changes including establishment of alien invasive plant species, altered plant community species composition and loss of habitat for indigenous flora Soil and water pollution Spread and establishment of alien invasive species Negative effect of human activities and road mortalities – snaring, killing and hunting of certain faunal 			S/L	L	D	BR	SL	Yes	<ul style="list-style-type: none"> See Table 6.4 	M	Terrestrial Biodiversity, Plant and Animal Species Impact Assessment (Appendix D1)

<p>hectares of indigenous vegetation...”</p> <p>Activity 28 (ii) (GNR 327): “Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.”</p> <p>Activity 4(h)(iv)(vi) (GN.R. 324): “The development of a road wider than 4 metres with a reserve less than 13.5 metres (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority and (vi) Areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a biosphere reserve.”</p> <p>Activity 12(h)(iv)(vi) (GNR. 324): “The clearance of an area of 300 square metres or more of indigenous vegetation...(h) in the North West (iv) Critical</p>	<p>the detailed geotechnical analysis.</p> <ul style="list-style-type: none"> Construction of access and inside roads/paths – existing paths will be used where reasonably possible. Additionally, the turning circle for trucks will also be taken into consideration. <p>Transportation and installation of PV panels into an Array</p> <p>The panels are assembled at the supplier’s premises and will be transported from the factory to the site on trucks. The panels will be mounted on metal structures which are fixed into the ground either through a concrete foundation or a deep-seated screw.</p> <p>Wiring to the Central Inverters</p> <p>Sections of the PV array would be wired to central inverters which have a maximum rated power of 2000kW each. The inverter is a pulse width mode inverter that converts DC electricity to alternating electricity (AC) at grid frequency.</p>		species, litter and inadequate sanitation, risk of uncontrolled fires												
		Wetland/ Riparian areas	<ul style="list-style-type: none"> Impact on the characteristics of the watercourse – i.e., flow regime, habitat, biota, water quality and geomorphology due to disturbance within the flood line Soil compaction and increased sediment transport and erosion Soil and water pollution Spread and establishment of alien invasive species 	-	S/L	L	D	BR	SL	Yes	<ul style="list-style-type: none"> See Table 6.4 	M	Ecological and wetland Impact Assessment (Appendix D1)		
		Avifauna	<ul style="list-style-type: none"> Displacement of priority avian species from important habitats. Displacement of resident avifauna through increased disturbance. Loss of important avian habitats 	-	S	M	Pr	PR	ML	Yes	<ul style="list-style-type: none"> See Table 6.4 	L	Avifaunal Impact Assessment (Appendix D2)		
		Air	<ul style="list-style-type: none"> Air pollution due to the increase of traffic of construction vehicles and the undertaking of construction activities. Ecosystem damage due to pollutants and dust 	-	S	S	D	CR	NL	Yes	<ul style="list-style-type: none"> A speed limit should be enforced on dirt roads (preferably 30-40km/h). Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an on-going basis) of construction areas and access roads, and ensure that these are continuously monitored to ensure effective implementation. 	L	Terrestrial Biodiversity, Plant and Animal Species Impact Assessment (Appendix D1)		
Soil	<ul style="list-style-type: none"> Loss of agricultural potential by occupation of land Loss of agricultural potential by soil degradation Enhanced agricultural potential through increased financial security for farming operations 	-/+	S	S	Pr	PR	ML	Yes	<ul style="list-style-type: none"> See Table 6.4 	L	Agriculture Compliance Statement (Appendix D4)				

<i>biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority and (vi) areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland."</i>			<ul style="list-style-type: none"> Improved security against stock theft and other crime 												
		Existing services infrastructure	<ul style="list-style-type: none"> Generation of waste that needs to be accommodated at a licensed landfill site. Generation of sewage that need to be accommodated by the local sewage plant. Increase in construction vehicles on existing roads. 	-	L	S	D	PR	ML	Yes	-	L	Confirmation from the Local Municipality to provide services		
		Groundwater	<ul style="list-style-type: none"> Pollution due to construction vehicles and the storage and handling of dangerous goods. 	-	S	S	Pr	CR	ML	Yes	<ul style="list-style-type: none"> A groundwater monitoring programme (quality and groundwater levels) should be designed and installed for the site. Monitoring boreholes should be securely capped (where used), and must be fitted with a suitable sanitary seal to prevent surface water flowing down the outside of the casing. Full construction details of monitoring boreholes must be recorded when they are drilled (e.g. screen and casing lengths, diameters, total depth, etc). Sampling of monitoring boreholes should be done according to recognised standards. 	L	-		
	SOCIAL/ECONOMIC ENVIRONMENT	Local unemployment rate	<ul style="list-style-type: none"> Direct and indirect employment opportunities and skills development Economic multiplier effect 	+	L/P	S	D	PR	N/A	Yes	<ul style="list-style-type: none"> Where reasonable and practical, the SPP service providers should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories 	M	Social Impact Assessment (Appendix D7)		
		Visual landscape	<ul style="list-style-type: none"> Visual impact of construction activities on sensitive visual receptors in close proximity to the addition to the Delta SPP 	-	L	S	D	PR	ML	Yes	<ul style="list-style-type: none"> See Table 6.4 	L	Visual Impact Assessment (Appendix D3)		
		Traffic volumes	<ul style="list-style-type: none"> Traffic Congestion Increase in traffic volumes Impact on road safety 	-	N	S	D	CR	NL	Yes	<ul style="list-style-type: none"> See Table 6.4 	M	Traffic Impact Assessment		

															(Appendix D8)
			Health, Safety & other social aspects	<ul style="list-style-type: none"> Potential loss of productive farmland Air/dust pollution. Impacts on safety and security. Impacts associated with the presence of construction workers on site and in the area. Influx of job seekers to the area. Increased safety risk to farmers, risk of stock theft and damage to farm infrastructure associated with presence of construction workers on the site. Impacts on daily movement patterns. Nuisance impacts Increased risk of veld fires. Visual and sense of place impacts 	-	L	P	Pr	PR	ML	Yes	<ul style="list-style-type: none"> See Table 6.4 	L	Social Impact Assessment (Appendix D7)	
			Noise levels	<ul style="list-style-type: none"> The generation of noise as a result of construction vehicles, the use of machinery such as drills and people working on the site. 	-	L	S	D	CR	NL	Yes	<ul style="list-style-type: none"> See Table 6.4 	L	Social Impact Assessment (Appendix D7)	
			Tourism industry	<ul style="list-style-type: none"> Since there are no tourism facilities in close proximity to the site, the proposed activities will not have an impact on tourism in the area. The closest tourism facility is the SA Lombard and Sandveld Nature reserves. 	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Heritage resources	<ul style="list-style-type: none"> Direct or physical impacts, implying alteration or destruction of heritage features within the project boundaries 	-	S	S	U	CR	NL	Yes	<ul style="list-style-type: none"> As no sites, features or objects of cultural historic significance have been identified in the project area, there would be no impact as a result of the proposed development. Any discovered artifacts shall not be removed under any circumstances. Any destruction of 	L	Heritage Impact Assessment (Appendix D5)	

<p>but not exceeding 500 cubic metres.”</p> <p>Activity 1 (GN.R 325): “The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more.”</p>	<p>inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.</p> <ul style="list-style-type: none"> • <u>Connection to the grid</u> Connecting the array to the electrical grid requires transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation and switching station will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid. • <u>Supporting Infrastructure</u> – Auxiliary buildings with basic services such as water and electricity will be constructed on the site and will have an 	Avifauna	<ul style="list-style-type: none"> • Displacement of priority avian species from important habitats • Displacement of resident avifauna through increased disturbance • Collisions with PV panels leading to injury or loss of avian life • Collision when flying into power line infrastructure • Electrocution when perched on power line infrastructure 	-	S	L	Pr	PR	ML	Yes	• See Table 6.5	M	Avifaunal Impact Assessment (Appendix D2)	
		Air quality	<ul style="list-style-type: none"> • The proposed development will not result in any air pollution during the operational phase. 	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Soil and Agriculture	<ul style="list-style-type: none"> • Erosion • Enhanced agricultural potential through increased financial security for farming operations • Increased security against stock theft and other crime 	-	L	L	D	PR	SL	Yes	• See Table 6.5	L	Agriculture Compliance Statement (Appendix D4)	
		Groundwater	<ul style="list-style-type: none"> • Leakage of hazardous materials. The development will comprise of a distribution substation and switching station and will include transformer bays which will contain transformer oils. Leakage of these oils can contaminate water supplies. 	-	L	L	Po	PR	ML	Yes	• All areas in which substances potentially hazardous to groundwater are stored, loaded, worked with or disposed of should be securely banded (impermeable floor and sides) to prevent accidental discharge to groundwater.	L	-	
		Wetland/ Riparian areas	<ul style="list-style-type: none"> • Impact on the characteristics of the watercourse – i.e., flow regime, habitat, biota, water quality and geomorphology due to disturbance within the flood line • Soil compaction and increased sediment transport and erosion • Soil and water pollution • Spread and establishment of alien invasive species 	-	S/L	L	D	BR	SL	Yes	• See Table 6.5	M	Wetland / Riparian Impact Assessment (Appendix D1)	

SOCIAL/ECONOMIC	<p>approximate footprint 820m². Other supporting infrastructure includes voltage and current regulators, protection circuitry</p> <ul style="list-style-type: none"> Roads – Access will be obtained from the Sterkfontein gravel road. An internal site road network will also be required to provide access to the solar field and associated infrastructure. Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm. 	Visual landscape	<ul style="list-style-type: none"> Visual impact on observers travelling along the roads and residents at homesteads within a 5km radius of the SPP. Visual impact on observers travelling along the roads and residents at homesteads within a 5-10km radius of the SPP. Visual impacts of lighting at night on sensitive visual receptors in close proximity to the proposed facility. Visual impacts of glint and glare on sensitive visual receptors in close proximity to the proposed facility. Visual impacts on observers travelling along the roads and residents at homesteads in close proximity to the power line structures. Visual impacts and sense of place impacts associated with the operation phase of Delta SPP. 	-		L	L	Pr	PR	SL	Yes	<ul style="list-style-type: none"> See Table 6.5 	L	Visual Impact Assessment (Appendix D3)
	Traffic volumes	<ul style="list-style-type: none"> The proposed development will not result in any major traffic impacts during the operational phase. 	-		S	L	Po	PR	NL	Yes	<ul style="list-style-type: none"> See Table 6.5 	L	Traffic Impact Assessment (Appendix D8)	
	Health & Safety	<ul style="list-style-type: none"> The proposed development will not result in any health and safety impacts during the operational phase. 	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A
	Positive social impacts	<ul style="list-style-type: none"> Direct and indirect employment and skills development opportunities Development of non-polluting, renewable energy infrastructure Contribution to LED and social upliftment 	+		N	L	D	PR	NL	Yes	<ul style="list-style-type: none"> See Table 6.5 	H-L	Social Impact Assessment (Appendix D7)	

				<ul style="list-style-type: none"> Potential impacts on tourism 	-										
			Negative social impacts	<ul style="list-style-type: none"> Potential impacts on tourism Impacts associated with the loss of agricultural land. Visual and sense of place impacts 	-		L	L	Pr	PR	SL	Yes	<ul style="list-style-type: none"> See Table 6.5 	L	Social Impact Assessment (Appendix D7)
			Noise levels	<ul style="list-style-type: none"> The proposed development will not result in any noise pollution during the operational phase. 	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Heritage resources	<ul style="list-style-type: none"> Direct or physical impacts, implying alteration or destruction of heritage features within the project boundaries 	-		S	S	U	CR	NL	Yes	<ul style="list-style-type: none"> As no sites, features or objects of cultural historic significance have been identified in the project area, there would be no impact as a result of the proposed development. Any discovered artifacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained, and the site has been mapped and noted. Permits shall be obtained from the SAHRA should the proposed site affect any world heritage sites or if any heritage sites are to be destroyed or altered. 	L	Heritage Impact Assessment (Appendix D5)
			Electricity supply	<ul style="list-style-type: none"> Generation of additional electricity. The power line will transport generated electricity into the grid. 	+		I	L	D	I	N/A	Yes	-	N/A	-
			Electrical infrastructure	<ul style="list-style-type: none"> Additional electrical infrastructure. The proposed solar facility will add to the existing electrical infrastructure and aid to lessen the reliance of electricity generation from coal-fired power stations. 	+		I	L	D	I	N/A	Yes	-	N/A	-
DECOMMISSIONING PHASE															
-	Dismantlement of infrastructure	BIOPHYSICAL	Fauna and Flora	<ul style="list-style-type: none"> Direct habitat destruction – loss and damage to natural habitats, impact/changes on vegetation & fauna communities, loss of 	-		S/L	L	D	BR	SL	Yes	<ul style="list-style-type: none"> Plant vegetation species for rehabilitation that will effectively bind the loose material. 	M	Terrestrial Biodiversity, Plant and Animal

<p>During the decommissioning phase the Solar PV Energy facility and its associated infrastructure will be dismantled.</p> <p><u>Rehabilitation of biophysical environment</u></p> <p>The biophysical environment will be rehabilitated.</p>		<p>threatened / near-threatened taxa, impact to fauna</p> <ul style="list-style-type: none"> Habitat fragmentation – disruption of natural movement patterns Increased soil erosion and fragmentation – terrestrial ecological changes including establishment of alien invasive plant species, altered plant community species composition and loss of habitat for indigenous flora Soil and water pollution Spread and establishment of alien invasive species Negative effect of human activities and road mortalities – snaring, killing and hunting of certain faunal species, litter and inadequate sanitation, risk of uncontrolled fires 									<ul style="list-style-type: none"> Rehabilitate all the land where infrastructure has been demolished. Monitor the establishment of the vegetation cover on the rehabilitated sites to the point where it is self-sustaining. Protect rehabilitation areas until the area is self-sustaining. Diversion trenches and storm water measures must be maintained Water management facilities will stay operational and maintained and monitored until such a stage is reached where it is no longer necessary. All the monitoring and reporting on the management and rehabilitation issues to the authorities will continue till rehabilitated areas / closure is approved. Monitor and manage invader species and alien species on the rehabilitated land until the natural vegetation can outperform the invaders or aliens. Refer to mitigation measures for the construction phase needed during the closure phase that are relevant (Table 6.4). 		Species Impact Assessment (Appendix D1)
	Air quality	<ul style="list-style-type: none"> Air pollution due to the increase of traffic of construction vehicles 	-		S	S	D	CR	NL	Yes	<ul style="list-style-type: none"> Regular maintenance of equipment to ensure reduced exhaust emissions. 	L	-
	Soil	<ul style="list-style-type: none"> Soil degradation, including erosion Disturbance of soils and existing land use (soil compaction) 	-		S	S	Pr	PR	M	Yes	<ul style="list-style-type: none"> Implement an effective system of stormwater run-off control, where it is required - that is at any points 	L	Agricultural Compliance Statement

			<ul style="list-style-type: none"> Physical and chemical degradation of the soils by construction vehicles (hydrocarbon spills) 								<p>where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion.</p> <ul style="list-style-type: none"> Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion. If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface. 		(Appendix D4)
		Existing services infrastructure	<ul style="list-style-type: none"> Generation of waste that needs to be accommodated at a licensed landfill site Generation of sewage that needs to be accommodated by the municipal sewerage system and the local sewage plant Increase in construction vehicles 	-	L	S	D	I	NL	Yes	-	L	Confirmation from the Local Municipality to provide services
		Groundwater	<ul style="list-style-type: none"> Pollution due to construction vehicles 	-	S	S	Pr	CR	ML	Yes	<ul style="list-style-type: none"> All vehicles should be inspected for oil and fuel leaks on a regular basis. Vehicle maintenance yards on site should make provision for drip trays that will be used to capture any spills. Drip trays should be emptied into a holding tank and returned to the supplier. 	L	-

			Wetland/ Riparian areas	<ul style="list-style-type: none"> • Impact on the characteristics of the watercourse – i.e., flow regime, habitat, biota, water quality and geomorphology due to disturbance within the flood line • Soil compaction and increased sediment transport and erosion • Soil and water pollution • Spread and establishment of alien invasive species 	-	S/L	L	D	BR	SL	Yes	<ul style="list-style-type: none"> • Plant vegetation species for rehabilitation that will effectively bind the loose material and which can absorb run-off from the development areas. • Rehabilitate all the land where infrastructure has been demolished. • Monitor the establishment of the vegetation cover on the rehabilitated sites to the point where it is self-sustaining. • Protect rehabilitation areas until the area is self-sustaining. • Diversion trenches and stormwater measures must be maintained • Water management facilities will stay operational and maintained and monitored until such a stage is reached where it is no longer necessary. • The development areas will be shaped to make it safe. • All the monitoring and reporting on the management and rehabilitation issues to the authorities will continue till closure of the site is approved. • Monitor and manage invader species and alien species on the rehabilitated land until the natural vegetation can outperform the invaders or aliens. • Refer to mitigation measures for the construction phase needed during the closure phase that are relevant 	L	Wetland / Riparian Impact Assessment (Appendix D1)
--	--	--	----------------------------	--	---	-----	---	---	----	----	-----	---	---	---

			Visual landscape	<ul style="list-style-type: none"> Visual impact of activities on sensitive visual receptors in close proximity to the proposed Delta SPP The decommissioning phase of the project will result in the same visual impacts experienced during the construction phase of the project. However, in the case of Delta SPP it is anticipated that the additional facility will be refurbished and upgraded to prolong its life. No decommissioning of the facility is proposed. 	-		L	S	D	PR	ML	Yes	<ul style="list-style-type: none"> See Table 6.4 	L	Visual Impact Assessment (Appendix D3)
			Traffic volumes	<ul style="list-style-type: none"> Road network will be affected Increase in traffic influencing traffic congestion and road safety 	-		L	S	D	CR	NL	Yes	<ul style="list-style-type: none"> See Table 6.6 	L	Traffic Impact Assessment (Appendix D8)
			Health & Safety	<ul style="list-style-type: none"> Air/dust pollution. Road safety. Increased crime levels. The presence of construction workers on the site may increase security risks associated with an increase in crime levels as a result of influx of people in the rural area. 	-		L	S	Pr	PR	ML	Yes	<ul style="list-style-type: none"> Demarcated routes to be established for construction vehicles to ensure the safety of communities, especially in terms of road safety and communities to be informed of these demarcated routes. Where dust is generated by trucks passing on gravel roads, dust mitigation must be enforced. Any infrastructure that would not be decommissioned must be appropriately locked and/or fenced off to ensure that it does not pose any danger to the community. Components that are dismantled must be recycled / reduced as far as possible. 	L	-
			Noise levels	<ul style="list-style-type: none"> The generation of noise as a result of construction vehicles, the use of 	-		L	S	D	CR	NL	Yes	<ul style="list-style-type: none"> The decommissioning phase must aim to adhere to the relevant noise 	L	Social Impact Assessment

			machinery and people working on the site										regulations and limit noise within standard working hours in order to reduce disturbance of dwellings in close proximity to the development.		(Appendix D7)
		Tourism industry	<ul style="list-style-type: none"> Since there are no tourism facilities in close proximity to the site, the decommissioning activities will not have an impact on tourism in the area. The closest tourism facility is the SA Lombard and Sandveld Nature reserves. 	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A	N/A
		Heritage resources	<ul style="list-style-type: none"> It is not foreseen that the decommissioning phase will impact on any heritage resources. 	-		S	S	U	PR	NL	Yes		<ul style="list-style-type: none"> Any discovered artifacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. Permits shall be obtained from the SAHRA should the proposed site affect any world heritage sites or if any heritage sites are to be destroyed or altered. 	L	Heritage Impact Assessment (Appendix D5)

Nature of the impact:	(N/A) No impact	(+) Positive Impact	(-) Negative Impact	
Geographical extent:	(S) Site;	(L) Local/District;	(P) Province/Region;	(I) International and National
Probability:	(U) Unlikely;	(Po) Possible;	(Pr) Probable;	(D) Definite
Duration:	(S) Short Term;	(M) Medium Term;	(L) Long Term;	(P) Permanent
Intensity / Magnitude:	(L) Low;	(M) Medium;	(H) High;	(VH) Very High
Reversibility:	(CR) Completely Reversible;	(PR) Partly Reversible;	(BR) Barely Reversible;	-
Irreplaceable loss of resources:	(IR) Irreversible	(NL) No Loss;	(ML) Marginal Loss;	(SL) Significant Loss;
Level of residual risk:	(L) Low;	(M) Medium;	(H) High;	(VH) Very High
				(CL) Complete Loss
				-

The recommended mitigation measures are included in the Environmental Management Programme for the project. The EMPr for the Solar Power Plant is included in Appendix F1. The EMPr for the power line is included in Appendix F2 and the EMPr for the substation is included in Appendix F3. An Alien Invasive Plant Species Management and Rehabilitation Plan is included as Appendix F4.

