DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

The Proposed Development of a 150 MW Concentrated Solar Power Plant (Parabolic Trough) and Associated Infrastructure on Remaining Extent of the Farm Groenwater 453 and Remaining Extent of Portions 4 and 5 of the Farm Groenwater 453 within the Tsantsabane Local Municipality, Kimberley Registration Division, Northern Cape Province

DEA reference: 14/12/16/3/3/2/923

Prepared for: Metsimatala CSP Solar Energy (Pty) Ltd

Prepared by: Enviroworks

July 2016

Part of the SHE GROUP

Prepared by
enviro works
Today's Impact | Tomorrow's Legacy
T +27 (0)86 198 8895 | F +27 (0)86 719 7191
E office@enviroworks.co.za

King's Landing Trading 507 (Pty) Ltd trading as Enviroworks | Registration: 2015/105273/07 | Operating since 2002

TABLE OF CONTENT

Report Review and Quality Management……iv

Executive Summary……...v

List of Figures……xii

List of Tables……xiii

Content of Appendices……xiv

Abbreviations……xv

Report layout……1

1. Introduction……3

1.1 Project history and overview 4

1.2 Project alternatives considered 5

1.3 Project applicant information 6

2. Environmental Assessment Practitioner……7

2.1 Details of the EAP 7

2.2 Expertise of the EAP Representative 8

2.3 Public Participation Officer 9

2.4 Details of the Internal Reviewer 9

3. Relevant Environmental Legislation and Guidelines……10

3.1 Constitution of the Republic of South Africa (Act 108 of 1996) 10

3.2 Other relevant environmental legislation 10

3.2.1 National 10

3.2.2 Provincial 15

3.2.3 District and Local 17

3.3 Relevant Guidelines 18

3.4 NEMA Listed Activities Triggered by the Proposed Project 19

3.5 NEMA Regulation 21 Scoping Report information compliance 21

4. Project Location and Description……26

4.1 Project Location 26

4.2 Project Description 30

4.2.1 Process Description 31

4.2.2 Facility and Associated Infrastructure Description 39

5. Needs and Desirability of the Project……56

6. Alternatives Considered……58

6.1 Scoping Phase Alternative Technology Investigation 58

6.2 Location Alternatives 59

6.3 Technology Alternatives 61
6.4 “No-Go” Option 64
7. Description of the Environment..... 65
7.1 Bio-Physical Description 65
7.1.1 Climate 65
7.1.2 Geology and Soils 65
7.1.3 Topography 66
7.1.4 Ecological and Wetland Impact Assessment 66
7.1.5 Avifaunal Impact Assessment 72
7.1.6 Soil and Land Capability Assessment 77
7.1.7 Heritage Impact Assessment 80
7.1.8 Visual Impact Assessment 83
7.2 Socio-Economic Description 87
8. Public Participation Process..... 91
8.1 Scoping Phase 91
8.1.1 Comments and Responses Received during the Scoping phase 92
8.2 Environmental Impact Assessment Phase 97
9. Assumptions, uncertainties and gaps in knowledge..... 98
10. Environmental Impact Assessment..... 100
10.1 Methodology for Impact Assessment and Risk Rating 100
10.2 Description of Potential Impacts and their Recommended Mitigation Measures 103
10.2.1 Construction Phase 103
10.2.2 Operational Phase 108
10.2.3 Cumulative Impacts 113
10.3 Risk Ratings of Potential Impacts 116
10.3.1 Construction Phase 117
10.3.2 Operational Phase 133
10.4 Preferred Alternative Concluding Statement 151
11. Professional Opinion of the EAP and Environmental Impact Statement..... 152
11.1 Professional Opinion of the EAP 152
11.2 Environmental Impact Statement 152
12. Conclusion..... 154
13. References..... 155

REPORT REVIEW AND QUALITY MANAGEMENT

	Issue 1	Revision 1	Revision 2	Revision 3
Issue/Revision Name	**Draft EIA Report**			
Report prepared/revised by:	**Rikus Lamprecht**			
Date:				
Signature:				
Report reviewed by:	**Elbi Bredenkamp**			
Date:				
Signature:				

EXECUTIVE SUMMARY

Metsimatala CSP Solar Energy (Pty) Ltd intends to construct a 150 MW CSP (parabolic trough) facility on the project location as discussed below. The principal objective of this project will be for the generation and supply of clean, renewable electricity into the Eskom national power grid, as part of the proposed Renewable Energy Independent Power Producers Procurement Program (REIPPPP).