An Environmental Awareness and Fire Management Plan is included in Appendix I of the EMPr in Appendix F1.

7.3 KEY ISSUES IDENTIFIED

From the above it is evident that mitigation measures should be available for potential impacts associated with the proposed activity and development phases. The scoping methodology identified the following key issues which were addressed in more detail in the BA report.

7.3.1 Impacts during the construction phase

During the construction phase the following activities will have various potential impacts on the biophysical and socio-economic environment:

- Activity 11(i) (GNR. 327): *“The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.”*
- Activity 28(ii) (GNR. 327): *“Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.”*
- Activity 24(ii) (GNR. 327): *“The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters”*
- Activity 56(ii) (GNR. 327): *“The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres...”*
- Activity 4(h)(iv)(vi) (GN.R. 324): *“The development of a road wider than 4 metres with a reserve less than 13.5 meters (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority and (vi) Areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a biosphere reserve.”*
- Activity 12(h)(iv)(vi) (GNR. 324): *“The clearance of an area of 300 square metres or more of indigenous vegetation...(h) in the North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority and (vi) areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.”*

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of months. The potentially most significant impacts relate to the impacts on the fauna and flora, soil, geology, existing services infrastructure, surface water (non-perennial streams and pans), impacts on heritage/paleontological resources, and socio-economic impacts such as the provision of temporary employment and other economic benefits. Table 6.4 summarises the potentially most significant impacts and the mitigation measures that are proposed during the construction phase.

Table 7.4: Impacts and the mitigation measures during the construction phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial Biodiversity, Plant and Animal Species Impact Assessment (Appendix D1)	Direct habitat destruction	Negative Very High	Negative Medium	<ul style="list-style-type: none"> • The removal of indigenous plants should be kept to a minimum necessary. Trim, rather than fell of woody species along the edges of the development site where possible. The clearing and damage of plant growth in the riparian and wetland areas should be restricted to the actual road crossing where possible, and not into the sensitive adjacent areas. Where protected plants such as geophytes will need to be cleared or pruned, permits should be obtained from the relevant authority. • Peripheral impacts around the development footprint sites on the surrounding vegetation of the area should be avoided and a monitoring programme should be implemented to ensure the impacts are kept to a minimum, while the rehabilitation of the site should be prioritized after construction has been completed. • During construction, sensitive habitats must be avoided by construction vehicles and equipment, wherever possible, to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place. • All development activities should be restricted to specific recommended areas. The Environment Control Officer (ECO) should control these areas. Storage of equipment, fuel and other materials should be limited to demarcated areas. Layouts should be adapted to fit natural patterns rather

				<p>than imposing rigid geometries. The entire development footprint should be clearly demarcated prior to initial site clearance and prevent construction personnel from leaving the demarcated area. This would only be applicable to the construction phase of the proposed development.</p> <ul style="list-style-type: none"> • The ECO should advise the construction team in all relevant matters to ensure minimum destruction and damage to the environment. The ECO should enforce any measures that he/she deem necessary. Regular environmental training should be provided to construction workers to ensure the protection of the habitat, fauna and flora and their sensitivity to conservation. • Where holes for poles pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and getting trapped and/or injured. This could be prevented by the constant excavating and backfilling during planting of the poles along the lines. • Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for the raptors occurring in the area. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist. • Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications. • Monitoring should be implemented during the construction phase of the development to ensure that minimal impact is caused to the fauna and flora of the area.
--	--	--	--	---

				<ul style="list-style-type: none"> Ten (10) individual <i>Vachellia erioloba</i> (Camel Thorn) trees were observed south of the site, six (6) of which were found within the site boundary. <i>Vachellia eriolobais</i> listed as a nationally protected tree in terms of the National Forests Act, No. 84 of 1998, and no individual may be disturbed without the appropriate permit. A permit must be obtained should any specimen need to be disturbed in any way (in terms of Section 12 of the National Forests Act, No. 84 of 1998).
	Habitat fragmentation	Negative Very High	Negative Medium	<ul style="list-style-type: none"> Use existing facilities (e.g., impacted areas) to the extent possible to minimize the amount of new disturbance. Ensure protection of important resources by establishing protective buffers to exclude unintentional disturbance. All possible efforts must be made to ensure as little disturbance as possible to the sensitive features such as surrounding woodland and riparian woodland outside the project area during construction. During construction, sensitive habitats must be avoided by construction vehicles and equipment, wherever possible, to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place. Construction activities must remain within defined construction areas. No construction / disturbance will occur outside these areas.
	Increased soil erosion and sedimentation	Negative High	Negative Low	<ul style="list-style-type: none"> The project should be divided into as many phases as possible, to ensure that the exposed areas prone to erosion are minimal at any specific time.

				<ul style="list-style-type: none"> • Cover disturbed soils as completely as possible, using vegetation or other materials. • Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices. • Protect sloping areas and drainage channel banks that are susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas. • Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth. • Gravel roads to the construction sites must be well drained to limit soil erosion. • Control the flow of runoff to move the water safely off the site without destructive gully formation. • Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas.
	Soil and water pollution	Negative Medium	Negative Low	<ul style="list-style-type: none"> • Any excess or waste material or chemicals should be removed from the site and discarded in an environmentally friendly way. The ECO should enforce this rule rigorously. • Spill kits should be on-hand to deal with spills immediately. • All vehicles should be inspected for oil and fuel leaks on a regular basis. Vehicle maintenance yards on site should make provision for drip trays that

				<p>will be used to capture any spills. Drip trays should be emptied into a holding tank and returned to the supplier.</p>
	Air pollution	Negative Very High	Negative Low	<ul style="list-style-type: none"> • A speed limit should be enforced on dirt roads (preferably 30-40km/h). • Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an on-going basis) of construction areas and access roads, and ensure that these are continuously monitored to ensure effective implementation.
	Spread and establishment of alien invasive species	Negative Medium	Negative Low	<ul style="list-style-type: none"> • Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Weeds and invader plants will be controlled in the manner prescribed for that category by the CARA or in terms of Working for Water guidelines. The control of these species should even begin prior to the construction phase considering that small populations of these species was observed during the field surveys. • Institute strict control over materials brought onto site, which should be inspected for seeds of noxious plants and steps taken to eradicate these before transport to the site. Routinely fumigate or spray all materials with appropriate low-residual herbicides prior to transport to or in a quarantine area on site. The contractor is responsible for the control of weeds and invader plants within the construction site for the duration of the construction phase. Alien invasive tree species listed by the CARA regulations should be eradicated.

				<ul style="list-style-type: none"> • Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish. • Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds. Once detected, an eradication/control programme should be implemented to ensure that the species' do not spread to surrounding natural ecosystems.
	Negative effect of human activities and road mortalities	Negative Medium	Negative Low	<ul style="list-style-type: none"> • No staff should be accommodated on the site. If practical, construction workers should stay in one of the nearby villages and transported daily to the site. • The ECO should regularly inspect the site, including storage facilities and compounds and eradicate any invasive or exotic plants and animals. • Maintain proper firebreaks around entire development footprint. • Educate construction workers regarding risks and correct disposal of cigarettes. • More fauna is normally killed the faster vehicles travel. A speed limit should be enforced (preferably 40 km/hour). It can be considered to install speed bumps in sections where the speed limit tends to be disobeyed. (Speed limits will also lessen the probability of road accidents and their negative consequences). • Travelling at night should be avoided or limited as much as possible.

Wetland / Riparian Impact Assessment (Appendix D1)	Impact on the characteristics of the watercourse – i.e., flow regime, habitat, biota, water quality and geomorphology due to disturbance within the flood line	Negative High	Negative Medium	<ul style="list-style-type: none"> • Clearing of vegetation should be scheduled for the drier winter months and limited to areas immediately needed for construction. Vegetation stripping should occur in parallel with the progress of construction to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. Only selected plant species must be used in the re-vegetation process. • Minimize soil exposure around the solar development. Re-vegetate exposed areas surrounding the solar development and allow a sufficient buffer between the development to prevent sedimentation into the wetlands / rivers. • Manage water effectively on, to, within, and from this site. • Employ sediment capture techniques and stormwater attenuation techniques. • All development activities should be restricted to the footprint areas of the proposed development. The Environment Site Officer (ESO) should demarcate and control these areas. Storage of building equipment, fuel and other materials should be limited to demarcated areas. Layouts should be adapted to fit natural patterns rather than imposing rigid geometries. • The Environment Control Officer (ECO) should advise the construction team in all relevant matters to ensure minimum destruction and damage to the environment and specifically wetlands. The ECO should enforce any measures that he/she deem necessary. Regular environmental training
---	--	---------------	-----------------	---

				<p>should be provided to construction workers to ensure the protection of the habitat, fauna and flora and their sensitivity to conservation.</p> <ul style="list-style-type: none"> • Rehabilitation of the development area after construction have been completed should be considered a high priority and all areas rehabilitated should be audited after construction has ceased by a suitably qualified environmentalist. • Should the development be approved by authorities, environmental monitoring of environmental aspects should be implemented during and after the construction phase of the development to ensure that minimal impact is caused to the floodline or wetlands of the area. • Demarcate all riparian boundaries with pegs and danger tape. • Edge effects of pre-construction and construction activities, including erosion, sedimentation and alien/weed control, need to be strictly managed in wetland areas as well as their associated buffer zones. • The following general rehabilitation measures should be implemented in the disturbed riparian zone: <ul style="list-style-type: none"> ○ All disturbed surface areas will be re-shaped to resemble the surrounding natural topography. Surfaces will be ripped / scarified, and re-vegetated with indigenous grass species. ○ As far, as is practical, implement concurrent rehabilitation processes to limit degradation of soil biota.
--	--	--	--	---

				<ul style="list-style-type: none"> ○ Terrestrial invasive removal programs must be maintained throughout the proposed development as well as in the aftercare and maintenance phases. ● A buffer zone of 32 meters should be implemented around the drainage channels and riparian zone to prevent sediment changes to the channels.
	<p>Soil compaction and increased sediment transport and erosion</p>	<p>Negative High</p>	<p>Negative Low</p>	<ul style="list-style-type: none"> ● Stringent controls must be put in place to prevent any unnecessary disturbance or compaction of alluvial soils. Compaction of soils should be limited and / or avoided as far as possible. Compaction will reduce water infiltration and will result in increased runoff and erosion. Where any disturbance of the soil takes place (have taken place in the past), these areas must be stabilized and any alien plants which establish should be cleared and follow up undertaken for at least 2 years thereafter and preferably longer. Where compaction becomes apparent, remedial measures must be taken (e.g., “ripping” the affected area). Topsoil should preferably be separated from the subsoil, and topsoil sections should be kept intact as deep as possible. ● Reprofilng of the banks of disturbed drainage areas to a maximum gradient of 1:3 to ensure bank stability. ● Reinforce banks and drainage features where necessary with gabions, reno mattresses and geotextiles. This is especially relevant for the stormwater outlet area. ● Reseed any areas where earthworks have taken place with indigenous grasses to prevent further erosion.

				<ul style="list-style-type: none"> • Erosion control mechanisms must be established as soon as possible. Further financial provision should be continued over the subsequent years to allow for maintenance of the gabions, reno mattresses, and associated structures. • A stormwater plan must be developed with the aid of an engineer to ensure that water runoff is diverted off the site without pooling and stagnation or erosion. Financial provision for closure will include the estimated costs for erosion control post-construction. • If compaction occurs, rectification can be done by application and mixing of manure, vegetation mulch or any other organic material into the area. Use of well cured manure is preferable as it will not be associated with the nitrogen negative period associated with organic material that is not composted. • Vehicle traffic should not be allowed on the rehabilitated areas, except on allocated roads, must not be allowed. It will have a negative impact due to the dispersive/compaction characteristics of soils and its implications on the long term. • Appropriate design and mitigation measures must be developed and implemented to minimise impacts on the natural flow regime of the watercourse i.e., through placement of structures/supports and to minimise turbulent flow in the watercourse. • The indiscriminate use of machinery within the in-stream and riparian habitat will lead to compaction of soils and vegetation and must therefore be strictly controlled.
--	--	--	--	--

				<ul style="list-style-type: none"> • A buffer zone of 32 meters should be implemented around the drainage channels and riparian zone to prevent sediment changes to the channels. • Perform scheduled maintenance to be prepared for storms. Ensure that culverts have their maximum capacity, ditches are cleaned, and that channels are free of debris and brush than can plug structures.
	Soil and water pollution	Negative Medium	Negative Low	<ul style="list-style-type: none"> • No dumping of waste should take place within the riparian zone. If any spills occur, they should be immediately cleaned up. • Appropriate sanitary facilities must be provided for the duration of the proposed development and all waste removed to an appropriate waste facility. • Excess waste should be removed from site and discarded in an environmentally friendly way. The ECO should enforce this rule rigorously. • All vehicles should be inspected for oil and fuel leaks on a regular basis. Vehicle maintenance yards on site should make provision for drip trays to capture spills. Drip trays should be emptied into a holding tank and returned to the supplier. • Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an on-going basis) and chemical dust suppressants of construction areas and access roads, and ensure that these are continuously monitored to ensure effective implementation. • A speed limit (preferably 40 km/hour) should be enforced on dirt roads.

				<ul style="list-style-type: none"> Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.
	Spread and establishment of alien invasive species	Negative Medium	Negative Low	<ul style="list-style-type: none"> Alien and invader vegetation must not be allowed to colonise the area. Control involves killing alien invasive plants present, seedlings and establishing an alternative plant cover to limit re-growth. The use of indigenous plants must be encouraged in the rehabilitated areas (stormwater canals), and stockpiles containing mostly exotic or weedy species should receive specialised handling and should be invasion. Control should begin prior to construction phase considering small populations of invasive species occur around the sites. Institute strict control over materials brought onto site, which should be inspected for seeds and steps taken to eradicate these before transport to the site. The contractor is responsible for the control of weeds and invader plants. Rehabilitate disturbed areas as quickly as possible. Institute a monitoring programme to detect alien invasive species early, Institute an eradication/control programme for early intervention if invasive species are detected. The use of indigenous plants must be encouraged in the rehabilitated areas (stormwater canals), and stockpiles containing mostly exotic or weedy species should receive specialised handling and should be covered for extended periods to inhibit seedling germination of these species. Active management and eradication of exotic / alien plant species should also occur when seedlings are found.

Avifaunal Assessment (Appendix D2)	Displacement of priority avian species from important habitats (PV array and associated infrastructure)	Negative Low	Negative Low	<ul style="list-style-type: none"> • Limit construction footprint and retain indigenous vegetation wherever possible. • Limit access to remainder of area outside of the construction footprint. • Avoid construction during the breeding season (summer). • Laydown areas to be located only in disturbed zones. • Construct in shortest timeframe. • Control noise to minimum.
	Displacement of resident avifauna through increased disturbance (PV array and associated infrastructure)	Negative Medium	Negative Low	<ul style="list-style-type: none"> • Limit construction footprint and retain indigenous vegetation wherever possible. • Limit access to remainder of area outside of the construction footprint. • Avoid construction during the breeding season (summer). • Laydown areas to be located only in disturbed zones. • Construct in shortest timeframe. • Control noise to minimum.
	Loss of important avian habitats (PV array and associated infrastructure)	Negative Medium	Negative Low	<ul style="list-style-type: none"> • Limit construction footprint. • Limit access to remainder of area outside of the construction footprint. • Laydown areas to be located only in disturbed zones. • Construct in shortest timeframe. • Use existing roads as far as possible.

				<ul style="list-style-type: none"> • Rehabilitate with indigenous vegetation.
	Displacement of priority avian species from important habitats (Power Line)	Negative Medium	Negative Low	<ul style="list-style-type: none"> • Limit construction footprint and retain indigenous vegetation wherever possible. • Limit access to remainder of area outside of the construction footprint. • Avoid construction during the breeding season (summer). • Laydown areas to be located only in disturbed zones. • Construct in shortest timeframe. • Control noise to minimum. • Maintain a single access and maintenance road within power line servitude.
	Displacement of resident avifauna through increased disturbance (Power Line)	Negative Low	Negative Low	<ul style="list-style-type: none"> • None required due to low significance
	Loss of important avian habitats (Power Line)	Negative Low	Negative Low	<ul style="list-style-type: none"> • None required due to low significance
Agriculture Compliance Statement (Appendix D4)	Loss of agricultural potential by occupation of land	Negative Low	Negative Low	<ul style="list-style-type: none"> • No mitigation measures based on the low impact significance. Agricultural land directly occupied by the development infrastructure will become unavailable for agricultural use, with consequent potential loss of agricultural productivity and employment. The site assessment has found that the soils across the development footprint are unsuitable for the

				<p>production of cultivated crops because of their shallow depth, and are therefore only suited to grazing.</p> <ul style="list-style-type: none"> • No further loss occurs in the subsequent project phases.
	Loss of agricultural potential by soil degradation	Negative Low	Negative Low	<ul style="list-style-type: none"> • Implement an effective system of stormwater run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion. • Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the stormwater run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring. • Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion. • Undertake a periodic site inspection to record the occurrence of and re-vegetation progress of all areas that require re-vegetation. • If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.

				<ul style="list-style-type: none"> Record GPS positions of all occurrences of below-surface soil disturbance (e.g. excavations). Record the date of topsoil stripping and replacement. Check that topsoil covers the entire disturbed area. Topsoil stockpiles must be conserved against losses through erosion by establishing vegetation cover on them. Dispose of all subsurface spoils from excavations where they will not impact on undisturbed land. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface. Erosion must be carefully controlled where necessary on topsoiled areas.
	Loss of agricultural potential by dust generation	Negative Low	Negative Low	<ul style="list-style-type: none"> Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil.
Heritage Impact Assessment (Appendix D5)	Direct or physical impacts, implying alteration or destruction of heritage features	Negative Low	Negative Low	<ul style="list-style-type: none"> Known sites should be clearly marked, so that they can be avoided during construction activities. The contractors and workers should be notified that archaeological sites might be exposed during the construction activities. Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer (ECO) shall be notified as soon as possible. All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon

				<p>advice from these specialists, the ECO will advise the necessary actions to be taken.</p> <ul style="list-style-type: none"> • Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and • Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA, Section 51(1).
Palaeontological Impact Assessment (Appendix D6)	Destroy or permanently damage sensitivities	Negative High	Negative Medium	<ul style="list-style-type: none"> • The ECO for this project must be informed that the Tertiary to Quaternary Calcrete has a High Palaeontological Sensitivity.
Visual Impact Assessment (Appendix D3)	Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed SPP	Negative Medium	Negative Low	<p>Planning</p> <ul style="list-style-type: none"> • Retain and maintain natural vegetation immediately adjacent to the development footprint. <p>Construction</p> <ul style="list-style-type: none"> • Ensure that vegetation is not unnecessarily removed during the construction phase. • Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e., in already disturbed areas) where possible. • Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.

				<ul style="list-style-type: none"> • Ensure that rubble, litter, etc. are appropriately stored (if it can't be removed daily) and then disposed of regularly at a licenced waste site. • Reduce and control dust during construction by utilising dust suppression measures. • Limit construction activities between 07:00 and 18:00, where possible, in order to reduce the impacts of construction lighting. • Rehabilitate all disturbed areas immediately after the completion of construction work and maintain good housekeeping.
Social Impact Assessment (Appendix D7)	Direct and indirect employment opportunities and skills development	Positive Low	Positive Medium	Enhancement: <ul style="list-style-type: none"> • A local employment policy should be adopted to maximise opportunities made available to the local labour force. • Labour should be sourced from the local labour pool, and only if the necessary skills are unavailable should labour be sourced from (in order of preference) the greater North West Province, South Africa, or elsewhere. • Where feasible, training and skills development programmes should be initiated prior to the commencement of the construction phase. • As with the labour force, suppliers should also as far as possible be sourced locally. • As far as possible local contractors that are compliant with Broad-Based Black Economic Empowerment (B-BBEE) criteria should be used. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.

	Economic Multiplier effect	Positive Low	Positive Medium	<p>Enhancement:</p> <ul style="list-style-type: none"> • It is recommended that a local procurement policy is adopted to maximise the benefit to the local economy. • A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) should be created and companies listed thereon should be invited to bid for project-related work where applicable. • Local procurement is encouraged along with engagement with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers where feasible.
	Potential loss of productive farmland	Negative Medium	Negative Low	<ul style="list-style-type: none"> • The proposed site needs to be fenced off prior to the construction phase and all construction related activities should be confined in this fenced off area. • Livestock/ game grazing on the proposed site need to be relocated. • All affected areas, which are disturbed during the construction phase, need to be rehabilitated prior to the operational phase and should be continuously monitored by the Environmental Control Officer (ECO). • Implement, manage and monitor a grievance mechanism for the recording and management of social issues and complaints.

	<p>Influx of jobseekers and change in population</p>	<p>Negative Medium</p>	<p>Negative Low</p>	<ul style="list-style-type: none"> • Develop and implement a local procurement policy which prioritises “locals first” to prevent the movement of people into the area in search of work. • Engage with local community representatives prior to construction to facilitate the adoption of the locals first procurement policy. • Provide transportation for workers (from closest towns and surrounds) to ensure workers can easily access their place of employment and do not need to move closer to the project site. • Working hours should be kept between daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities. • Compile and implement a grievance mechanism. • Appoint a Community Liaison Officer (CLO) to assist with the procurement of local labour. • Prevent the recruitment of workers at the project site. • Implement, manage and monitor a grievance mechanism for the recording and management of social issues and complaints. • Establish clear rules and regulations for access to the proposed site. • Appoint a security company and implement appropriate security procedures to ensure that workers do not remain onsite after working hours. • Inform local community organisations and policing forums of construction times and the duration of the construction phase.
--	--	----------------------------	---------------------	---

				<ul style="list-style-type: none"> • Establish procedures for the control and removal of loiterers from the construction site.
	Safety and security impacts	Negative Medium	Negative Low	<ul style="list-style-type: none"> • Working hours should be kept within daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities. • Provide transportation for workers to prevent loitering within or near the project site outside of working hours. • The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site. The fencing of the site should be maintained throughout the construction period. • The appointed EPC Contractor must appoint a security company to ensure appropriate security procedures and measures are implemented. • Access in and out of the construction site should be strictly controlled by a security company appointed to the project. • A CLO should be appointed as a grievance mechanism. A method of communication should be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process. • The EPC Contractor should implement a stakeholder management plan to address neighbouring farmer concerns regarding safety and security. • The project proposed must prepare and implement a Fire Management Plan; this must be done in conjunction with surrounding landowners.

				<ul style="list-style-type: none"> • The EPC Contractor must prepare a Method Statement which deals with fire prevention and management.
	<p>Impacts on daily living and movement patterns</p>	<p>Negative Medium</p>	<p>Negative Low</p>	<ul style="list-style-type: none"> • All vehicles must be road worthy, and drivers must be qualified, obey traffic rules, follow speed limits and be made aware of the potential road safety issues. • Heavy vehicles should be inspected regularly to ensure their road worthiness. • Provision of adequate and strategically placed traffic warning signs, that have to be maintained for the duration of the construction phase, and control measures along the Sterkfontein gravel road (D997) road and the N12 to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be always visible, especially at night. • Implement penalties for reckless driving to enforce compliance to traffic rules. • Avoid heavy vehicle activity during “peak” hours (when children are taken to school, or people are driving to work). • The developer and EPC Contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed due to construction activities. • The developer and EPC Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if disturbed due to construction activities.

				<ul style="list-style-type: none"> • The EPC Contractor must ensure that damage / wear and tear caused by construction related traffic to the access roads is repaired before the completion of the construction phase. • A method of communication must be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process.
	Nuisance impacts (noise and dust)	Negative Medium	Negative Low	<ul style="list-style-type: none"> • The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. • Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • Ensure all vehicles are road worthy, drivers are qualified and are made aware of the potential noise and dust issues. • A CLO should be appointed, and a grievance mechanism implemented.
	Increased risk of potential veld fires	Negative Medium	Negative Low	<ul style="list-style-type: none"> • A firebreak should be implemented before the construction phase. The firebreak should be controlled and implemented around the perimeters of the project site. • Adequate fire-fighting equipment should be provided and readily available on site and all staff should be trained in firefighting and how to use the fire-fighting equipment. • No staff (except security) should be accommodated overnight on site and the contractor should ensure that no open fires are allowed on site. The

				<p>use of cooking or heating implements should only be used in designated areas.</p> <ul style="list-style-type: none"> • Contractors need to ensure that any construction related activities that might pose potential fire risks, are done in the designated areas where it is also managed properly. • Precautionary measures need to be taken during high wind conditions or during the winter months when the fields are dry. • The contractor should enter an agreement with the local farmers before the construction phase that any damages or losses during the construction phase related to the risk of fire and that are created by staff during the construction phase, are borne by the contractor.
	<p>Visual and sense of place impacts</p>	<p>Negative Low</p>	<p>Negative Low</p>	<ul style="list-style-type: none"> • Implement mitigation measures identified in the Visual Impact Assessment (VIA) prepared for the project. • Limit noise generating activities to normal daylight working hours and avoid weekends and public holidays. • The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. • Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • All vehicles must be road-worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.

				<ul style="list-style-type: none"> • Communication, complaints, and grievance channels must be implemented and contact details of the CLO must be provided to the local community in the study area.
Traffic Impact Assessment (Appendix D8)	Increase in traffic volumes, influencing traffic congestion and road safety	Negative Medium	N/A	<ul style="list-style-type: none"> • Stagger component delivery to site. • Reduce the construction period. • The use of mobile batch plants and quarries in close proximity to the site. • Staff and general trips should occur outside of peak traffic periods. • Regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase • All construction vehicles must be roadworthy and drivers must have the relevant licenses for the type of vehicles they are operating. • All vehicle drivers need to strictly adhere to the rules of the road.

7.3.2 Impacts during the operational phase

During the operational phase the study area will serve as a solar plant. The potential impacts will take place over a period of 20 – 25 years. During the operational phase the following activities will have various potential impacts on the biophysical and socio-economic environment:

- Activity 1 (i) (GNR. 327): *“The development of facilities or infrastructure for the generation of electricity from renewable resource where (i) the electricity output is more than 10 megawatts but less than 20 megawatts.”*
- Activity 28(ii) (GNR. 327): *“Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.”*
- Activity 4(h)(iv)(vi) (GN.R. 324): *“The development of a road wider than 4 metres with a reserve less than 13.5 meters (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority and (vi) Areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a biosphere reserve.”*

Table 6.5 summarised the negative impacts are generally associated with the Delta Solar Power Plant. The potential impacts will take place over a period of 20 – 25 years. The negative impacts are generally associated with impacts on the soils, geology, surface water, the increased consumption of water, and visual impacts. The provision of sustainable services delivery also needs to be confirmed. The operational phase will have a direct positive impact through the provision of employment opportunities for its duration, and the generation of income to the local community.

Table 7.5: Impacts and the mitigation measures during the operational phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial Biodiversity, Plant and Animal Species Impact Assessment (Appendix D1)	Direct habitat destruction	Negative Very High	Negative Medium	<ul style="list-style-type: none"> • The removal of indigenous plants should be kept to a minimum necessary. Trim, rather than fell of woody species along the edges of the development site where possible. The clearing and damage of plant growth in the riparian and wetland areas should be restricted to the actual road crossing where possible, and not into the sensitive adjacent areas. Where protected plants such as geophytes will need to be cleared or pruned, permits should be obtained from the relevant authority. • Peripheral impacts around the development footprint sites on the surrounding vegetation of the area should be avoided and a monitoring programme should be implemented to ensure the impacts are kept to a minimum. • All operation and maintenance activities should be restricted to specific recommended areas. Storage of equipment, fuel and other materials should be limited to demarcated areas. • Where holes for poles pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and getting trapped and/or injured. • Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous

				<p>consequences for the raptors occurring in the area. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist.</p> <ul style="list-style-type: none"> • Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.
	Habitat fragmentation	Negative Very High	Negative Medium	<ul style="list-style-type: none"> • Use existing facilities (e.g., impacted areas) to the extent possible to minimize the amount of new disturbance. • Ensure protection of important resources by maintaining protective buffers to exclude unintentional disturbance. All possible efforts must be made to ensure as little disturbance as possible to the sensitive features such as surrounding woodland and riparian woodland outside the project area. • Operation and maintenance activities must remain within defined areas. No disturbance must occur outside these areas.
	Increased soil erosion and sedimentation	Negative High	Negative Low	<ul style="list-style-type: none"> • Ensure that the exposed areas prone to erosion are minimal at any specific time. • Cover disturbed soils as completely as possible, using vegetation or other materials. • Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices.

				<ul style="list-style-type: none"> • Protect sloping areas and drainage channel banks that are susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the site. • Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth. • Gravel roads must be well drained to limit soil erosion. • Control the flow of runoff to move the water safely off the site without destructive gully formation. • Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the site.
	Soil and water pollution	Negative Medium	Negative Low	<ul style="list-style-type: none"> • Any excess or waste material or chemicals should be removed from the site and discarded in an environmentally friendly way. • Spill kits should be on-hand to deal with spills immediately. • All vehicles should be inspected for oil and fuel leaks on a regular basis. Vehicle maintenance yards on site should make provision for drip trays that will be used to capture any spills. Drip trays should be emptied into a holding tank and returned to the supplier.

	Air pollution	Negative Very High	Negative Low	<ul style="list-style-type: none"> • A speed limit should be enforced on dirt roads (preferably 30-40km/h). • Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an on-going basis) of access roads, and ensure that these are continuously monitored to ensure effective implementation.
	Spread and establishment of alien invasive species	Negative Medium	Negative Low	<ul style="list-style-type: none"> • Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Weeds and invader plants will be controlled in the manner prescribed for that category by the CARA or in terms of Working for Water guidelines. The control of these species should continue throughout the operation phase. • Institute strict control over materials brought onto site, which should be inspected for seeds of noxious plants and steps taken to eradicate these before transport to the site. Routinely fumigate or spray all materials with appropriate low-residual herbicides prior to transport to or in a quarantine area on site. Alien invasive tree species listed by the CARA regulations should be eradicated.

				<ul style="list-style-type: none"> • Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish. • Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds. Once detected, an eradication/control programme should be implemented to ensure that the species' do not spread to surrounding natural ecosystems.
	<p>Negative effect of human activities and road mortalities</p>	<p>Negative Medium</p>	<p>Negative Low</p>	<ul style="list-style-type: none"> • No staff should be accommodated on the site. If practical, construction workers should stay in one of the nearby villages and transported daily to the site. • Regularly inspect the site, including storage facilities and compounds and eradicate any invasive or exotic plants and animals. • Maintain proper firebreaks around entire development footprint. • Educate workers regarding risks and correct disposal of cigarettes. • A speed limit should be enforced (preferably 40 km/hour). It can be considered to install speed bumps in sections where the speed limit tends to be disobeyed. (Speed limits will also

				<p>lessen the probability of road accidents and their negative consequences).</p> <ul style="list-style-type: none"> • Travelling at night should be avoided or limited as much as possible.
<p>Wetland / Riparian Impact Assessment (Appendix D1)</p>	<p>Impact on the characteristics of the watercourse – i.e. flow regime, habitat, biota, water quality and geomorphology due to disturbance within the floodline</p>	<p>Negative High</p>	<p>Negative Medium</p>	<ul style="list-style-type: none"> • Minimize soil exposure around the solar development. Re-vegetate exposed areas surrounding the solar development and allow a sufficient buffer between the development to prevent sedimentation into the wetlands / rivers. • Manage water effectively on, to, within, and from this site. • Employ sediment capture techniques and stormwater attenuation techniques. • Storage of building/maintenance equipment, fuel and other materials should be limited to demarcated areas. • Demarcate all riparian boundaries with pegs and danger tape. • Edge effects, including erosion, sedimentation and alien/weed control, need to be strictly managed in wetland areas as well as their associated buffer zones. • The following general rehabilitation measures should be implemented in the disturbed riparian zone:

				<ul style="list-style-type: none"> ○ Terrestrial invasive removal programs must be maintained throughout the proposed development as well as in the aftercare and maintenance phases. ● A buffer zone of 32 meters should be implemented around the drainage channels and riparian zone to prevent sediment changes to the channels.
	<p>Soil compaction and increased sediment transport and erosion</p>	<p>Negative High</p>	<p>Negative Low</p>	<ul style="list-style-type: none"> ● Stringent controls must be put in place to prevent any unnecessary disturbance or compaction of alluvial soils. Compaction of soils should be limited and / or avoided as far as possible. Compaction will reduce water infiltration and will result in increased runoff and erosion. Where any disturbance of the soil takes place (have taken place in the past), these areas must be stabilized and any alien plants which establish should be cleared and follow up undertaken for at least 2 years thereafter and preferably longer. Where compaction becomes apparent, remedial measures must be taken (e.g., “ripping” the affected area). Topsoil should preferably be separated from the subsoil, and topsoil sections should be kept intact as deep as possible. ● Reprofiling of the banks of disturbed drainage areas to a maximum gradient of 1:3 to ensure bank stability. ● Reinforce banks and drainage features where necessary with gabions, reno mattresses and geotextiles. This is especially relevant for the stormwater outlet area.

				<ul style="list-style-type: none"> • Reseed any areas where earthworks have taken place with indigenous grasses to prevent further erosion. • Erosion control mechanisms must be established as soon as possible. Further financial provision should be continued over the subsequent years to allow for maintenance of the gabions, reno mattresses, and associated structures. • Financial provision for closure must include the estimated costs for erosion control post-construction. • If compaction occurs, rectification can be done by application and mixing of manure, vegetation mulch or any other organic material into the area. Use of well cured manure is preferable as it will not be associated with the nitrogen negative period associated with organic material that is not composted. • Vehicle traffic should not be allowed on the rehabilitated areas, except on allocated roads, must not be allowed. It will have a negative impact due to the dispersive/compaction characteristics of soils and its implications on the long term. • The indiscriminate use of machinery within the in-stream and riparian habitat will lead to compaction of soils and vegetation and must therefore be strictly controlled. • A buffer zone of 32 meters should be implemented around the drainage channels and riparian zone to prevent sediment changes to the channels.
--	--	--	--	--

				<ul style="list-style-type: none"> • Perform scheduled maintenance to be prepared for storms. Ensure that culverts have their maximum capacity, ditches are cleaned, and that channels are free of debris and brush than can plug structures.
	Soil and water pollution	Negative Medium	Negative Low	<ul style="list-style-type: none"> • No dumping of waste should take place within the riparian zone. If any spills occur, they should be immediately cleaned up. • Appropriate sanitary facilities must be provided for the duration of the proposed development and all waste removed to an appropriate waste facility. • Excess waste should be removed from site and discarded in an environmentally friendly way. • All vehicles should be inspected for oil and fuel leaks on a regular basis. Vehicle maintenance yards on site should make provision for drip trays to capture spills. Drip trays should be emptied into a holding tank and returned to the supplier. • Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an on-going basis) and chemical dust suppressants of access roads, and ensure that these are continuously monitored to ensure effective implementation.

				<ul style="list-style-type: none"> • A speed limit (preferably 40 km/hour) should be enforced on dirt roads. • Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.
	<p>Spread and establishment of alien invasive species</p>	<p>Negative Medium</p>	<p>Negative Low</p>	<ul style="list-style-type: none"> • Alien and invader vegetation must not be allowed to colonise the area. Control involves killing alien invasive plants present, seedlings and establishing an alternative plant cover to limit re-growth. The use of indigenous plants must be encouraged in the rehabilitated areas (stormwater canals), and stockpiles containing mostly exotic or weedy species should receive specialised handling and should be invasion. Control should begin prior to construction phase considering small populations of invasive species occur around the site, and continue throughout the remaining phases of the development. • Institute strict control over materials brought onto site, which should be inspected for seeds and steps taken to eradicate these before transport to the site. • Rehabilitate disturbed areas as quickly as possible. • Institute a monitoring programme to detect alien invasive species early.

				<ul style="list-style-type: none"> Institute an eradication/control programme for early intervention if invasive species are detected. The use of indigenous plants must be encouraged in the rehabilitated areas (stormwater canals), and stockpiles containing mostly exotic or weedy species should receive specialised handling and should be covered for extended periods to inhibit seedling germination of these species. Active management and eradication of exotic / alien plant species should also occur when seedlings are found.
Avifauna Impact Assessment (Appendix D2)	Displacement of priority avian species from important habitats	Negative Medium	Negative Low	<ul style="list-style-type: none"> Limit ongoing human activity to the minimum required for ongoing operation. Control noise to minimum. Rehabilitate with indigenous vegetation. Limit roadways and vehicle speeds.
	Displacement of resident avifauna through increased disturbance	Negative Medium	Negative Low	<ul style="list-style-type: none"> Limit ongoing human activity to the minimum required for ongoing operation. Control noise to minimum. Rehabilitate with indigenous vegetation. Limit roadways and vehicle speeds.
	Collisions with PV panels leading to injury or loss of avian life	Negative Medium	Negative Low	<ul style="list-style-type: none"> Panels to be flat at night. Preferably low sheen/matt surfaces.