The development will constitute a total footprint area of 500 ha which will include associated infrastructure such as an onsite substation, wiring between the CSP mirror panels, internal access roads, security infrastructure and a storage area.

It is envisaged that the construction phase of the proposed project will take approximately 2 to 3 years to complete, while the operational phase will continue for a period of between 20 to 25 years. This anticipated operational phase will be followed either by retrofitting and upgrading or decommissioning.

Project location

The proposed project facility and associated infrastructure will be established on the Farm Groenwater No 453 which is located directly adjacent to the west of the informal settlement of Metsimatala. The specific farm portions on which the facility will be established are the Remaining Extent of Farm Groenwater No 453 as well as Remaining Extent of Portions 4 and 5 of Farm Groenwater No 453. The properties are owned by the Groenwater Communal Property Association (CPA) members and is situated approximately 22 km north-east of the town of Postmasburg and 17 km north-east of the town of Lime Acres in the Northern Cape Province. The properties are situated in the Tsantsabane Local Municipality which, in turn, forms part of the greater ZF Mgcawu District Municipality. Access to the proposed project area is obtained by way of the R 385 provincial road which lies directly adjacent to the south of the proposed project area and runs between the towns of Daniëlskuil and Postmasburg. The Groenwaterspruit lies to the West of the Farm Groenwater No 453 on a neighbouring farm, while a railroad traverses the Farm Groenwater No 453 on the Remaining Extent of Portion 4 and the Remaining Extent.

Details of the farm portions on which the facility of the proposed project will be established area are indicated in the table below:

Table 1: Details of the farm portions on which the proposed project will be located

Farm Name and Number	SG 21 Digit Code	Land owner
Remaining Extent, Farm Groenwater No 453	C03100000000045300000	Groenwater Communal Property Association
Remaining Extent of Portion 4, Farm Groenwater No 453	C03100000000045300004	Groenwater Communal Property Association
Remaining Extent of Portion 5, Farm Groenwater No 453	C03100000000045300005	Groenwater Communal Property Association

Project alternatives considered

The specific proposed location for the footprint area of the project was determined to be the most suitable on the basis of various information and criteria (see under heading 7.2).

The following technology alternatives for the establishment and operation of a solar power plant were considered and their impacts evaluated during the Scoping phase in order to determine and compare their potential effects on the surrounding natural environment and identify adequate mitigation measures:

Concentrated Solar Power technology (CSP) was determined to be the most favourable and preferred technology option due to it having significant storage capability which enables it to continuously generate electricity during the night or times of lower solar radiation levels. Two alternatives within the CSP technology were considered and investigated during the Scoping phase in order to determine the most viable option with regards to potential environmental impacts and mitigations. The Parabolic Trough System was compared to the Central Tower/Receiver System.

The results from the Scoping phase evidently and concisely demonstrated that the environmental impacts associated with the Central Tower/Receiver System were significantly higher than those of the Parabolic Trough System and that the implementation of the required mitigation measures for the former would not be viable in adequately reducing the effects to acceptable levels. The Parabolic Trough System was therefore chosen/recommended as the preferred alternative due to its significantly lower environmental impact as well as its more efficient surface area: energy generation ratio.

The Scoping Report was accepted by the competent authority and this EIA process has therefore continued to investigate the preferred technology alternative.