				<ul style="list-style-type: none"> Quarterly fatality monitoring.
	Displacement of priority avian species from important habitats (Power Line)	Negative Low	Negative Low	<ul style="list-style-type: none"> None required due to low significance.
	Displacement of resident avifauna through increased disturbance (Power Line)	Negative Low	Negative Low	<ul style="list-style-type: none"> None required due to low significance.
	Collision when flying into power line infrastructure	Very High Negative	Medium Negative	<ul style="list-style-type: none"> Require walk-through after pole positions are determined to demarcate sections requiring bird deterrents/flappers. Install flappers on all required sections of power line (as directed by avifaunal specialist) on or directly adjacent to site. Quarterly fatality monitoring and record-keeping throughout project life
	Electrocution when perched on power line infrastructure	High Negative	Medium Negative	<ul style="list-style-type: none"> Pole designs to discourage bird perching and to be signed off by avifaunal specialist. Quarterly fatality monitoring and record-keeping throughout project life.
Agriculture Compliance Statement	Loss of agricultural potential by occupation of land	Negative Low	Negative Low	<ul style="list-style-type: none"> Maintain the stormwater run-off control system. Monitor erosion and remedy the stormwater control system in the event of any erosion occurring.

(Appendix D4)				<ul style="list-style-type: none"> • Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the stormwater run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring. • Facilitate re-vegetation of denuded areas throughout the site. • Undertake a periodic site inspection to record the progress of all areas that require re-vegetation.
	Increased financial security for farming operations	Low Positive	Low Positive	<ul style="list-style-type: none"> • No mitigation measures required.
	Impacts on agricultural production and employment	Negative Low	Negative Low	<ul style="list-style-type: none"> • No mitigation required.
Heritage Impact Assessment (Appendix D5)	Direct or physical impacts, implying alteration or destruction of heritage features	Negative Low	Negative Low	<ul style="list-style-type: none"> • Known sites should be clearly marked, so that they can be avoided during construction activities. • The contractors and workers should be notified that archaeological sites might be exposed during the construction activities. • Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall

				<p>cease immediately and the Environmental Control Officer (ECO) shall be notified as soon as possible.</p> <ul style="list-style-type: none"> • All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the ECO will advise the necessary actions to be taken. • Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and • Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA, Section 51(1).
<p>Visual Impact Assessment (Appendix D3)</p>	<p>Visual impact on observers travelling along the roads and residents at homesteads within a 5km radius of the SPP</p>	<p>Negative Medium</p>	<p>Negative Low</p>	<p>Planning</p> <ul style="list-style-type: none"> • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted using endemic, fast growers that are water efficient. <p>Operations</p> <ul style="list-style-type: none"> • Maintain general appearance of the facility as a whole.

	<p>Visual impact on observers travelling along the roads and residents at homesteads within a 5-10km radius of the SPP.</p>	<p>Negative Low</p>	<p>Negative Low</p>	<p>Planning</p> <ul style="list-style-type: none"> Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. Where insufficient natural vegetation exists next to the property, a 'screen' can be planted using endemic, fast growers that are water efficient. <p>Operations</p> <ul style="list-style-type: none"> Maintain general appearance of the facility as a whole.
	<p>Visual impacts of lighting at night on sensitive visual receptors in close proximity to the proposed facility.</p>	<p>Negative Medium</p>	<p>Negative Low</p>	<p>Planning & Operation</p> <ul style="list-style-type: none"> Shield the source of light by physical barriers (walls, vegetation etc.) Limit mounting heights of lighting fixtures, or alternatively use footlights or bollard level lights. Make use of minimum lumen or wattage in fixtures. Make use of down-lighters, or shield fixtures. Make use of low-pressure sodium lighting or other types of low impact lighting. Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.

	Visual impacts of glint and glare on sensitive visual receptors in close proximity to the proposed facility.	Negative Medium Low	N/A	<ul style="list-style-type: none"> No mitigation measures are required.
	Visual impacts on observers travelling along the roads and residents at homesteads in close proximity to the power line structures – Option 1	Negative Low	Negative Low	<p>Planning</p> <ul style="list-style-type: none"> Retain/re-establish and maintain natural vegetation immediately adjacent to the power line servitude. <p>Operations</p> <ul style="list-style-type: none"> Maintain the general appearance of the servitude as a whole.
	Visual impacts on observers travelling along the roads and residents at homesteads in close proximity to the power line structures – Option 2	Negative Low	Negative Low	<p>Planning</p> <ul style="list-style-type: none"> Retain/re-establish and maintain natural vegetation immediately adjacent to the power line servitude. <p>Operations</p> <ul style="list-style-type: none"> Maintain the general appearance of the servitude as a whole.
	Visual impacts and sense of place impacts associated with the operation phase of Delta SPP	Negative Low	Negative Low	<ul style="list-style-type: none"> The subjectivity towards the project in its entirety can be influenced by creating a “Green Energy” awareness campaign, educating the local community and potentially tourists on the benefits of renewable energy. This can be achieved by also hosting an ‘open day’ where the local community can have the opportunity to view the completed

				<p>project which may enlist a sense of pride in the renewable energy project in their area.</p> <ul style="list-style-type: none"> • Implement good housekeeping measures.
Social Impact Assessment (Appendix D7)	Direct and Indirect employment opportunities and skills development	Positive Low	Positive Medium	<p>Enhancement:</p> <ul style="list-style-type: none"> • It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. • Vocational training programs should be established to promote the development of skills.
	Development of non-polluting, renewable energy infrastructure	Positive Medium	Positive Medium	<ul style="list-style-type: none"> • No enhancement identified
	Potential loss of agricultural land	Negative Medium	Negative Low	<ul style="list-style-type: none"> • The proposed mitigation measures for the construction phase should have been implemented at this stage. • Mitigation measures from the Agricultural Compliance Statement should also be implemented.
	Contribution to Local Economic Development (LED) and social upliftment	Positive Medium	Positive High	<p>Enhancement:</p>

						<ul style="list-style-type: none"> • A CNA must be conducted to ensure that the LED and social upliftment programmes proposed by the project are meaningful. • Ongoing communication and reporting are required to ensure that maximum benefit is obtained from the programmes identified, and to prevent the possibility for such programmes to be misused. • The programmes should be reviewed on an ongoing basis to ensure that they are best suited to the needs of the community at the time (bearing in mind that these are likely to change over time).
	Impact on tourism	Negative Low	Positive Low	Negative Low	Positive Low	<ul style="list-style-type: none"> • The impact rating is dependent on how the development is perceived by tourism. In some cases, renewable energy developments can be seen as an addition to the tourist industry in the area (positive low) or it can be viewed as a negative. The rating is subjective. • Due to the extent of the project no viable mitigation measures can be implemented to eliminate the visual impact of the PV panels, but the subjectivity towards the PV panels can be influenced by creating a “Green Energy” awareness campaign, educating the local community and tourists on the benefits of renewable energy. Tourists visiting the area should be made aware of South Africa’s movement towards renewable energy. This might create a positive feeling of a country moving forward in terms of environmental

						<p>sustainability. This could be implemented by constructing a visitor's centre on the property allocated to the proposed solar farm which should be open to school fieldtrips, the local community, and tourists</p>
	Visual and sense of place impacts	Negative Low	Negative Low			<ul style="list-style-type: none"> To effectively mitigate the visual impact and the impact on sense of place during the operational phase of the proposed SPP, it is suggested that the recommendations made in the Visual Impact Assessment (specialist study) should be followed in this regard
Traffic Impact Assessment (Appendix D8)	The road network will be affected as there will be an increase in traffic, congestion and impact on road safety	Negative Low	N/A			<ul style="list-style-type: none"> All operations and maintenance vehicles must be roadworthy and drivers must have the relevant licenses for the type of vehicles they are operating. All vehicle drivers need to strictly adhere to the rules of the road.

7.3.3 Impacts during the decommissioning phase

The physical environment will benefit from the closure of the solar facility since the site will be restored to its natural state. The decommissioning phase will however result in the loss of permanent employment. However, skilled staff will be eminently employable and a number of temporary jobs will also be created during the decommissioning phase.

Table 7.6: Impacts and the mitigation measures during the decommissioning phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial Biodiversity, Plant and Animal Species Impact Assessment (Appendix D1)	Improvement of habitat through revegetation / succession over time	Positive Low	Positive Medium	<ul style="list-style-type: none"> Plant vegetation species for rehabilitation that will effectively bind the loose material. Rehabilitate all the land where infrastructure has been demolished. Monitor the establishment of the vegetation cover on the rehabilitated sites to the point where it is self-sustaining. Protect rehabilitation areas until the area is self-sustaining. Diversion trenches and storm water measures must be maintained Water management facilities will stay operational and maintained and monitored until such a stage is reached where it is no longer necessary. All the monitoring and reporting on the management and rehabilitation issues to the authorities will continue till rehabilitated areas / closure is approved. Monitor and manage invader species and alien species on the rehabilitated land until the natural vegetation can outperform the invaders or aliens. Refer to mitigation measures for the construction phase needed during the closure phase that are relevant (Table 6.4).
	Soil erosion and sedimentation	Negative Medium	Negative Low	
	Spreading and establishment of alien invasive species	Negative Medium	Negative Low	
	Habitat degradation due to dust	Negative High	Negative Low	
	Spillages of harmful substances	Negative Medium	Negative Low	
	Road mortalities of fauna / impact of human activities on site	Negative Medium	Negative Low	

Wetland / Riparian Impact Assessment (Appendix D1)	Impact on the characteristics of the watercourse – i.e. flow regime, habitat, biota, water quality and geomorphology due to disturbance within the floodline	Positive Low	Positive Medium	<ul style="list-style-type: none"> Plant vegetation species for rehabilitation that will effectively bind the loose material and which can absorb run-off from the development areas. Rehabilitate all the land where infrastructure has been demolished. Monitor the establishment of the vegetation cover on the rehabilitated sites to the point where it is self-sustaining. Protect rehabilitation areas until the area is self-sustaining. Diversion trenches and stormwater measures must be maintained Water management facilities will stay operational and maintained and monitored until such a stage is reached where it is no longer necessary. The development areas will be shaped to make it safe. All the monitoring and reporting on the management and rehabilitation issues to the authorities will continue till closure of the site is approved. Monitor and manage invader species and alien species on the rehabilitated land until the natural vegetation can outperform the invaders or aliens. Refer to mitigation measures for the construction phase needed during the closure phase that are relevant
	Soil compaction and increased sediment transport and erosion	Negative Medium	Negative Low	
	Soil and water pollution	Negative Medium	Negative Low	
	Spread and establishment of alien invasive species	Negative Medium	Negative Low	
Avifauna Impact Assessment (Appendix D2)	Displacement of priority avian species from important habitats (PV facility and power line)	Negative Low	Negative Low	<ul style="list-style-type: none"> None required due to low significance

	Displacement of resident avifauna through increased disturbance (PV facility and power line)	Negative Low	Negative Low	<ul style="list-style-type: none"> • None required due to low significance
Agriculture Compliance Statement (Appendix D4	Loss of agricultural potential by occupation of land	Negative Low	Negative Low	<ul style="list-style-type: none"> • No mitigation measures.
	Loss of agricultural potential by soil degradation (erosion)	Negative Low	Negative Low	<ul style="list-style-type: none"> • Implement an effective system of stormwater run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion. • Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the stormwater run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring. • Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion. • Undertake a periodic site inspection to record the occurrence of and re-vegetation progress of all areas that require re-vegetation.

				<ul style="list-style-type: none"> • If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface. • Record GPS positions of all occurrences of below-surface soil disturbance (e.g. excavations). Record the date of topsoil stripping and replacement. Check that topsoil covers the entire disturbed area.
	Loss of agricultural potential by dust generation	Negative Low	Negative Low	<ul style="list-style-type: none"> • Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil.
Traffic Impact Assessment (Appendix D8)	The road network will be affected as there will be an increase in traffic, congestion and impact on road safety	Negative Low (insignificant)	N/A	<ul style="list-style-type: none"> • All decommissioning vehicles must be roadworthy and drivers must have the relevant licenses for the type of vehicles they are operating. • All vehicle drivers need to strictly adhere to the rules of the road.

7.4 SUMMARY OF RECOMMENDATIONS FROM SPECIALIST STUDIES

To address the key issues highlighted in the previous section the following specialist studies and processes were commissioned:

- Ecological and wetland Impact Assessments – The Biodiversity Company (see Appendix D1)
- Avifaunal Impact Assessment – The Biodiversity Company (see Appendix D2)
- Visual Impact Assessment – Donaway Environmental Consultants (see Appendix D3)
- Soil study – The Biodiversity Company (see Appendix D4)
- Heritage Impact Assessment – JA van Schalkwyk Heritage Consultants (see Appendix D5)
- Palaeontological Impact Assessment – Banzai Environmental (see Appendix D6)
- Social Impact Assessment – Donaway Environmental Consultants (see Appendix D7)
- Stormwater management plan hydrological Assessment – Geostratum Water Management Consulting (see Appendix D9)

The following sections summarise the main findings from the specialist reports in relation to the key issues raised during the scoping phase.

7.4.1 Issue 1: Geotechnical suitability

The geotechnical suitability for the Delta SPP site was determined. The main question had to be addressed was:

“Are the geotechnical conditions favourable for the development of a PV solar plant?”

According to the Hydrogeological Investigation (Appendix D9) the groundwater can be used as a viable source of water supply for the facility. The study also confirmed that one production borehole exists in close proximity of the facility and is recommended for further investigation. It is recommended that a 24-hour Constant Rate Aquifer Test be carried out on borehole Delta BH1, to confirm the sustainable yield of the borehole and to confirm that the borehole can supply the daily requirements for both the construction and operational phase of the facility. A water quality sample should be obtained from the borehole in order to confirm that the water quality fall within the facilities operation specifications. A detailed risk and impact assessment should be done for the facility once the aquifer parameters of the borehole are determined during the aquifer testing. In the event that the borehole does not have sufficient yield then the potential geological structure delineated from the Aeromagnetic survey can be further investigated as an additional source of water supply.

7.4.2 Issue 2: Heritage and archaeological impacts

South Africa's heritage resources comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site. In accordance with Section 38 of the NHRA, an independent heritage consultant was therefore appointed to conduct a Heritage Impact Assessment (HIA) to determine if any sites, features or objects of cultural heritage significance occur within the proposed site. The main question which needs to be addressed is:

“Will the proposed development impact on any heritage or archaeological artefacts?”

According to the Heritage Impact Assessment (Appendix D5) cultural landscape qualities of the region are made up of a pre-colonial element consisting of very limited Stone Age and Iron Age occupation, as well as a much later colonial (farmer) component, which also gave rise to an urban and industrial (mining) component.

The impacts expected to occur will be of a low significance based on the fact that no sites of cultural significance or value was identified or discovered.

For this proposed project, the assessment has determined that no sites, features or objects of cultural heritage significance occur in the project area, therefore no permits are required from SAHRA or the PHRA. If heritage features are identified during construction, as stated in the management recommendation, these finds would have to be assessed by a specialist, after which a decision will be made regarding the application for relevant permits.

From a heritage point of view, it is recommended that the proposed project be allowed to continue on acceptance of the mitigation measures presented and the conditions proposed.

7.4.3 Issue 3: Ecological Impacts

The potential impact of the proposed development on flora and fauna known to occur in the North West Province had to be determined. The main question which needs to be addressed is:

“How will the proposed development impact on the ecology?”

The site is located approximately 7 km west of Bloemhof town and 4 km north of the Vaal River. Other than the nearby town and the large N12 highway adjacent to the south, the surrounding region is largely made up of undeveloped grazing land to the north, and agricultural land to the south.

According to the Terrestrial Biodiversity, Plant and Animal Species Impact Assessment (Appendix D1), the proposed development activities will modify the vegetation and faunal habitats of the development site to a certain extent varying according to the habitats on the site, although in general the vegetation on site where the development footprint is planned are classified as pristine to slightly degraded. The development footprint contains areas that are variously categorised in terms of their conservation value and ecosystem functioning.

Areas of varying ecological sensitivity were identified in the development footprint as indicated in Figure 6.1 below.

It is evident from the distribution of biodiversity, presence of threatened species and sites of scientific interest, that the proposed development has the potential for negative impact on the flora and faunal of the site. This is particularly true of the sensitive vegetation associated with the riverine and wetland ecosystems and the development footprint.

Many threatened species are grassland and wetland species, linked to these habitats either for breeding, feeding or shelter. Major impacts on wetland and rocky areas should be avoided wherever possible during construction. Where unavoidable impacts will occur on grassland and wetland zones, strict mitigation measures and legislation should be implemented (licence for eradication of protected plants, IWUL application etc.).

Many endemic and protected species have been recorded in the region. The mitigation and management measures for the development should highlight the conservation status of these species and note that steps must be undertaken in conjunction with conservation authorities to protect or translocate any populations encountered during project actions. Ecological monitoring is recommended for the construction phase of the development considering the presence of protected trees and potential red data fauna on areas surrounding the site. Three habitats were delineated in total, and these are mapped in Figure 6.1 above. The locations of ten individuals of the protected tree, *Vachellia erioloba*, are also included in the map. Specific mitigation measures (permit applications, avoidance, relocation) should be implemented to avoid negative impacts on the species.

The importance of rehabilitation and implementation of mitigation processes to prevent negative impacts on the environment during and after the construction phase of the solar development should be considered a high priority. The proposed site for the development varies from being in a completely modified to slightly degraded state.

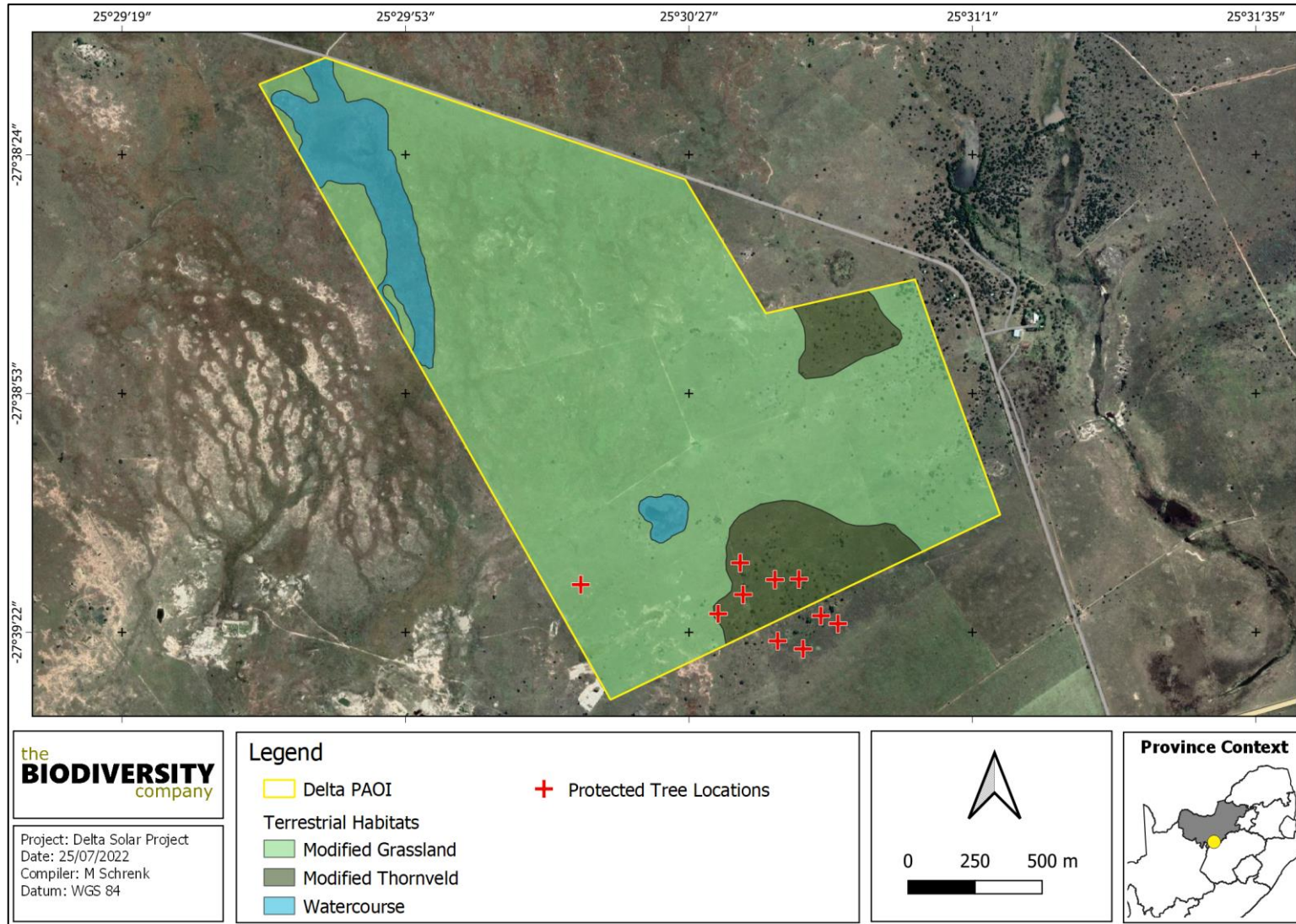


Figure 7.1: Ecological sensitivity map of the development footprint.

Some potential rare faunae may also occur in the area, and specific mitigation measures need to be implemented to ensure that the impact of the development on the species' habitat will be low. Specific mitigation relating to red data fauna includes the following:

- Disturbances in close vicinity of the development (periphery) should be limited to the smallest possible area to protect species habitat.
- Corridors are important to allow fauna to move freely between the areas of disturbance.

Several potential impacts were identified and assessed. A few of these were assessed as having potentially medium or high significance, including the following:

- Destruction or disturbance to sensitive ecosystems leading to reduction in the overall extent of a particular habitat.
- Increased soil erosion.
- Impairment of the movement and/or migration of animal species resulting in genetic and/or ecological impacts.
- Destruction/permanent loss of individuals of rare, endangered, endemic and/or protected species.
- Soil and water pollution through spillages.
- Establishment and spread of declared weeds and alien invader plants.
- Impacts of human activities on fauna and flora of the area during construction.
- Air pollution through dusts and fumes from construction vehicles (construction phase)

Mitigation measures are provided that would reduce these impacts from a higher to a lower significance. Furthermore, the proposed layout plan of the development should be consistent with the sensitivity map, and the impact on the sensitive habitats on site should be kept to a minimum.

Provided that the proposed development (and associated layout plan) is consistent with the ecological sensitivity map and take all the mitigation measures into consideration stipulated in this report, the planned development can be supported.

7.4.4 Issue 4: Wetland / Riparian Impacts

The potential impact of the proposed development on wetlands known to occur on site, had to be determined. The main question which needs to be addressed is:

“How will the proposed development impact on the wetlands?”

According to the Wetland / Riparian Impact Assessment (Appendix D1), four types of NFEPA wetlands were identified within the site, namely channelled valley bottom wetlands, depressions, wetland flats as well as unchannelled valley bottoms (see Figure 6.2). All the NFEPA wetlands identified within the 500 m regulated area are classified as natural with a condition of largely natural (A/B). According to the land type database (Land Type Survey Staff, 1972-2006), the project area is characterised by the Ae 36 land type. This land type consists

of red-yellow apedal soils which are freely drained. The soils tend to have a high base status and is deeper than 300 mm. The geology of the region consists of the andesitic lavas of the Allanridge Formation as well as the fine-grained sediments of the Karoo Supergroup. It consists of deep sandy to loamy soils from the Hutton soil form (Ae and Ah land types) on top of undulating sandy plains (Mucina and Rutherford, 2006).

Based on the results and conclusions presented in the Wetland Impact Assessment Report, it is expected that the proposed activities will have low impacts on the wetlands and thus no fatal flaws were identified for the project. A General Authorisation (GN 509 of 2016) is required for the water use authorisation.

An impact assessment was conducted for the wetlands on site in addition to the mitigation measures recommended to ensure the protection of the riverine ecosystems.

Specific mitigation measures need to be implemented in the areas surrounding the riparian zones and water courses to prevent any negative impacts.

Provided that all the mitigation measures and recommendations surrounding the water courses and riparian zones are strictly adhered to the development of the solar development can be supported.

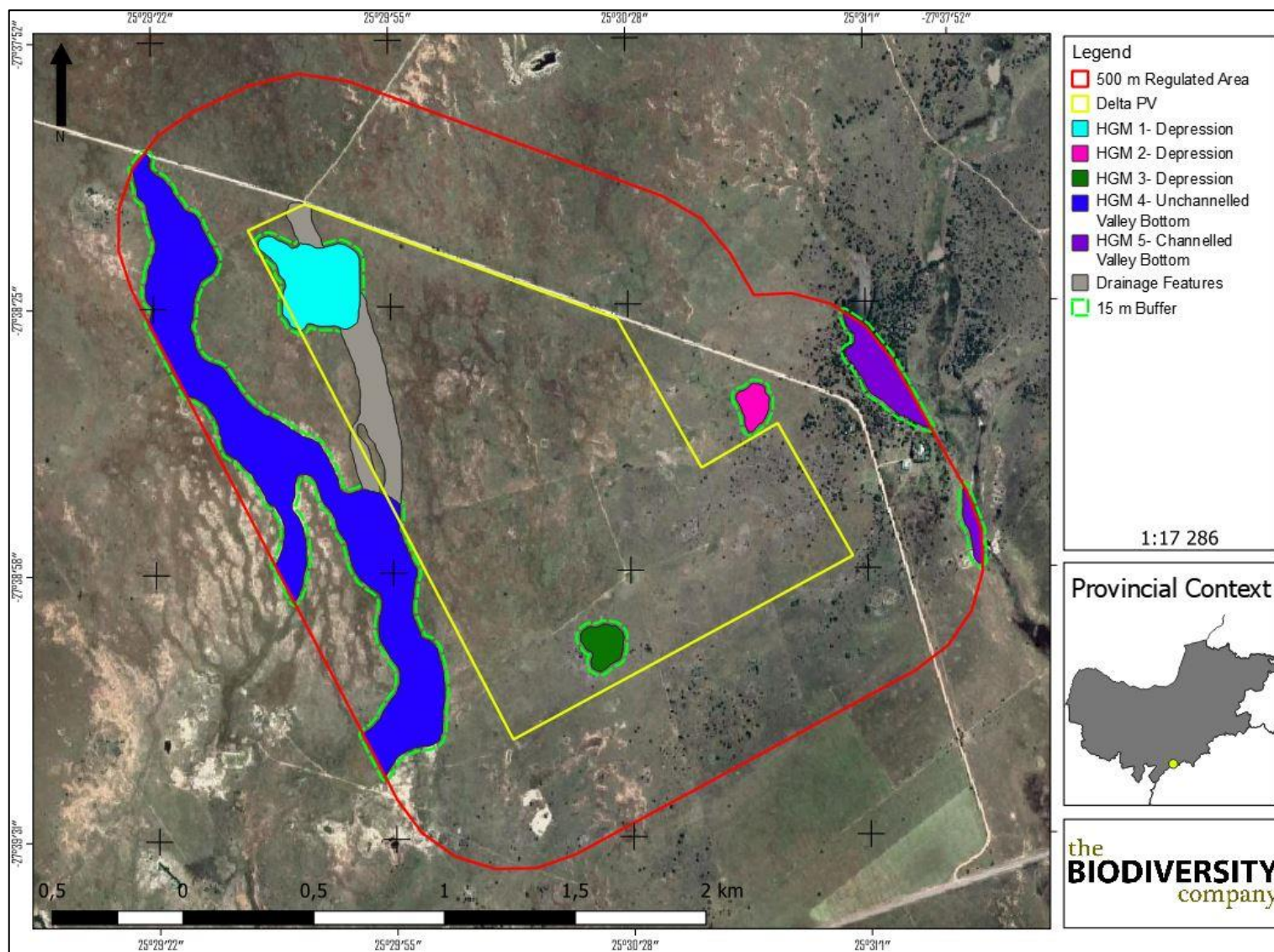


Figure 7.2: Wetland / riparian sensitivity map of the development footprint

7.4.5 Issue 5: Avifaunal Impacts

The potential impact of the proposed development on birds known to occur in North West Province had to be determined. The main question which needs to be addressed is:

“How will the proposed development impact on the avifauna?”

According to the Avifaunal Assessment (Appendix D2), the proposed project is situated in an area based on the latest available ecologically relevant spatial data the following information is pertinent to the site:

- It overlaps with a Critical Biodiversity Area 2;
- It is located 9 km west of the Sandveld and Bloemhof Dam Nature Reserve;
- It is located 300 m from a Critically Endangered unnamed tributary of the Vaal and 1 km from a relatively large depression wetland; and
- The Terrestrial Biodiversity Theme Sensitivity was rated as ‘Very High’ according to the Environmental Screening Tool.

There are impacts that are relatively high, however most can be effectively mitigated through the implementation of the mitigation measures prescribed by the specialist. The overall mitigated impacts can result in the project having an overall Low-Negative impact rating on avifauna.

The site was observed to support a relatively diverse assemblage of avifauna species with 54 species recorded during the field survey, accounting for approximately 23% of the total number of expected species. It is postulated that more species will be recorded during the wet season. This is attributed to the water resources within the region. The dominant species comprised of those that are typically considered to be ‘tolerant’ or non-sensitive species. A single SCC on a global scale, *Gyps africanus* (White-backed Vulture), was observed in close proximity to the site, with no evidence of nesting sites. Although not observed within the site, the species exhibits extensive foraging areas and will therefore utilise the site. Moreover, there are several SCC that have a high likelihood of occurrence within the site, albeit a large proportion of these will not utilise the habitats within the site but will fly over to access suitable habitat within the proximal landscape. This suggests that the ‘Lake Effect’ of solar panels and collisions with overhead cables area concern. Despite some residual impacts, there is no objection, from an avifaunal perspective to the development, should the controls prescribed by the independent specialist be adequately followed, with sufficient monitoring of mitigation effectiveness. If the project is authorised, then a pre-construction winter baseline assessment is recommended, along with post-construction monitoring and throughout the life of the project. Considering that a portion of the facility has been approved, it is the opinion of the specialist that the project may be favourably considered, on condition that all the mitigation and recommendations provided in this report and other specialist reports are implemented.

7.4.6 Issue 6: Visual Impacts

Due to the extent of the proposed photovoltaic solar plant, it is expected that the plant will result in potential visual impacts. The main question which needs to be addressed is:

“To what extent will the proposed development be visible to observers and to what extent will the landscape provides any significant visual absorption capacity”

The construction and operational phase of the proposed Delta SPP and its associated infrastructure will have a visual impact on the area, especially within (but not restricted to) a 5km radius of the proposed SPP. The visual impact will differ amongst places, depending on the distance of the SPP.

Due to the height of the power line (32m) and the extent of the project, no viable mitigation measures can be implemented to eliminate the visual impact of the PV facility and power lines, but the possible visual impacts can be reduced. Several mitigation measures have however been proposed regardless of whether mitigation measures will reduce the significance of the of the anticipated impacts, they are considered good practice and should be implemented and maintained throughout the construction, operational and decommissioning phases of the project.

Aesthetic issues are subjective, and some people find solar farms and their associated infrastructure pleasant and optimistic while others may find it visually invasive; it is mostly perceived as symbols of energy independence; and local prosperity. The visual impact is also dependant on the land use of an area and the sensitivity thereof in terms of visual impact, such as protected areas, parks and other tourism related activities.

Considering all positive factors of such a development including economic factors, social factors and sustainability factors, especially in an arid country, and the industrialised and degraded landscape, the visual impact of this proposed development will be insignificant and is suggested that the development commence, from a visual impact point of view. The specialist has recommended that the project be approved.

7.4.7 Issue 7: Agricultural / impacts on the soil

In order to determine the potential impacts that the proposed development will have on agricultural production, the soil forms and current land capability of the area where the proposed project will be situated was investigated. The main question which needs to be addressed is:

“To what extent will the proposed development compromise (negative impacts) or enhance (positive impacts) current and/or potential future agricultural production?”

The Agriculture Compliance Statement (Appendix D4) states that the assessment area is associated with non-arable lands, due to the type of soils in the area. The available climate limits crop production significantly. The harsh climatic conditions are associated with low annual rainfall and high evapotranspiration potential demands of the area, which consequently result into a very restricted choice of crops due to the heat and moisture stress. The area is not favourable for most cropping practices, which corresponds to the current livestock and game farming activities in the area.

The proposed development will occupy only land that is of limited land capability and is not suitable or used for crop production. There is not a scarcity of such agricultural land in South Africa and its conservation for agricultural production is not therefore a priority.

The amount of agricultural land loss is within the allowable development limits prescribed by the agricultural protocol. These limits reflect the national need to conserve valuable agricultural land and therefore to steer, particularly renewable energy developments, onto land with lower agricultural production potential.

The proposed development also offers some positive impact on agriculture by way of improved financial security for farming operations, as well as security benefits against stock theft and other crime.

The installation of PV panels will not totally exclude agriculture. The area between and underneath the panels can still be used to graze sheep that will in addition be protected against stock theft within the security area of the facility.

The loss of agricultural potential by occupation of land is not permanent. The land will become fully available again for agricultural production once the proposed activity ceases.

The proposed development poses a low risk in terms of causing soil degradation, which can be adequately and fairly easily managed by standard, best practice mitigation management actions.

The proposed development will also have the wider societal benefits of generating additional income and employment in the local economy. In addition, it will contribute to the country's need for energy generation, particularly renewable energy that has lower environmental and agricultural impact, on a national scale, than existing, coal powered energy generation.

The conclusion of this assessment on the acceptability of the proposed development and the recommendation for its approval is not subject to any conditions, other than recommended mitigation. The proposed development is therefore acceptable, and from an agricultural impact point of view, it is recommended that the development be approved.

7.4.8 Issue 8: Socio-economic impacts

A Social Impact Assessment has been compiled in order to provide a description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed facility; to provide a description and assessment of the potential social issues associated with the proposed facility; and the identification of enhancement and mitigation aimed at maximizing opportunities and avoiding and or reducing negative impacts (refer to Appendix D7). The main question which needs to be addressed is:

“How will the proposed development impact on the socio-economic environment?”

There are some vulnerable communities within the project area that may be affected by the development of Delta SPP and its associated infrastructure. Traditionally, the construction phase of a PV solar development is associated with most social impacts. Many of the social impacts are unavoidable and will take place to some extent but can be managed through the careful planning and implementation of appropriate mitigation measures. Several potential

positive and negative social impacts have been identified for the project, however an assessment of the potential social impacts indicated that there are no perceived negative impacts that are sufficiently significant to allow them to be classified as “fatal flaws”.

Based on the social impact assessment, the following general conclusions and findings can be made:

- The potential negative social impacts associated with the construction phase are typical of construction related projects and not just focussed on the construction of solar PV projects (these relate to an influx of non-local workforce and jobseekers, intrusion and disturbance impacts (i.e., noise and dust, wear and tear on roads) and safety and security risks), and could be reduced with the implementation of the mitigation measures proposed. The significance of such impacts on the local communities can therefore be mitigated.
- The development will introduce employment opportunities during the construction phase (temporary employment) and a limited number of permanent employment opportunities during operation phase.
- The proposed project could assist the local economy in creating entrepreneurial growth and opportunities, especially if local business is involved in the provision of general material, goods and services during the construction and operational phases. This positive impact is likely to be compounded by the cumulative impact associated with the development of several other solar facilities within the surrounding area, and because of the project’s location within an area which is characterised by high levels of solar irradiation, and which is therefore well suited to the development of commercial solar energy facilities.
- The proposed development also represents an investment in infrastructure for the generation of non-polluting, Renewable Energy, which, when compared to energy generated because of burning polluting fossil fuels, represents a positive social benefit for society.
- When considering Delta SPP, it is also important to consider the cumulative social impacts that may arise with other proposed solar PV projects in the area.
- It should be noted that the perceived benefits associated with the project, which include RE generation and local economic and social development, outweigh the perceived impacts associated with the project.

The proposed mitigation measures should be implemented to limit the negative impacts and enhance the positive impacts associated with the project. Based on the social assessment, the following recommendations are made:

- The appointment of a CLO to assist with the management of social impacts and to deal with community issues, if feasible.
- It is imperative that local labour be sourced, wherever possible, to ensure that benefits accrue to the local communities. Efforts should be made to involve local businesses during the construction activities, where possible. Local procurement of labour and services / products would greatly benefit the community during the construction and operational phases of the project.

- Local procurement of services and equipment is required where possible in order to enhance the multiplier effect.
- Involve the community in the process as far as possible (encourage co-operative decision making and partnerships with local entrepreneurs).
- Employ mitigation measures to minimise the dust and noise pollution and damage to existing roads.
- Safety and security risks should be considered during the planning / construction phase of the proposed project. Access control, security and management should be implemented to limit the risk of crime increasing in the area.

The proposed project and associated infrastructure are unlikely to result in permanent damaging social impacts. From a social perspective it is concluded that the project could be developed subject to the implementation of recommended mitigation measures and management actions identified for the project.

7.4.9 Issue 9: Paleontological Impacts

South Africa's heritage resources comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site. The main question which needs to be addressed is:

"How will the proposed development impact on the Palaeontological resources?"

According to the Palaeontological Impact Assessment (Appendix D6) the proposed Delta Solar Power Plant site is underlain by Tertiary to Quaternary calcrete. The PalaeoMap of the South African Heritage Resources Information System (SAHRIS) indicates that the Palaeontological Sensitivity of these calcretes is High. A site-specific field survey of the development footprint was conducted on foot on 16 July 2022. No visible evidence of fossiliferous outcrops was found in the development footprint and thus an overall LOW palaeontological significance is allocated to the development footprint. It is therefore considered that the proposed development will not lead to detrimental impacts on the palaeontological reserves of the area and construction of the development may be authorised in its whole extent.

By implementing mitigation measures the significance of the impact will be reduced to medium. Mitigation should take place after initial vegetation is cleared away but before the ground is levelled for construction. These recommendations should be included in the Environmental Management Plan of the Delta Solar Plant.

The following recommendations have been made by the specialist:

The ECO for this project must be informed that the Tertiary to Quaternary calcrete has a High Palaeontological Sensitivity.

If Palaeontological Heritage is uncovered during surface clearing and excavations the Chance find Protocol attached to the Palaeontological Impact Assessment should be implemented immediately. Fossil discoveries ought to be protected and the ECO/site manager must report

to South African Heritage Resources Agency (SAHRA)(Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web:www.sahra.org.za)so that mitigation (recording and collection) can be carried out.

Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA. It is therefore considered that the proposed development is deemed appropriate and will not lead to detrimental impacts on the palaeontological reserves of the area.

7.4.10 Issue 10: Traffic Impacts

Large developments are normally associated with an increase in construction vehicle traffic. The main question which needs to be addressed is:

“How will the proposed development impact on the traffic on main delivery routes to the site?”