NEMA listed activities triggered by the proposed project

The development activities in the Environmental Impact Assessment Regulations, 2014 which are triggered by the proposed project are listed in the table below:

Table 2: Environmental Impact Assessment Regulations, 2014 listed activities triggered by the proposed project

Regulation	Activity	Description of trigger activity in proposed project
GN. R. 983 (Listing Notice 1)	**Activity 11** 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.	A substation and associated transmission/distribution components will be constructed on the 500 ha footprint area.
	Activity 28 Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	Construction and operation of a CSP (Parabolic Trough) facility with associated infrastructure (power block and internal substation) with a 500 ha footprint and which will have a power generating capacity of 150 MW.
GN. R. 984 (Listing Notice 2)	**Activity 1** The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where	Construction and operation of a CSP (Parabolic Trough) facility with associated infrastructure (power block and internal substation) with a 500 ha footprint and which will

Regulation	Activity	Description of trigger activity in proposed project
	such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area.	have a power generating capacity of 150 MW.
	Activity 15 The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for - (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	Construction and operation of a CSP (Parabolic Trough) facility with associated infrastructure (power block and internal substation) on a natural area with indigenous vegetation covering a footprint area of 500 ha. The area will be cleared during construction.
GN. R. 985 (Listing Notice 3)	**Activity 4** The development of a road wider than 4 metres with a reserve less than 13,5 metres. (a) In Free State, Limpopo, Mpumalanga and Northern Cape provinces: (ii) Outside urban areas, in: (ee) Critical Biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	All site roads will require a width of approximately 5 – 6 m and drainage trenches will be installed along the sides of the internal road network. In addition, silt traps will be installed at the outfall of the drainage trenches to existing watercourses. A small portion of the proposed development footprint is classified as CBA.
	Activity 12 The clearance of an area of 300 square metres or more of indigenous vegetation except where such	Construction and operation of a CSP Facility with associated infrastructure on an area with indigenous

Regulation	Activity	Description of trigger activity in proposed project
	clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with the maintenance management plan. (d) In Northern Cape: (ii) Within critical biodiversity areas identified in bioregional plans	vegetation covering a footprint area of 500 ha. A small portion of the proposed development footprint is classified as CBA.
	Activity 18 The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (a) In Free State, Limpopo, Mpumalanga and Northern Cape provinces: ii. Outside urban areas, in: (ee) Critical Biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	All site roads will require a width of approximately 5 – 6 m and drainage trenches will be installed along the sides of the internal road network. In addition, silt traps will be installed at the outfall of the drainage trenches to existing watercourses. A small portion of the proposed development footprint is classified as CBA.

Needs and desirability of the project

Various key factors must be taken into consideration as motivation/incentive for the potential benefits involved with the proposed project. These factors have been summarised below:

Alignment with National commitments to address Climate Change

Solar Power Facilities is a renewable energy technology which displaces/decreases the necessity for fossil fuel derived energy and therefore aids in the reduction of the country's CO_2 emissions.

Alignment with National commitments towards Renewable Energy Generation

South Africa has made commitments towards promoting the generation of energy derived from renewable resources. One of the programmes to promote renewable energy is the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP). Concentrated Solar

Power is listed as one of the recommended technologies in the REIPPPP which is committed to be generating at least 1000 MW of electricity by the year 2030. The proposed project will contribute significantly to this national commitment which in, turn, therefore acts as strong motivation for the development of the proposed project.

Economic stimulus to the local economy, and subsequent social benefits to local communities
Construction and operational phase job creation (local employment) and sustainable capacity building (skills, experience and resources development) in order to aid in immediate and continuous local community upliftment and poverty alleviation are significant benefits associated with the proposed project.

Statistics South Africa reports in their results from the third quarter of 2015 that the working-age population unemployment rate is at 25.5 % (5.4 million individuals). The REIPPPP requires significant local employment and incentivises projects to maximise these numbers.

The duration of the construction phase of the proposed project will last for a period of approximately 2 to 3 years and will result in the creation of an estimated 1200 construction related job opportunities of which the majority will be locally sourced (60 % unskilled; 20 % semi-skilled and 20 % skilled). The construction phase will also result in sustainable skills transfer to the local communities and significant stimulus to the local economy.

An estimated 120 permanent job opportunities will subsequently be available for the operational phase of the proposed project which is envisioned to last for 20 to 25 years.

The REIPPPP requires minimum levels of community ownership (2.5 %) and South African products to be utilised for a project (40 %) which will enable the proposed project to add further local socio-economic benefits. Furthermore the DoE requires that a minimum of 1.5 % of project revenues are spent on socio-economic development in local communities which could equate to approximately R 117.53 million. Enterprise Development in the local communities will also receive 0.6 % of revenue which equates to approximately R 46.89 million. A 7.5 % shareholding will be accrued by the local community trust within a 50 km radius for then previously disadvantaged. These revenue streams will go towards Corporate Social Investment programmes.

The potential impacts associated with the proposed project including recommended mitigation measures are discussed in detail in this report.

Public Participation Process

A continual and comprehensive Public Participation Process (PPP) has been undertaken up to date during the Scoping phase with all stakeholders and Interested and Affected Parties (I & AP's), including the relevant Organs of State and competent authority being adequately consulted and provide with sufficient time for comment.

The PPP is being conducted in accordance with the requirements of Regulation 41 of the EIA Regulations, 2014 and the designated Public Participation Officer will ensure that the PPP is facilitated in a manner which ensures reasonable opportunity for all stakeholders and registered I & AP's to comment and provide input on the proposed project.

Conclusion

No "red flag" significant potential impacts on the environment were identified of which the severity might suggest that the EIA phase and proposed project should not continue. All identified impacts can be adequately mitigated to an acceptable level.

This EIA process has adequately assessed the potential impacts associated with the proposed Metsimatala CSP (Parabolic Trough) facility development and determined based on the outcomes of a multitude of contributing information that the proposed development would not result in any unacceptable impacts or fatal flaws and as such may be authorised.

LIST OF FIGURES

Figure 1: Image visually illustrating the general landscape of the proposed project area 27
Figure 2: Locality map of the proposed project layout……..…28
Figure 3: Image illustrating the overall plot plan (see Appendix E on CD for digital version)..... 54
Figure 4: Image illustrating the general plant layout (see Appendix E on CD for digital version) 55
Figure 5: Illustration of the functionality of a Parabolic Trough System 62
Figure 6: An example of the layout of a Parabolic Trough System 63
Figure 7: Vegetation map of the proposed project layout……70
Figure 8: Ecological sensitivity map of the proposed project layout..... 71
Figure 9: Image indicating the degraded status of vegetation 79
Figure 10: Map indicating the potential (preliminary) visual exposure of the proposed facility. 86

LIST OF TABLES

Table 1: Details of the farm portions on which the proposed project will be located vi
Table 2: Environmental Impact Assessment Regulations, 2014 listed activities triggered by the proposed project vii
Table 3: Project applicant information 6
Table 4: Details of the EAP 7
Table 5: Details of the internal reviewer 9
Table 6: Applicable guideline documents 18
Table 7: Environmental Impact Assessment Regulations, 2014 listed activities triggered by the proposed project 19
Table 8: Information required in the EIR as per Appendix 3 of GN R. 982 of the EIA Regulations, 2014 22
Table 9: Details of the farm portions on which the proposed project will be located 29
Table 10: Description of proposed project infrastructure 40
Table 11: Facility building dimensions 52
Table 12: List of Specialist Studies Conducted 65
Table 13: Raptors and Priority Species recorded by SABAP1 in the Quarter Degree Square (QDS) covering the proposed project site 72
Table 14: Raptors and Priority Species recorded in the SABAP 2 Pentad Squares Covering the proposed project site and the immediate south of the project site 74
Table 15: Raptors and Priority Species recorded in the 9 SABAP2 Pentad Squares in the Quarter Degree Square covering the proposed project site 74
Table 16: Summary of all comments and responses received during the Scoping Report PPP 92
Table 17: Scale utilised for the evaluation of the Environmental Risk Ratings 100
Table 18: Scale used for the evaluation of the Environmental Significance Ratings 102
Table 19: Environmental Risk and Significance Ratings for the Construction Phase 117
Table 20: Environmental Risk and Significance Ratings for the Operational Phase 133