The need for a traffic assessment was not included in this Basic Assessment process as the existing Environmental Authorisation approved for the Original Delta Site included this assessment and accommodates the whole of the site in total (current BA site as well as Original Delta site).

7.4.11 Risk Assessment for battery storage system

Battery storage facilities are a relatively new technology, particularly in South Africa. Batteries, as with most electrical equipment, can be dangerous and may catch fire, explode or leak dangerous pollutants if damaged, possibly injuring people working at the facility or polluting the environment. Common failure scenarios of Li-ion batteries include: electrical, mechanical, and thermal. The potential hazards associated with them are fire with consequent emission of gas and explosion. The major risks include thermal runaway, difficulty of fighting battery fires, failure of control systems and the sensitivity of Li-ion batteries to mechanical damage and electrical transients.

For this Basic Assessment Process, no battery storage is included in the designs. The battery storage will form part of another BA process in the future.

7.5 SENSITIVITY ANALYSIS

The sensitivity analysis undertaken as part of the BAR focusses on providing an understanding of the environmentally sensitive areas and features identified within the development footprint proposed for the SPP. This section considers the findings of each of the independent specialist studies undertaken for the development and describes the sensitive features and areas identified, including the location, the sensitivity rating of the features or areas as well as the associated buffers recommended by the specialist (where a buffer is considered to be relevant). The sensitive areas and features identified are also displayed on the sensitivity map included as Figure H1-H3 of this BA report.

The following points below provide the sensitivity analysis for the Delta Solar Power Plant:

Ecology:

The Terrestrial Biodiversity, Plant and Animal Species Impact Assessment (refer to Appendix D1) has considered the features present within the development footprint and has made the following observations with regards to the main impacts that may be expected to occur, as a result of the proposed activities, include the following:

- Direct habitat loss and fragmentation (including the loss of CBA2 areas);
- Degradation of surrounding habitat;
- Disturbance and displacement of SCC fauna (including direct mortality of fauna); and
- Introduction and further spreading of IAP and weed species.

All mitigation measures as described in this report must be implemented so as to reduce the significance of all anticipated impacts to an acceptable level (from 'Medium' – 'High' to 'Low'). The cumulative impact of the project, taking into account the transformation of surrounding land, is rated as 'Medium' and as such it is important to consider careful regional spatial planning and management in order to maintain the functionality of the remaining corridors of habitat (this is particularly relevant to the nearby IBA and regional protected areas).

Considering the assessment findings, no fatal flaws are evident for the proposed project. It is the opinion of the specialists that the project may be favourably considered, on condition that all prescribed mitigation measures are implemented.

Refer to Figure 6.1 for the ecological sensitivity map.

Within the remaining areas of the SPP development footprint the specialist has indicated that all areas are appropriate for development, however with some areas requiring the implementation of stricter mitigation and management measures.

Wetlands / Riparian Areas:

The Wetland / Riparian Impact Assessment (refer to Appendix D1) has considered the features present within the development footprint and has made the following observations in this regard:

Four wetland types were identified on the site for the proposed solar development namely:

- Channelled Valley Bottom wetlands,
- Depressions,
- Wetland Flats, and
- Unchannelled Valley Bottoms.

All the NFEPA wetlands identified within the 500 m regulated area are classified as natural with a condition of largely natural (A/B).

This spatial dataset is part of the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) which was released as part of the National Biodiversity Assessment (NBA 2018). National Wetland Map 5 includes inland wetlands and estuaries, associated with river line data and

many other datasets within the South African Inventory of Inland Aquatic Ecosystems (SAIIAE, 2018). Two wetland types were identified by means of this dataset, including three depression wetlands and a river system. The conditions of these wetlands are classified as “A/B” (largely natural).

The importance and sensitivity for both the depression and unchannelled valley bottom wetlands has been calculated to be “Low”, which combines the relatively low threat status of the wet vegetation type and the low protection status of the wetland itself.

Avifauna:

Based on the latest available ecologically relevant spatial data the following information is pertinent to the site:

- It overlaps with a Critical Biodiversity Area 2;
- It is located 9 km west of the Sandveld and Bloemhof Dam Nature Reserve;
- It is located 300 m from a Critically Endangered unnamed tributary of the Vaal and 1 km from a relatively large depression wetland; and
- The Terrestrial Biodiversity Theme Sensitivity was rated as ‘Very High’ according to the Environmental Screening Tool.

The site was observed to support a relatively diverse assemblage of avifauna species with 54 species recorded during the field survey, accounting for approximately 23% of the total number of expected species. It is postulated that more species will be recorded during the wet season.

A single SCC on a global scale, *Gyps africanus* (White-backed Vulture), was observed in close proximity to the site, with no evidence of nesting sites.

Visual:

No specific areas of sensitivity have been identified from a visual perspective (Visual Impact Assessment, Appendix D3). Therefore, from a visual perspective, no areas have been identified as no-go for the development of the SPP and associated infrastructure.

Heritage:

One site, destroyed, shows the remains of face-bricks that were used for the buildings. Two rectangular structures, built with local stone, are located about 80m to the west. These are interpreted as small-stock enclosures that are related to the main structure.

Due to the fact that these features are demolished, they judged to have low significance and are viewed to be sufficiently documented after having been included in the Heritage Impact Assessment report (Appendix D5).

No sites, features or objects of cultural significance from the Stone Age, Iron Age or the historic period were identified on site.

Therefore, no specific features of sensitivity have been identified from a heritage perspective.

Palaeontology:

No palaeontological no-go areas have been identified for the project (Palaeontological Impact Assessment, Appendix D6). However, the proposed development is underlain by Tertiary to Quaternary calcrete. The PalaeoMap of the South African Heritage Resources Information System (SAHRIS) indicates that the Palaeontological Sensitivity of these calcretes is High.

No visible evidence of fossiliferous outcrops was found in the development footprint and thus an overall LOW palaeontological significance is allocated to the development footprint.

Social:

No specific areas of sensitivity have been identified from a social perspective (Social Impact Assessment, Appendix D7). Therefore, from a social perspective, no areas have been identified as no-go for the development of the SPP and associated infrastructure.

Traffic:

No specific areas of sensitivity have been identified from a traffic perspective (Traffic Impact Assessment of the Original Delta Site, Appendix D8). Therefore, from a traffic perspective, no areas/road aspects have been identified as no-go for the development of the SPP and associated infrastructure.

Agriculture:

The agricultural sensitivity of the SPP have been confirmed as being of a **low and medium** sensitivity (Agricultural Compliance Statement, Appendix D9). The site has low agricultural potential due to soil constraints, including shallow soils, which makes the site unsuitable for cultivation, but suitable for grazing. Therefore, the agricultural land use (outside of the irrigated areas) is limited to grazing. No specific areas of sensitivity have been identified by the specialist that needs to be considered for the placement of infrastructure. Therefore, from an agricultural perspective, no areas have been identified as no-go for the development of the SPP and associated infrastructure.

7.6 METHOD OF ENVIRONMENTAL ASSESSMENT

The environmental assessment aims to identify the various possible environmental impacts that could result from the proposed activity. Different impacts need to be evaluated in terms of their significance and in doing so highlight the most critical issues to be addressed.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 6.7.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

7.6.1 Impact Rating System

Impact assessment must take account of the nature, scale and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact, the following criteria is used:

Table 6.7: The rating system

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
DURATION		

This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.
INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired.

		Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
REVERSIBILITY		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.

4	High cumulative impact	The impact would result in significant cumulative effects
SIGNIFICANCE		
<p>Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.</p> <p>The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.</p>		
Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

8 CUMULATIVE EFFECTS ASSESSMENT

This section aims to address the following requirements of the regulations:

Appendix 1. (3)(i) A BAR (...) must include-

(j) an assessment of each identified potentially significant impact and risk, including- (i) cumulative impacts.

8.1 INTRODUCTION

The EIA Regulations (as amended) determine that cumulative impacts, *“in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.”* Cumulative impacts can be incremental, interactive, sequential or synergistic. EIAs have traditionally failed to come to terms with such impacts, largely as a result of the following considerations:

- Cumulative effects may be local, regional or global in scale and dealing with such impacts requires coordinated institutional arrangements;
- Complexity - dependent on numerous fluctuating influencing factors which may be completely independent of the controllable actions of the proponent or communities; and
- Project level investigations are ill-equipped to deal with broader biophysical, social and economic considerations.

Despite these challenges, cumulative impacts have been afforded increased attention in this Basic Assessment Report and for each impact a separate section has been added which discusses any cumulative issues, and where applicable, draws attention to other issues that may contextualise or add value to the interpretation of the impact. This chapter analyses the proposed project’s potential cumulative impacts in more detail by: (1) defining the geographic area considered for the cumulative effects analysis; (2) providing an overview of relevant past and present actions in the project vicinity that may affect cumulative impacts; (3) presenting the reasonably foreseeable actions in the geographic area of consideration; and (4) determining whether there are adverse cumulative effects associated with the resource areas analysed.

The term "Cumulative Effect" has for the purpose of this report been defined as: the summation of effects over time which can be attributed to the operation of the project itself, and the overall effects on the ecosystem of the site that can be attributed to the project and other existing and planned future projects.

8.2 GEOGRAPHIC AREA OF EVALUATION

The geographic area of evaluation is the spatial boundary in which the cumulative effects analysis was undertaken. The spatial boundary evaluated in this cumulative effects analysis generally includes an area of a 30km radius surrounding the proposed development – refer to Figure 7.1 below and Figure G.

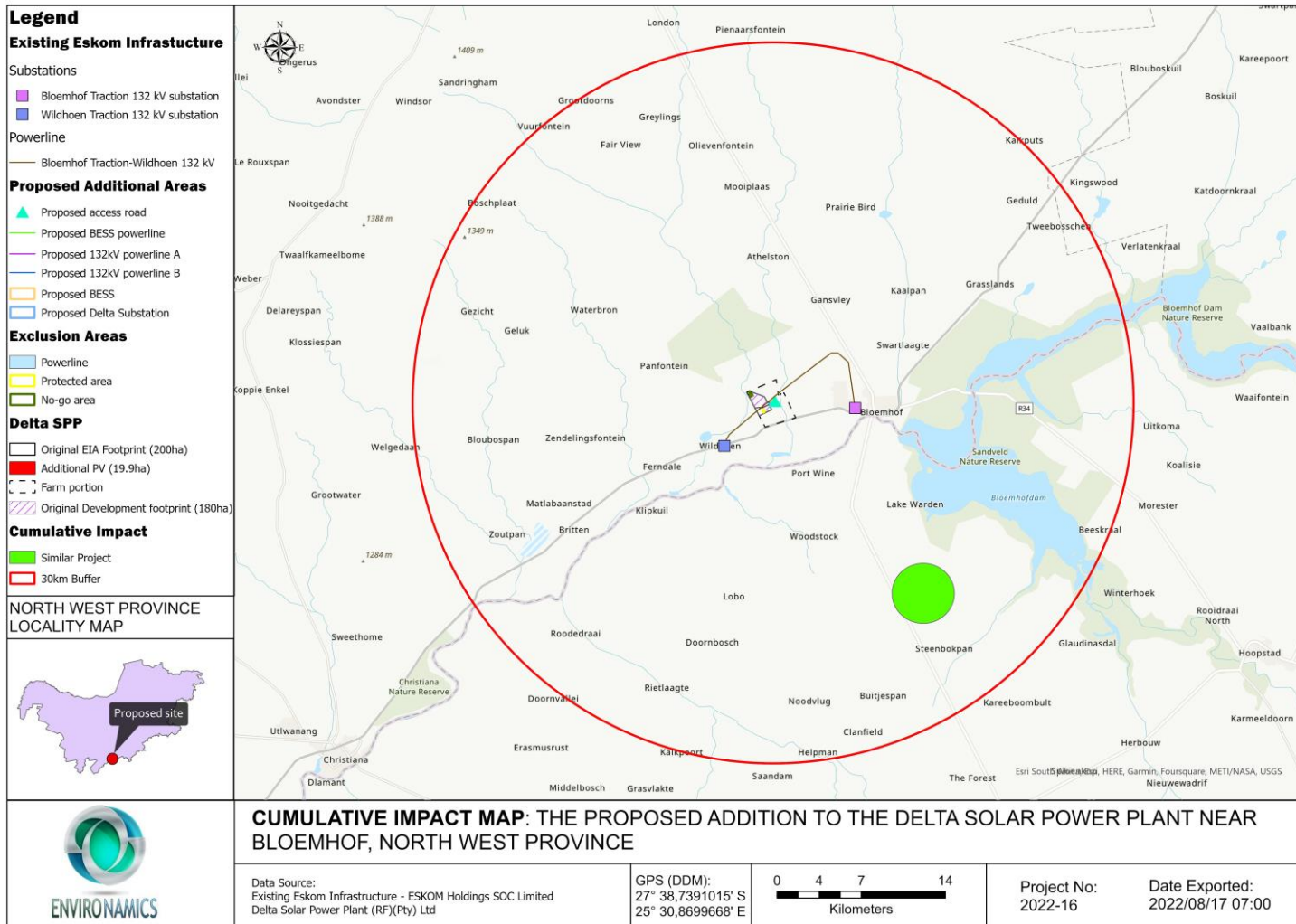


Figure 8.1: Geographic area of evaluation with utility-scale renewable energy generation sites.

The geographic spread of PV solar projects, administrative boundaries and any environmental features (the nature of the landscape) were considered when determining the geographic area of investigation. It was argued that a radius of 30km would generally confine the potential for cumulative effects within this particular environmental landscape. The geographic area includes projects located within the Province and North West Province. A larger geographic area may be used to analyse cumulative impacts based on the specific temporal or spatial impacts of a resource. For example, the socio-economic cumulative analysis may include a larger area, as the construction workforce may draw from a much wider area. The geographic area of analysis is specified in the discussion of the cumulative impacts for that resource where it differs from the general area of evaluation described above.

8.3 TEMPORAL BOUNDARY OF EVALUATION

A temporal boundary is the timeframe during which the cumulative effects are reasonably expected to occur. The temporal parameters for these cumulative effects analysis is the anticipated lifespan of the proposed project, beginning in 2023 and extending over at least 20 years, which is the minimum expected project life of the proposed project. Where appropriate, particular focus is on near-term cumulative impacts of overlapping construction schedules for proposed projects in the area of evaluation.

8.4 OTHER PROJECTS IN THE AREA

The following section provides details on existing projects, and projects being proposed in the geographical area of evaluation.

8.4.1 Existing projects in the area

The Delta SPP is proposed within proximity to one other proposed solar energy facility. According to the DFFE's database one solar PV plant applications have been submitted to the Department within the geographic area of investigation (refer to **Table 8.1** for an overview of solar PV facilities within a 30km radius of the project site).

Table 8.1: A summary of related facilities, that may have a cumulative impact, in a 3 km radius of the study area

Site name	Distance from study area	Proposed generating capacity	DFFE reference	EIA process	Project status
Unknown	17km	Unknown	DEA/EIA/0000386/2011	BAR	Approved

It is unclear whether other projects not related to renewable energy is to be constructed in this area, and whether other projects are proposed. It is quite possible that future solar farm development may take place within the general area.

8.4.2 Projects in the foreseeable future

As part of the SEA for Wind and Solar Energy in South Africa, the CSIR and the DFFE mapped the location of all EIA applications submitted within South Africa. According to this database one (1) application has been submitted for renewable energy projects within the geographical area of investigation and is incorrectly listed on DFFE database with no project name or generation capacity.

8.5 SPECIALIST INFORMATION ON CUMULATIVE EFFECTS

In line with the Terms of Reference (ToR) provided, specialists were asked to, where possible, take into consideration the cumulative effects associated with the proposed development and other projects which are either developed or in the process of being developed in the local area – refer to Figure 7.2 for a process flow. The following sections present their findings.

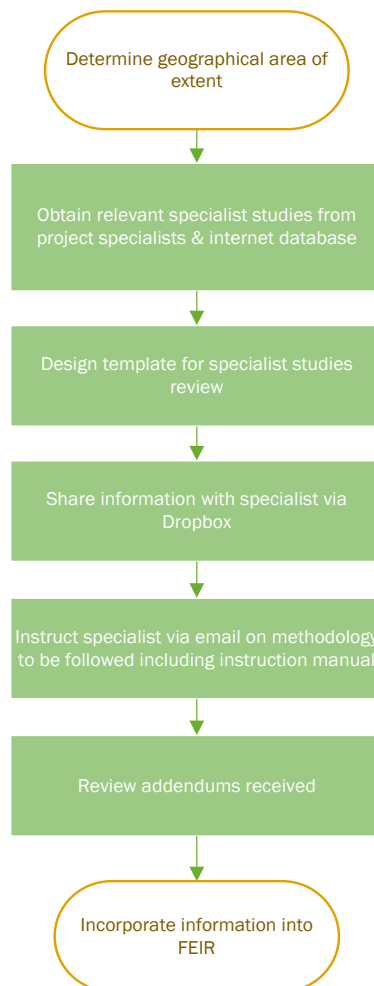


Figure 8.2: Process flow diagram for determining cumulative effects

8.5.1 Soil, Land Capability and Agricultural Potential

According to the Agriculture Compliance Statement (Appendix D4) the most important concept related to cumulative impact is that of an acceptable level of change to an

environment. A cumulative impact only becomes relevant when the impact of the proposed development will lead directly to the sum of impacts of all developments causing an acceptable level of change to be exceeded in the surrounding area. If the impact of the development being assessed does not cause that level to be exceeded, then the cumulative impact associated with that development is not significant.

The potential cumulative agricultural impact of importance is a regional loss (including by degradation) of agricultural land, with a consequent decrease in agricultural production.

In quantifying the cumulative impact, the area of land taken out of agricultural production (grazing) as a result of all developments (total generation capacity of 1,300 MW) will amount to a total of approximately 3,250 hectares. This is calculated using the industry standards of 2.5 and 0.3 hectares per megawatt for solar and wind energy generation respectively, as per the Department of Environmental Affairs (DEA) Phase 1 Wind and Solar Strategic Environmental Assessment (SEA) (2015). As a proportion of the total area within a 30km radius (approximately 282,700 ha), this amounts to only 1.15% of the surface area. That is within an acceptable limit in terms of loss of grazing land, of which there is no particular scarcity in the country. This is particularly so when considered within the context of the following point.

The proposed development poses a low risk in terms of causing soil degradation, which can be adequately and fairly easily managed by standard best practice mitigation management actions included in the EMPr (Appendix F). If the risk for each individual development is low, then the cumulative risk is also low.

Due to the considerations discussed above, the cumulative impact of loss of agricultural land use will not have an unacceptable negative impact on the agricultural production capability of the area. The proposed development is therefore acceptable in terms of cumulative impact, and it is therefore recommended that it is approved.

Because of the negligible agricultural impact of grid connection infrastructure, its cumulative impact cannot exceed acceptable levels of change in terms of agricultural land loss, no matter how much grid infrastructure exists. The cumulative impact of the grid infrastructure is therefore also assessed as negligible.

8.5.2 Terrestrial Biodiversity, Plant and Animal Species Impact Assessment

The Terrestrial biodiversity, Plant and Animal Species Impact Assessment (Appendix D1) identified three major categories of impact on biodiversity, which includes that of cumulative impacts. These are:

- Impacts on habitat resulting in loss, degradation and / or fragmentation.
- Direct impacts on fauna and flora and species, for example plants and animals that are endemic / threatened / special to a habitat will not be able to survive if that habitat is destroyed or altered by the development.
- Impact on natural environmental processes and ecosystem functioning. This can lead to an accumulated effect on both habitat and species.