CONTENT OF APPENDICES

Appendix A – CV's of the EAP and internal reviewer

Appendix B – Locality and Sensitivity maps

Appendix C – Public Participation Report

Appendix D – Photo Report

Appendix E – Specialist Reports

Appendix F – Title deeds

Appendix G – WULA

Appendix H – Declaration of EAP

Appendix I – Deviations from approved Scoping Report

Appendix K – EMPr

ABBREVIATIONS

BA	Basic Assessment
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CEL	Cost Estimate Letter
CIA	Cumulative Impact Assessment
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
CPA	Communal Property Association
CRR	Comments and Responses Report
CSP	Concentrated Solar Power
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DENC	Department of Environment and Nature Conservation
DM	District Municipality
DMR	Department of Mineral Resources
DoE	Department of Energy
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
FSR	Final Scoping Report
Ha	Hectares
HTF	Heat Transfer Fluid
I & APs	Interested and Affected Parties
IDP	Integrated Development Plan
IPP	Independent Power Producer
kV	Kilovolt
LED	Local Economic Development
LM	Local Municipality
LSA	Late Stone Age
MAP	Mean Annual Precipitation
MASL	Metres Above Sea Level

MLL	Minimum living level
MSA	Middle Stone Age
MVA	Megavolt ampere
MW	Megawatt
NCPSDF	Northern Cape Provincial Spatial Development Framework
NDP	National Development Plan
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMWA	National Environmental Management: Waste Act (Act 59 of 2008)
NERSA	National Energy Regulator of South Africa
NFA	National Forests Act (Act 84 of 1998)
NHRA	National Heritage Resources Act (Act 25 of 1999)
NIP	National Infrastructure Plan
NWA	National Water Act (Act 36 of 1998)
PFS	Pre-feasibility Study
PPP	Public Participation Process
PUC	Point of Utility Connection
PoSEIA	Plan of Study for Environmental Impact Assessment
REIPPP	Renewable Energy Independent Power Producers Procurement Programme
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SIA	Social Impact Assessment
SIP	Strategic Integrated Project
ToR	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change
VIA	Visual Impact Assessment
WRYCM	Water Resource Yield Computer Model
WULA	Water Use Licence Application

REPORT LAYOUT

Chapter	Chapter Heading	Content Summary
1	Introduction	Provides a brief background to renewable energy in the RSA, history and overview of the proposed project, project alternatives and project applicant information
2	Environmental Assessment Practitioner	Provides details and expertise of the EAP undertaking this EIA process, as well as information on Public Participation officer and internal reviewer
3	Relevant Environmental Legislation and Guidelines	Briefly explains the environmental legislation applicable to the proposed project on a national, provincial and district/local level. It also provides an overview of the guideline documents that are relevant to this EIA process and discusses the listed activities applicable to this proposed project as per the NEMA: EIA Regulations, 2014.
4	Description of the Project and Proposed Activities	Describes the project location, a detailed description of the proposed project, as well as the relevant site infrastructure and services.
5	Need and Desirability of the Project	Explains the need ("timing") and desirability ("placing") of the project in line with the applicable Guideline on Need and Desirability.
6	Consideration of Alternatives	Describes those alternatives that have been considered (i.e. identified and investigated), and indicates which alternatives are deemed to be "feasible" and "reasonable". Also provide a comparative assessment of the potential impacts (i.e. advantages and disadvantages).
7	Description of the Environment	Describes the biophysical, social, economic and cultural aspects of the existing environment.
8	Public Participation Process	Explains the public participation process that is being undertaken as part of this EIA process.
9	Assumptions, Uncertainties and Gaps in Knowledge	Provides the assumptions, uncertainties and gaps in knowledge associated with this EIA process.
10	Environmental Impact Assessment	Provides a summary of the environmental impacts identified during scoping, describes the project phases considered as part of this impact assessment, describes similar activities in the

		area (for cumulative assessment purposes), describes the impact assessment methodology applied, and assesses the potential impacts associated with the proposed project, without and with mitigation (including alternatives and cumulative impacts).
11	EAP's Professional Opinion and Impact Assessment Statement	Provides the EAP's professional opinion on this proposed project, an Environmental Impact Statement, as well as a conclusion.
12	Declarations	Provides declarations by the Applicant and the EAP.
13	References	Lists all references referred to in this EIA Report

1. INTRODUCTION

The generation of electricity can be easily explained as the conversion of energy from one form to another. Solar energy facilities operate by converting solar energy into a useful form such as electricity. Solar technologies can be divided into two categories, namely those that harness solar energy from the sun and those that use the light energy. The former uses water or liquid mixtures for harnessing the heat energy in the form of steam generation (i.e. solar thermal) while the latter rather makes use of the chemistry between photons form the sun and positive/negative charged receptors (i.e. photovoltaic technology).

The use of solar energy for electricity generation is a non-consumptive use of a natural resource and consumes no fuel for continuing operation. Renewable energy is considered a clean source of energy with very little undesired by products being produced during the generation process. Solar energy has the potential to positively contribute significantly and also responsibly to a more ecologically, socially, and economically sustainable future. The challenge however is to ensure that solar energy projects are able to meet all economic, social and environmental sustainability criteria.

Alternative and renewable energy generation is becoming a necessary substitute for the replacement of fossil fuel powered energy sources which have significant negative impacts on the surrounding natural environment. This is rapidly being realised on an international scale with critical focus on reducing global atmospheric greenhouse gas emissions, to address undesired global temperature rises and other phenomena linked to human-induced climate change.

In line with international agreements and national policy, South Africa has committed itself to significantly reducing its greenhouse gas footprint in the mid to long term future. The energy generation industry, being the largest emitting sector, is therefore required to start focussing more on cleaner and renewable technologies for the generation of electricity. The current main identified forms of potential renewable clean energy include solar, wind, hydro-power and wave energy as catalysts for the capturing and conversion of energy into electricity.

In response to this national and international necessity for a shift in the dynamics of energy generation, Metsimatala CSP Solar Energy (Pty) Ltd intends to construct a 150 megawatt (MW) Concentrated Solar Power (CSP) (parabolic trough) facility to capture and covert solar radiation into electricity on the Remaining Extent of the Farm Groenwater No 453 as well as the Remaining Extent of Portions 4 and 5 of the Farm Groenwater No 453 in the Northern Cape Province. South Africa and in particular the Northern Cape Province is highly suited for solar power generation as it is

favourably located on the earth's sun belt where there is frequent, adequate sunlight and high levels of solar radiation. The area receives approximately 2500 to 2981 kW/h per square meter yearly.

The following report aims to give context to the proposed development through providing a comprehensive description of the proposed activities and relevant infrastructure; the identification of significant potential environmental impacts associated with the proposed project; identification of appropriate alternatives to the project and mitigation measures for prevention or reduction of undesired impacts; and communication of results in a clear and concise manner to the competent authorities and other relevant parties in order to enable an informed and transparent decision making process.

1.1 PROJECT HISTORY AND OVERVIEW

The original project scope of work was for the development and management of a 50 MW Concentrated Solar Power (CSP) facility (Linear Fresnel System). Enviroworks was requested by Ample Solar Groenwater (Pty) Ltd (project applicant) to act as the Environmental Assessment Practitioner (EAP) and facilitate the entire environmental authorisation (EA) application process. A full Scoping & Environmental Impact Assessment (EIA) process was therefore conducted on behalf of the applicant/client as per the EIA Regulations, 2010 requirements and the Final Environmental Impact Report (EIR) was subsequently submitted to the competent authority (Department of Environmental Affairs/DEA). Environmental authorisation was approved from the DEA on 10 October 2012 for the originally proposed project to commence.