It can be expected that if ecosystem diversity is managed effectively, species and genetic diversity should also be protected.

The specialist has considered the cumulative impacts for all three development phases of the development, which includes construction, operation and decommissioning.

The cumulative impacts expected during construction includes habitat destruction and fragmentation of, soil erosion and sedimentation, dust pollution, spillages of harmful substances, spreading of alien invasive species and negative effect of human activities on fauna and flora and road mortalities on fauna. These impacts are rated as high or medium before the implementation of mitigation measures. With the implementation of the recommended mitigation measures the ratings are reduced to an acceptable level of either medium or low.

During the operation phase the same cumulative impacts have been identified and assessed as mentioned above. These impacts are rated as high or medium before the implementation of mitigation measures. With the implementation of the recommended mitigation measures the ratings are reduced to an acceptable level of either medium or low. The same results are relevant for the decommissioning phase.

Overall, the cumulative impact of the proposed development on the natural ecosystems (fauna and flora) would be moderate considering that large sections of the area for development has already been degraded through agricultural activities (crop cultivation, overgrazing etc.). The moderate cumulative impacts are however dependant on the strict implementation of mitigation measures and monitoring during the construction, operational and decommissioning phases of all solar developments within the area.

8.5.3 Wetland Impact Assessment

The Wetland Impact Assessment (Appendix D1) has considered an assessment of the cumulative effect that the development will have. Cumulative impacts have been identified for all three development phases of the project, including construction, operation and decommissioning.

The impacts identified for the construction and operation phases are the same and include impacts on the characteristics of the watercourses, soil erosion and sedimentation, spillages of harmful substances that result in water pollution and spreading and establishment of alien invasive species in the wetland features. These impacts are rated as high or medium before the implementation of mitigation measures. With the implementation of the recommended mitigation measures the ratings are reduced to an acceptable level of either medium or low.

During the decommissioning phase the cumulative impacts identified include improvement of habitat through revegetation / succession over time, soil erosion and sedimentation, spreading and establishment of alien invasive species in wetlands and spillages of harmful substances in wetlands. These impacts are rated as medium before the implementation of mitigation measures. With the implementation of the recommended mitigation measures the ratings are reduced to an acceptable level of low.

Overall, the cumulative impact of the proposed development on the wetlands would be low considering that most of the development would avoid the wetland areas according to the guidelines and buffers needed for developments. Large sections of the area have also already been degraded through agricultural activities (crop cultivation, overgrazing etc.), which have

altered the pristine state of the wetlands. The low cumulative impacts are however dependant on the strict implementation of mitigation measures and monitoring during the construction, operational and decommissioning phases of the solar developments.

8.5.4 Avifaunal Assessment

The Avifauna Impact Assessment (Appendix D2) has identified and assessed cumulative impacts associated with the SPP, including the grid connection infrastructure. The impacts assessed includes displacement of priority avian species from important habitats, displacement of resident avifauna, loss of important avian habitats, collisions when flying into power line infrastructure and electrocutions when perched on power line infrastructure.

In terms of the power line Cumulative impacts associated with displacement of priority avian species from important habitats scored High-Negative, whilst the cumulative displacement of resident avifauna scored Medium-Negative. Cumulative impacts associated with power line collisions and electrocutions scored Very High-Negative.

Mitigating the cumulative impacts would require limiting the impact of the Delta Solar Power Plant to an absolute minimum, which is not necessarily feasible but should be pursued. The mitigations to reduce cumulative impacts involve limiting the disturbance footprint (overall size), focussing the development on already disturbed zones, limiting human activity and noise throughout the project life, disturbing as little natural vegetation as possible, retaining the natural vegetation beneath the panels and around infrastructure, limiting the extent and width of roadways, reducing the speeds that vehicles travel, and then thoroughly rehabilitating the entire footprint back to natural grassland representing the Vaal Reefs Dolomite Sinkhole Woodland after decommissioning.

An alternative would be to create a buffer of acceptable size (proposed 25%), where no development takes place and where intact habitats are present but this is not possible for the Delta Solar Power Plant as it is surrounded by transformed habitats or proposed development. Buffers are not necessarily feasible due to their small size and large 'edge effect'.

Implementing successful mitigations would reduce the cumulative impacts of displacement of priority species by 32% to medium-negative, would reduce the cumulative impacts of displacement of resident avifauna by 29% to an acceptable low-negative score, and would reduce the cumulative impacts of loss of important avian habitats by 33% to medium-negative.

Implementing successful mitigations along the power line should reduce the impact rating for cumulative displacement of resident avifauna by 19% down to an acceptable low-negative score, however cumulative displacement of priority avian species would reduce by 28% but would still be in the medium-negative category.

8.5.5 Social Impact Assessment

The Social Impact Assessment (Appendix D7) indicates that the potential for cumulative impacts to occur as a result of potential surrounding projects. Potential cumulative impacts identified for the project include positive impacts on the economy, business development,

and employment, as well as negative impacts such as an influx of jobseekers and change in the area's sense of place.

Delta SPP and the establishment of potential other solar power projects within the area has the potential to result in significant positive cumulative impacts, specifically with regards to the creation of a number of socio-economic opportunities for the region, which in turn, can result in positive social benefits.

While the development of a single solar power project may not result in a major influx of people into an area, the development of several projects may have a cumulative impact on the in-migration and movement of people. In addition, the fact that the project is proposed within an area characterised by good levels of solar irradiation suitable for the development of commercial solar energy facilities implies that the surrounding area is likely to be subject to considerable future applications for PV energy facilities. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and higher standards of living. It is exceedingly difficult to control an influx of people into an area, especially in a country where unemployment rates are high. It is therefore important that the project proponent implement and maintain strict adherence with a local employment policy in order to reduce the potential of such an impact occurring.

The positive cumulative impacts will be of a medium significance and the negative cumulative impacts will also be of a medium significance.

8.5.6 Visual Impact Assessment

The Visual Impact Assessment (Appendix D3) indicates that the proposed development is located in a close proximity of existing Eskom power infrastructure and might have a cumulative impact on viewers. One other SPP is also proposed in the area and the potential for cumulative impacts to occur as a result of the projects is therefore likely, but very low. The visual landscape mainly consists of agricultural developments with a better visual appearance, together with a tourism and recreational aspect connected to the Vaal River, Bloemhof Dam, SA Lombard Nature Reserve and the Sandveld Nature Reserve. Permanent residents of the area might be desensitised over time with the construction of more SPP's, but will stay subjective for each viewer. The location of the SPPs within the study area will contribute to the consolidation of SPP structures to this locality and avoid a potentially scattered proliferation of solar energy infrastructure throughout the region.

8.5.7 Heritage Impact Assessment

From a review of available databases, publications, as well as available heritage impact assessments done for the purpose of developments in the region, it was determined that the Delta Solar Power Plant project is located in an area with a very low presence of heritage sites and features.

Heritage resources are sparsely distributed on the wider landscape with highly significant (Grade 1) sites being rare. Because of the low likelihood of finding further significant heritage resources in the area of the proposed for development and the generally low density of sites

in the wider landscape the overall impacts to heritage are expected to be of generally low significance before mitigation.

The cultural heritage profile of the larger region is very low. Most frequently found are stone artefacts, mostly dating to the Middle Stone Age. Sites containing such material are usually located along the margins of water features (pans, drainage lines), small hills and rocky outcrops. Such surface scatters or ‘background scatter’ is usually viewed to be of limited significance (Orton 2016). In addition to the Stone Age profile, there is also the Iron Age element. However, this is located well outside the 30km radius, in the Vredefort Dome area and north of Klerksdorp. The colonial period manifests largely as individual farmsteads, in all its complexity, burial sites and infrastructure features such as roads, railways and power lines. For the purpose of this review, heritage sites located in urban areas have been excluded.

For the project area, the impacts to heritage sites are expected to be of medium significance. However, this can be ameliorated by implementing mitigation measures, include isolating sites, relocating sites (e.g. burials) and excavating or sampling any significant archaeological material found to occur within the project area. The chances of further such material being found, however, are considered to be negligible. After mitigation, the overall impact significance would therefore be low.

8.5.8 Paleontological Impact Assessment

It is quite possible that future solar farm developments may take place within the general area. The SPPs are all underlain by similar geology and therefore the Impact on these developments will be similar.

The palaeontological cumulative impacts have been assessed as being of a low significance and can reduced with the implementation of appropriate mitigation measures.

8.6 IMPACT ASSESSMENT

Following the definitions of the term, the “residual effects on the environment”, i.e., effects after mitigation measures have been put in place, combined with the environmental effects of past, present and future projects and activities will be considered in this assessment. Also, a “combination of different individual environmental effects of the project acting on the same environmental component” can result in cumulative effects.

8.6.1 Potential Cumulative Effects

The receptors (hereafter referred to as Valued Ecosystem Components (VECs) presented in Section 6 (refer to the matrix analysis) have been examined alongside other past, present and future projects for potential adverse cumulative effects. A summary of the cumulative effects discussed are summarized in Table 7.2. Specific VECs have been identified with reference to the Solar Project (Table 6.2), which relates to the biophysical and socio-economic environments. Table 7.2 indicates the potential cumulative effects VECs and the rationale for inclusion/exclusion.

Table 8.2: Potential Cumulative Effects for the proposed project

	Valued Ecosystem Components (VECs)	Rationale for Inclusion / Exclusion	Level of Cumulative Effect
Construction Phase			
Terrestrial Biodiversity, Plant and Animal Species Impact Assessment	Habitat destruction and Fragmentation	Clearing of vegetation for construction of infrastructure, access roads etc. will be undertaken	- Medium
	Soil erosion and sedimentation	Topsoil and subsoil stripping, exposure of soils to wind and rain during construction causing erosion and sedimentation in wetlands will occur due to the construction activities	- Low
	Dust pollution	Exposure of soils to rainfall and wind during construction will result in dust pollution	- Medium
	Spillages of harmful substances	The operation and presence of heavy machinery and vehicle movement on site results in a risk for spillages	- Low
	Spreading of alien invasive species	Continued movement of personnel and vehicles on and off the site during the construction phase, as well as occasional delivery of materials required for maintenance, may result in the establishment and spreading of alien invasive species	- Low
	Negative effect of human activities on fauna and flora and road mortalities on fauna	Construction of infrastructure and the use of access roads etc. will have a negative effect on fauna and flora	- Low
Wetland / Riparian Assessment	Impact on the characteristics of the watercourse i.e. flow regime, habitat, biota, water quality and geomorphology due to construction within floodline zone (road crossings etc.)	Clearing of vegetation for construction of infrastructure, access roads etc. may result in an impact or change to the characteristics of water features present	- Medium

	<p>Soil erosion and sedimentation</p>	<p>Topsoil and subsoil stripping, exposure of soils to wind and rain during construction causing erosion and sedimentation in wetlands is expected where these sensitive water features are present</p> <p>The use of heavy machinery during the construction of the development will result in the compaction of soil, resulting in decreased infiltration of rainwater and increased surface run-off volumes and velocities leading to a greater erosion risk. The hardened surfaces of the road and compacted soils of the proposed development area will also lead to an increase in surface run-off during storm events which will likely be discharged via stormwater outlet points, concentrating flows leaving the exposed areas. This can lead to erosion in the cleared areas and channel forming where culverts concentrate water on the side of the road. It can lead to sedimentation, in the river. The impact is considered to be cumulative due to proposed development contributing to the risk of sediment transport and erosion in the area.</p>	<p>- Medium</p>
	<p>Water pollution of the wetland features through spillages of harmful substances</p>	<p>Construction work will also carry a risk of soil and water pollution, with large construction vehicles contributing substantially due to oil and fuel spillages (heavy machinery and vehicle movement on site). If not promptly dealt with, spillages or accumulation of waste matter can contaminate the soil and surface- or groundwater, leading to potential medium/long-term impacts on fauna and flora.</p> <p>The impact is considered to be cumulative due to proposed development contributing to the risk of soil and water pollution in the area.</p>	<p>- Medium</p>

	<p>Spread and establishment of alien invasive species in wetland features</p>	<p>The construction almost certainly carries by far the greatest risk of alien invasive species being imported to the site, and the high levels of habitat disturbance also provide the greatest opportunities for such species to establish themselves, since most indigenous species are less tolerant of disturbance. The biggest risk is that seeds of noxious plants may be carried onto the site along with materials that have been stockpiled elsewhere at already invaded sites.</p> <p>Continued movement of personnel and vehicles on and off the site, as well as occasional delivery of materials required for maintenance, will result in a risk of importation of alien species throughout the life of the project.</p> <p>Furthermore, the spread of the alien invasive species through the area will be accelerated when seeds are carried by stormwater into the drainage features on the site that will cause environmental degradation and indigenous species to be displaced.</p>	<p>- Low</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Avifaunal Impact Assessment</p>	<p>Displacement of priority avian species from important habitats</p>	<p>The displacement of resident avifauna through increased disturbance and possible collisions with PV panels leading to injury or loss of avian life are considered as a cumulative impact due to the large number of planned solar development in a 30 km radius.</p>	<p>- Medium</p>
	<p>Displacement of resident avifauna</p>	<p>The displacement of resident avifauna through increased disturbance and possible collisions with PV panels leading to injury or loss of avian life are considered as a cumulative impact due to the large number of planned solar development in a 30 km radius.</p>	<p>- Low</p>
	<p>Loss of important avian habitats</p>	<p>The loss of important avian habitats through increased disturbance are considered as a cumulative impact due to the large number of planned solar development in a 30 km radius.</p>	<p>- Medium</p>

<p style="text-align: center;">Compliance</p> <p style="text-align: center;">Agricultural Statement</p>	<p>Loss of agricultural land</p>	<p>The cumulative impact of loss of agricultural land use will not have an unacceptable negative impact on the agricultural production capability of the area. The proposed development is therefore acceptable in terms of cumulative impact, and it is therefore recommended that it is approved. Because of the negligible agricultural impact of grid connection infrastructure, its cumulative impact is also assessed as negligible.</p>	<p style="text-align: center;">- Low</p>
<p style="text-align: center;">Heritage Impact Assessment</p>	<p>Direct or physical impacts, implying alteration or destruction of heritage features within the project boundaries and indirect impacts, e.g. restriction of access or visual intrusion concerning the broader environment.</p>	<p>The cultural heritage profile of the larger region is very low. Most frequently found are stone artefacts, mostly dating to the Middle Stone Age. Sites containing such material are usually located along the margins of water features (pans, drainage lines), small hills and rocky outcrops. For the project area, the impacts to heritage sites are expected to be of medium significance. However, this can be ameliorated by implementing mitigation measures, include isolating sites, relocating sites (e.g. burials) and excavating or sampling any significant archaeological material found to occur within the project area. The chances of further such material being found, however, are considered to be negligible. After mitigation, the overall impact significance would therefore be low.</p>	<p style="text-align: center;">- Low</p>
<p style="text-align: center;">Palaeontological Impact Assessment</p>	<p>Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study</p>	<p>The proposed development is underlain by Tertiary to Quaternary calcrete. The PalaeoMap of the South African Heritage Resources Information System (SAHRIS) indicates that the Palaeontological Sensitivity of these calcretes is High. Currently only one other SPP development is proposed for the area.</p>	<p style="text-align: center;">- Medium</p>
<p style="text-align: center;">Social Assessment</p>	<p>Impacts of employment opportunities, business opportunities and skills development</p>	<p>Delta SPP and the establishment of other potential solar power projects within the area has the potential to result in significant positive cumulative impacts, specifically with regards to the creation of a number of socio-economic opportunities for the region, which in turn, can result in positive social benefits. The positive cumulative impacts include creation of</p>	<p style="text-align: center;">+ Medium</p>

		employment, skills development and training opportunities, and downstream business opportunities. The cumulative benefits to the local, regional, and national economy through employment and procurement of services are more considerable than that of Delta SPP alone.	
	Impact of large-scale in-migration of people	<p>While the development of a single solar power project may not result in a major influx of people into an area, the development of several projects may have a cumulative impact on the in-migration and movement of people. In addition, the fact that the project is proposed within an area characterised by good levels of solar irradiation suitable for the development of commercial solar energy facilities implies that the surrounding area is likely to be subject to considerable future applications for PV energy facilities. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and higher standards of living.</p> <p>It is exceedingly difficult to control an influx of people into an area, especially in a country where unemployment rates are high. It is therefore important that the project proponent implement and maintain strict adherence with a local employment policy in order to reduce the potential of such an impact occurring.</p>	- Medium
Operational Phase			
Terrestrial Biodiversity, Plant and Animal Species Assessment	Habitat destruction and Fragmentation	Clearing of vegetation for as part of operation and maintenance	- Medium
	Soil erosion and sedimentation	Increased hardened surfaces around infrastructure and exposed areas	- Low
	Dust pollution	Vehicle movement on site for maintenance	- Medium
	Spillages of harmful substances	Vehicle movement on site for maintenance	- Low

	Spreading of alien invasive species	Vehicle movement on site for maintenance	- Low
	Road mortalities of fauna / impact of human activities on site	Vehicle movement on site for maintenance	- Low
Wetland / Riparian Assessment	Impact on the characteristics of the watercourse i.e. flow regime, habitat, biota, water quality and geomorphology due to construction within floodline zone	Clearing of vegetation for operation and maintenance of support infrastructure, access roads etc.	- Medium
	Soil erosion and sedimentation	Increased hardened surfaces around infrastructure and exposed areas during operation	- Low
	Spread and establishment of alien invasive species	Continued movement of personnel and vehicles on and off the site for maintenance, as well as occasional delivery of materials required for maintenance, will result in a risk of importation of alien species throughout the life of the project. Furthermore, the spread of the alien invasive species through the area will be accelerated when seeds are carried by stormwater into the drainage features on the site that will cause environmental degradation and indigenous species to be displaced. The impact will be low as the mitigation measures proposed will reduce the overall impact of the development.	- Medium
	Spillages of harmful substances (water pollution)	Vehicle movement on site for maintenance purposes, as well as equipment	- Low
	Avifaunal Impact	Loss of habitat	Negative Low Impact due to limited SPP development in the area.

Visual Impact Assessment	Visual impacts related to the SPP and power line	The proposed development is located in a close proximity of existing Eskom power infrastructure and might have a cumulative impact on viewers. One other SPP is also proposed in the area and the potential for cumulative impacts to occur as a result of the projects is therefore likely, but very low	- Medium
Heritage Impact Assessment	Direct or physical impacts, implying alteration or destruction of heritage features within the project boundaries and indirect impacts, e.g. restriction of access or visual intrusion concerning the broader environment.	For the project area, the impacts to heritage sites are expected to be of low significance. This can further be lowered by implementing mitigation measures, include isolating sites, relocating sites (e.g. burials) and excavating or sampling any significant archaeological material found to occur within the project area. The chances of further such material being found, however, are considered to be negligible. After mitigation, the overall impact significance would therefore be low.	- Low
Decommissioning Phase			
Terrestrial Biodiversity, Plant and Animal Species Impact Assessment	Improvement of habitat through revegetation / succession over time	Rehabilitation of site	- Low
	Soil erosion and sedimentation	Demolition of infrastructure / rehabilitation of site	- Low
	Spreading and establishment of alien invasive species	Demolition of infrastructure / rehabilitation of site	- Low
	Habitat degradation due to dust	Demolition of infrastructure / rehabilitation of site	- Medium
	Spillages of harmful substances	Vehicle movement on site for rehabilitation	- Low
	Road mortalities of fauna / impact of human activities on site	Vehicle movement on site for rehabilitation	- Low

Wetland / Riparian Assessment	Improvement of habitat through revegetation / succession over time	Rehabilitation of site	- Low
	Soil erosion and sedimentation	Demolition of infrastructure / rehabilitation of site	- Low
	Spreading and establishment of alien invasive species in wetlands	Demolition of infrastructure / rehabilitation of site	- Medium
	Spillages of harmful substances in wetlands	Vehicle movement on site for rehabilitation	- Low
Visual Assessment	Visual Intrusion	The decommissioning of the PV plant and 132kV power line may increase the cumulative visual impact together with farming activities and people using the existing gravel roads adjacent to site increasing the amount of dust generated. Dust control and housekeeping will be the main factors to consider.	- Low
Other	Generation of waste	An additional demand on municipal services could result in significant cumulative impacts with regards to the availability of landfill space.	- Medium

8.7 CONCLUSION

This chapter of the Basic Assessment Report addressed the cumulative environmental effects of the construction, operation and decommissioning project phases. The information to date has shown that no significant adverse residual impacts are likely. However, cumulative impacts could arise as other similar projects are constructed in the area. All cumulative impacts will be of a medium or low significance.