After receipt of the EA the applicant however made the decision to increase the magnitude of the project scope of work to 150 MW and change the technology to a CSP (Parabolic Trough) system a new EA application process therefore had to commence for the revised project scope of work. This subsequently resulted in the necessity for an entirely new Scoping & EIA process to be conducted.

The new EA application and Scoping and EIA process will however be conducted in accordance with the new Environmental Impact Assessment Regulations of 2014 (Government Notices R982 in Government Gazette No. 38282 of 04 December 2014) which have now officially substituted the previous 2010 Regulations.

Enviroworks was again appointed by applicant to act as the EAP and facilitate this second application process. The applicant however established a new company called Metsimatala CSP Solar Energy (Pty) Ltd under which this EA application has been submitted. This revised project is however divided into two separate EA applications which are essentially being handled as two separate projects.

- A Basic Assessment is being conducted for the construction and operational phases of the proposed new 132 kV transmission line which is required for the transfer of generated electricity from the proposed CSP facility and connection into the Eskom power grid at the Manganore substation. The transmission line will originate at the new Metsimatala Solar substation to be constructed inside the proposed CSP facility and will connect into Eskom's national power grid at the Manganore substation. An application for the connection of the Project to the Eskom network was submitted on 1 July 2015 by the applicant, Metsimatala CSP Solar Energy (Pty) Ltd. The Eskom Cost Estimate Letter (CEL) was received on 17 September 2015 (Eskom Reference number: IPP148362637). Eskom has confirmed the maximum export capacity of 150 MW through the establishment of the new Metsimatala Solar substation that will connect to the existing Manganore substation new 132 kV feeder bay. The connection infrastructure will consist of both Eskom built and applicant built components.
    - The proposed diversion of the existing 132 kV Blingklip transmission line which currently runs through the centre of the proposed CSP facility footprint will also be included in this Basic Assessment process. It is envisaged that the existing transmission line will simply be diverted around the outer boundary of the proposed CSP footprint.
- A full Scoping & EIA process is being conducted for the construction and operational phases of the proposed CSP facility and associated infrastructure. An initial Scoping Report was submitted to the competent authority and acceptance of this report was received on 13 June 2016 enabling the continuation of the EIA process. This EIR constitutes the final step in the process of obtaining environmental authorisation for the development of the proposed project.

1.2 PROJECT ALTERNATIVES CONSIDERED

The specific proposed location for the footprint area of the project was determined to be the most suitable on the basis of various information and criteria (see under heading 6.2).

The following technology alternatives for the establishment and operation of a solar power plant were considered and their impacts evaluated during the Scoping phase in order to determine and compare their potential effects on the surrounding natural environment and identify adequate mitigation measures:

Concentrated Solar Power technology (CSP) was determined to be the most favourable and preferred technology option due to it having significant storage capability which enables it to continuously generate electricity during the night or times of lower solar radiation levels. Two alternatives within the CSP technology were considered and investigated during the Scoping phase in order to determine the most viable option with regards to potential environmental impacts and mitigations. The Parabolic Trough System was compared to the Central Tower/Receiver System.

The results from the Scoping phase evidently and concisely demonstrated that the environmental impacts associated with the Central Tower/Receiver System were significantly higher than those of the Parabolic Trough System and that the implementation of the required mitigation measures for the former would not be viable in adequately reducing the effects to acceptable levels. The Parabolic Trough System was therefore chosen/recommended as the preferred alternative due to its significantly lower environmental impact as well as its more efficient surface area: energy generation ratio.

The Scoping Report was accepted by the competent authority and this EIA process has therefore continued to investigate the preferred technology alternative.