The potential most significant cumulative impacts relate to:

- Cumulative effects during construction phase:
 - Habitat destruction and Fragmentation (- Medium)
 - Dust pollution (- Medium)
 - Impact on the characteristics of the watercourse i.e. flow regime, habitat, biota, water quality and geomorphology due to construction within floodline zone (road crossings etc.) (- Medium)
 - Soil erosion and sedimentation (- Medium)

- Displacement of priority avian species from important habitats (- Medium)
- Loss of important avian habitats (- Medium)
- Impacts of employment opportunities, business opportunities and skills development (+ Medium)
- Impact with large-scale in-migration of people (- Medium)
- Cumulative effects during the operational phase:
 - Habitat destruction and fragmentation (- Medium)
 - Dust pollution (- Medium)
 - Spread and establishment of alien invasive species (- Medium)
 - Avifauna collisions when flying into power line infrastructure (- Medium)
 - Electrocutions when perched on power line infrastructure (- Medium)
 - Visual intrusion (- Medium)
- Cumulative effects during the decommissioning phase:
 - Habitat degradation due to dust (- Medium)
 - Spreading and establishment of alien invasive species in wetlands (- Medium)
 - Generation of waste (- Medium)

The cumulative impact for the proposed development is medium to low and no high, unacceptable impacts related to the project is expected. Considering the extent of the project and information presented in section 7 of this report, it can be concluded that the cumulative impacts will not result in large scale changes and impacts on the environment. Photovoltaic solar energy technology is a clean technology which contributes toward a better-quality environment. The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the North West Province. No cumulative impacts with a high residual risk have been identified.

In terms of the desirability of the development of renewable energy, it may be preferable to incur a higher cumulative loss in such a region as this one, than to lose land with a higher environmental value elsewhere in the country. Also, the acceptable cumulative impacts expected will not result in a whole-scale change of the environment and therefore are considered to be acceptable, and considering the associated positive impacts associated with the development of solar energy facilities, the proposed facility is considered desirable.

9 ENVIRONMENTAL IMPACT STATEMENT

This section aims to address the following requirements of the regulations:

Appendix 3. (3) A BAR (...) must include-

- (l) an environmental impact statement which contains-
 - (i) a summary of the key findings of the environmental impact assessment;
 - (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and
 - (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;
- (m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;
- (n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;
- (o) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;
- (q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;

9.1 SUMMARY OF KEY FINDINGS AND ASSESSMENT RESULTS

Based on the contents of the report the following key environmental issues were identified, which were addressed in this final BA report. The ratings provided gives an indication of the impact significance with the implementation of the recommended mitigation measures.

- Impacts during construction phase:
 - Direct habitat destruction (- Medium)
 - Habitat fragmentation (- Medium)
 - Increased soil erosion and sedimentation (- Low)
 - Soil and water pollution (- Low)
 - Air pollution (- Low)
 - Spread and establishment of alien invasive species (- Low)
 - Negative effect of human activities and road mortalities (- Low)

- Soil compaction and increased sediment transport and erosion (- Low)
 - Displacement of priority avian species from important habitats (- Low)
 - Displacement of resident avifauna through increased disturbance (- Low)
 - Loss of important avian habitats (- Low)
 - Loss of agricultural potential by occupation of land (- Low)
 - Loss of agricultural potential by soil degradation (- Low)
 - Loss of agricultural potential by dust generation (- Low)
 - Direct or physical impacts, implying alteration or destruction of heritage features within the project boundaries (- Low)
 - Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed SPP (- Low)
 - Direct and indirect employment opportunities and skills development (+ Medium)
 - Economic Multiplier effect (+ Medium)
 - Potential loss of productive farmland (- Low)
 - Influx of jobseekers and change in population (- Low)
 - Safety and security impacts (- Low)
 - Impacts on daily living and movement patterns (- Low)
 - Nuisance impacts (noise and dust) (- Low)
 - Increased risk of potential veld fires (- Low)
 - Visual and sense of place impacts (- Low)
 - Increase in traffic volumes, influencing traffic congestion and road safety (- Low)
 - Protected Camelthorn trees (-High)
- Impacts during the operational phase:
- Direct habitat destruction (- Medium)
 - Habitat fragmentation (- Medium)
 - Increased soil erosion and sedimentation (- Low)
 - Soil and water pollution (- Low)
 - Air pollution (- Low)
 - Spread and establishment of alien invasive species (- Low)
 - Negative effect of human activities and road mortalities (- Low)
 - Soil compaction and increased sediment transport and erosion (- Low)

- Displacement of priority avian species from important habitats (- Low)
 - Displacement of resident avifauna through increased disturbance (- Low)
 - Collisions with PV panels leading to injury or loss of avian life (- Low)
 - Collision when flying into power line infrastructure (- Medium)
 - Electrocutation when perched on power line infrastructure (- Medium)
 - Loss of agricultural potential by occupation of land (- Low)
 - Increased financial security for farming operations (+ Low)
 - Direct or physical impacts, implying alteration or destruction of heritage features within the project boundaries (- Low)
 - Visual impact on observers travelling along the roads and residents at homesteads within a 5km radius of the SPP (- Low)
 - Visual impact on observers travelling along the roads and residents at homesteads within a 5-10km radius of the SPP (- Low)
 - Visual impacts of lighting at night on sensitive visual receptors in close proximity to the proposed facility (- Low)
 - Visual impacts of glint and glare on sensitive visual receptors in close proximity to the proposed facility (- Low)
 - Visual impacts on observers travelling along the roads and residents at homesteads in close proximity to the power line structures (- Low)
 - Visual impacts and sense of place impacts associated with the operation phase of Delta SPP (- Low)
 - Direct and Indirect employment opportunities and skills development (+ Medium)
 - Development of non-polluting, renewable energy infrastructure (+ Medium)
 - Contribution to Local Economic Development (LED) and social upliftment (+ High)
 - Impact on tourism (+/- Low)
 - The road network will be affected as there will be an increase in traffic, congestion and impact on road safety (- Low)
- Impacts during the decommissioning phase:
- Improvement of habitat through revegetation / succession over time (+ Medium)
 - Soil erosion and sedimentation (- Low)
 - Spreading and establishment of alien invasive species (- Low)
 - Habitat degradation due to dust (- Low)

- Spillages of harmful substances (- Low)
 - Road mortalities of fauna / impact of human activities on site (- Low)
 - Soil compaction and increased sediment transport and erosion (- Low)
 - Soil and water pollution (- Low)
 - Loss of agricultural potential by soil degradation (erosion) (- Low)
 - The road network will be affected as there will be an increase in traffic, congestion and impact on road safety (- Low)
- The cumulative impact for the proposed development is low and no high, unacceptable impacts related to the project is expected. The cumulative impacts will not result in large scale changes and impacts on the environment.

9.2 SENSITIVITY ANALYSIS SUMMARY AND SITE-SPECIFIC CONDITIONS

The sensitivity analysis has guided the developer in optimising the final layout of the addition to the Delta Solar Power Plant through identifying specific environmental areas and features present within the site which needs to be avoided through the careful placement of infrastructure as part of the development footprint. Refer to Section 6.4 for the complete sensitivity analysis and Appendix H for the final layout map which avoids the areas required to be conserved.

No Species of Conservation Concern (SCC) flora species were recorded, however ten (10) individual *Vachellia erioloba* (Camel Thorn) trees were observed south of the site, six (6) of which were found within the site boundary. *Vachellia erioloba* is listed as a nationally protected tree in terms of the National Forests Act, No. 84 of 1998, and no individual may be disturbed without the appropriate permit.

A single SCC on a global scale, *Gyps africanus* (White-backed Vulture), was observed in close proximity to the site, with no evidence of nesting sites.

The main features to be avoided are related to wetlands, heritage and palaeontology. No wetland /riparian features are associated with the solar power plant area.

No palaeontological no-go areas have been identified for the project. Mitigation of a sample of well-preserved stromatolites and oolites is therefore recommended. These areas are however not considered to be no-go to development.

Further mitigation measures for the development, as recommended by the independent specialists, have been included in the EMP(s) for the project as per Appendix F1-F4.

9.3 TECHNICAL DETAILS OF THE PROPOSED INFRASTRUCTURE TO BE AUTHORISED

- PV Panel Array - To produce up to 100MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun or using one-axis tracker structures to follow the sun to increase the yield.

- Wiring to Central Inverters - Sections of the PV array will be wired to inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency. The maximum voltage from the PV arrays to the inverters will be 1500V. The inverter will then convert the 1500Vdc to 600Vac 50Hz.
- Connection to the grid - Connecting the array to the electrical grid requires transformation of the PV Plant inverter voltage from 600V to 33kV and a further step-up to Eskom's 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 600V and this is fed into 0.6/33kV 50Hz step up transformer, the 33kV output from the transformer goes to a 33/132kV 50Hz Transformer whose output goes to Eskom's 132kV power line. An onsite substation will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid via the proposed Bloemhof-Wildhoeven 132kV power line. The Project will inject up to 75MWac into the National Grid and the installed capacity will be approximately 100MWdc. It is expected that generation from the facility will tie into the Eskom network via the Bloemhof-Wildhoeven 132kV power line via a Loop-in-loop-out (LILIO) connection.
- Electrical reticulation network – An internal electrical reticulation network will be required and will be laid ~2-4 m underground as far as practically possible.
- Roads – Access will be obtained from the Sterkfontein gravel road traversing the site which is accessed from the N12 national road. An internal site road network will also be required to provide access to the solar field and associated infrastructure. The access and internal roads will be constructed within a 25-meter corridor.
- Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm. Fencing with a height of 2.5 meters will be used.

9.4 RECOMMENDATION OF EAP

The final recommendation by the EAP considered firstly if the legal requirements for the EIA process had been met and secondly the validity and reliability of the substance of the information contained in the BA report. In terms of the legal requirements, it is concluded that:

- All key consultees have been consulted as required by Chapter 6 of the EIA Regulations (as amended)
- The Basic Assessment process has been conducted as required by the EIA Regulations (as amended), Regulations 19 and Appendix 1.
- The EMPr was compiled for the Delta Solar Power Plant as per Appendix 4 of the EIA Regulations (GN.R. 326), published in Government Gazette 40772 on 07 April 2017.

- The proposed mitigation measures will be sufficient to mitigate the identified impacts to an acceptable level, no impacts of a high significance are relevant following the implementation of the recommended mitigation measures.

In terms of the contents and substance of the BA report the EAP is confident that all key environmental issues were identified, assessed and mitigation measures recommended for. These key issues have been adequately assessed during the BA process to provide the competent authority with sufficient information to allow them to make an informed decision.

The final recommendation of the EAP is that:

It is the opinion of the independent EAP that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources and land. All negative environmental impacts can further be effectively mitigated through the proposed mitigation measures. Based on the contents of the report it is proposed that an environmental authorisation be issued, which states (amongst other general conditions) that the Delta Solar Power Plant, a commercial Photovoltaic (PV) solar energy facility and associated infrastructure, located on the remaining extent of the Farm Kareefontein No. 340, Registration Division H.O. ,Bloemhof, North West Province, situated within the Dr Ruth Segomotsi Mompati District Municipality area of jurisdiction, North West Province be approved subject to the following conditions:

- Implementation of the proposed mitigation measures set out in the EMPr(s).
- Implementation of the proposed mitigation measures set out in the specialist studies.
- The proposed solar facility must comply with all relevant national environmental laws and regulations.
- All actions and tasks allocated in the EMPr(s) should not be neglected and a copy of the EMPr(s) should be made available onsite at all times.
- The wetlands, and the recommended 32m buffer must be avoided and no disturbance must take place within these areas.
- A detailed Geotechnical Assessment must be undertaken for the development footprint, with specific focus on areas with dolomite grassland, as part of the micro-siting of the layout.
- When the Delta Power Plant layout has been established a walkdown of the area must be completed by a qualified Palaeontologist to catalogue and photograph well-preserved stromatolites. This action should take place after initial vegetation clearance but before the ground is levelled for construction.
- The ECO for this project must be informed that the Tertiary to Quaternary calcrete has a High Palaeontological Sensitivity.
- Several fauna SCC are expected to occur within the site (considering findings from the avifaunal study), including the regionally 'Near Threatened' *Pyxicephalus*

adspersus (Giant Bull Frog) and *Parahyaena brunnea* (Brown Hyena). Numerous *Vachellia erioloba* (Camel Thorn) trees were recorded. These are listed as nationally protected trees and a permit must be obtained should any specimen need to be disturbed in any way (in terms of Section 12 of the National Forests Act, No. 84 of 1998).

- Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.
- An avifauna pre-construction winter baseline assessment is strongly recommended, along with post-construction monitoring and throughout the life of the project.
- Due to the effects of the dry season on the vegetation of the region many indigenous plants occurring in the area may not have been observable or identifiable. Therefore, it is recommended that a wet season walkthrough of the site be conducted prior to the commencement of the project construction phase. This walkthrough may be a requirement of the Environmental Authorisation.

We trust that the department finds the report in order and eagerly await your comment and input in this regard.

Marelle Botha

Environamics - Environmental Consultants

10 REFERENCE

ANON. nd. Guidelines for Environmental Impact Assessments. <http://redlist.sanbi.org/eiaguidelines.php>

ACTS see SOUTH AFRICA

Benzai Environmental. 2022. Palaeontological Impact Assessment for The Proposed addition to the Delta Solar Power Plant near Bloemhof, North West Province.

Biodiversity Company. 2022. Agricultural Impact Assessment for The Proposed addition to the Delta Solar Power Plant near Bloemhof, North West Province.

Biodiversity Company. 2022. Avifauna Impact Assessment for The Proposed addition to the Delta Solar Power Plant near Bloemhof, North West Province.

Biodiversity Company. 2022. Ecological and Wetland Impact Assessment for The Proposed addition to the Delta Solar Power Plant near Bloemhof, North West Province.

Biodiversity Company. 2022. Soils Impact Assessment for The Proposed addition to the Delta Solar Power Plant near Bloemhof, North West Province.

BODEN, T.A., G. MARLAND, and R.J. ANDRES. 2011. Global, Regional, and National Fossil-Fuel CO₂ Emissions. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A.

CONSTITUTION *see* SOUTH AFRICA. 1996.

DEPARTMENT OF ENERGY (DoE). Integrated Resource Plan 2010-2030

DEPARTMENT OF MINERALS AND ENERGY (DME). 2003. White Paper on Renewable Energy.

DR RUTH SEGOMOTSI MOMPATI DISTRICT MUNICIPALITY. 2014/2015 Integrated Development Plan (IDP).

Donway Environmental Consultants. 2022. Social Impact Assessment – The Proposed addition to the Delta Solar Power Plant near Bloemhof, North West Province.

Donway Environmental Consultants. 2022. Visual Impact Assessment – The Proposed addition to the Delta Solar Power Plant near Bloemhof, North West Province.

ENERGY BLOG. 2015. Energy Blog – Project Database. [Web:] [http://www.energy.org.za/knowledge-tools/project-database?search=project lookup&task=search](http://www.energy.org.za/knowledge-tools/project-database?search=project%20lookup&task=search) [Date of assess: 28 September 2015].

FIRST SOLAR. 2011. PV Technology comparison.

Geostratum Water Management Consulting. 2022. Stormwater Management Plan and Hydrogeological Assessment for the Proposed addition to the Delta Solar Power Plant near Bloemhof, North West Province.

LANZ, J. 2022. Site Verification and Agricultural Compliance Statement for The Proposed addition to the Delta Solar Power Plant near Bloemhof, North West Province.

MUCINA, L. AND RUTHERFORD, M.C. 2006. The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.

NATIONAL DEPARTMENT OF AGRICULTURE. 2006. Development and Application of a Land Capability Classification System for South Africa.

NERSA. 2009. South Africa Renewable Energy Feed-in Tariff (REFIT) – Regulatory Guidelines.

SANBI. 2016. Guidelines for Environmental Impact Assessments. [Web:] <http://redlist.sanbi.org/eiaguidelines.php>. Date of access: 26 April 2016.

SOLARGIS. 2021. Global Horizontal Irradiation (GHI). [Web:] <https://globalsolaratlas.info/download/south-africa> [Date of access: 04 May 2021].

SOUTH AFRICA(a). 1998. The Conservation of Agricultural Resources Act, No. 85 of 1983. Pretoria: Government Printer.

SOUTH AFRICA. 1996. Constitution of the Republic of South Africa as adopted by the Constitutional Assembly on 8 May 1996 and as amended on 11 October 1996. (B34B-96.) (ISBN: 0-260-20716-7.)

SOUTH AFRICA(a). 1998. The National Environmental Management Act, No. 107 of 1998. Pretoria: Government Printer.

SOUTH AFRICA(b). 1998. The National Water Act, No. 36 of 1998. Pretoria: Government Printer.

SOUTH AFRICA. 1999. The National Heritage Resources Act, No. 25 of 1999. Pretoria: Government Printer.

SOUTH AFRICA. 2004. The National Environment Management: Air Quality Act, No. 39 of 2004. Pretoria: Government Printer.

SOUTH AFRICA(a). 2008. The National Energy Act, No. 34 of 2008. Pretoria: Government Printer.

SOUTH AFRICA(b). 2008. The National Environmental Management: Waste Act, No. 59 of 2008. Pretoria: Government Printer.

SOUTH AFRICA. Minister in the Presidency: Planning. 2009. *Medium Term Strategic Framework. – A Framework to guide Governments Programme in the Electoral Mandate Period 2009-2014.*

SOUTH AFRICA. 2010. Regulations in terms of Chapter 5 of the National Environmental Management Act, 1998. (GNR. 543, 544 and 545. 2010.). Pretoria: Government Printer.

SWINGLER, S. 2006. Statistics on Underground Cable in Transmission networks, Final Report of CIGRE Working Group B1.07.

THE MESOTHELIOMA CENTRE. 2016. Mesothelioma in South Africa. [Web:] <http://www.asbestos.com/mesothelioma/south-africa/>. [Date of access: 27 June 2016].

VAN SCHALKWYK, J. 2022. Cultural Heritage Impact Assessment: The Proposed addition to the Delta Solar Power Plant near Bloemhof, North West Province.

WORLD BANK GROUP. 2006. The Equator Principles.