1.3 PROJECT APPLICANT INFORMATION

Table 3: Project applicant information

Company/entity name:	Metsimatala CSP Solar Energy (Pty) Ltd
Registration number:	2012/082721/07 (see Appendix F)
Physical address:	65 Swannswa; Heuwilsig; Kimberley; 8301
Postal address:	P.O. Box 1058; Kimberley; 8300
Contact person:	Andrew Kesiamang
ID number:	751130 5309 089
Designation:	Director
Contact number:	+27 (0) 53 861 1514/083 269 5948
E-mail address:	andrew@afridevo.co.za

2. ENVIRONMENTAL ASSESSMENT PRACTITIONER

This section provides details and expertise of the EAP undertaking this EIA process, as well as information on Public Participation officer and internal reviewer.

2.1 DETAILS OF THE EAP

Enviroworks was appointed by Metsimatala CSP Solar Energy (Pty) Ltd as the independent Environmental Assessment Practitioner (EAP) to conduct a full Scoping & EIA process for the proposed project.

Enviroworks was established in November 2002. Although the formal establishment of the company took place in 2002, it is backed by more than 70 years of collective professional service and experience in the environmental field. The qualifications, expertise and experience of our professional team form the backbone of the company's continued success.

The vision of Enviroworks is to provide excellent, cutting edge Environmental Management Solutions and Services, underpinned by a team of professional consultants together with our associated network of specialist partners and project managers. The company continuously engages existing and emerging legislation, guidelines and practices in order to ensure the execution of high quality and appropriate studies. Through an integration of skills and expertise, it is envisioned that Enviroworks will deliver exceptional, competitive services for task execution and to meet deliverables. Enviroworks through years of experience and industry presence assures the seamless execution and roll out of tasks to achieve projected results on time. Our past experience on the execution of renewable energy projects further benefits our understanding of relevant technology-related processes and the impacts thereof.

Table 4: Details of the EAP

Company/entity name:	Rikus Lamprecht (on behalf of Enviroworks)
Physical address:	5 Walter Sisulu Street; Universitas; Bloemfontein; 9301
Postal address:	PO Box X 01; Suite 116; Brandhof; 9324
Contact person:	Rikus Lamprecht
Designation:	Senior Environmental Consultant
Contact number:	072 230 9598
E-mail address:	rikus@enviroworks.co.za
Qualifications:	M.Env.Sci Ecological Remediation and Sustainable Utilisation

2.2 EXPERTISE OF THE EAP REPRESENTATIVE

Rikus Lamprecht was employed by Enviroworks in 2016 as a Senior Environmental Consultant. Rikus was previously employed by Fraser Alexander Tailings from 2011 to 2015 as an Environmental Contracts Manager where he was responsible for the technical and operational management of all Fraser Alexander Tailings' environmental mining rehabilitation work. He was responsible for all facets of project management as well as implementation of rehabilitation and environmental strategies by planning activities, organizing physical, financial and human resources, delegating task responsibilities, leading people, controlling risks and providing technical support.

Rikus holds a B.Sc Botany and Zoology as well as an M.Env.Sci Ecological Remediation and Sustainable Utilisation degree. His environmental management knowledge and practical experience as well as his enthusiasm, disciplined goal-driven mind-set and high personal standards ensures high quality outputs during the implementation and completion of any environmental project.

Relevant Project Experience

2016

- Management of the Environmental Authorisation and EIA processes of the proposed Meerkat Hydropower Facility Project in the Orange River in the Northern Cape Province.
- Management of the Environmental Authorisation and EIA processes of the proposed N8 Realignment Project in the Freestate Province.
- Conducting of Environmental Impact Assessment Report for the proposed cultivation of a 500 ha Vineyard for CarpeDiem in the Northern Cape
- Management of the 24G Environmental Authorisation and EIA processes of the Mooihoekdam Project in the Freestate Province.
- Conducting of Waste License and Air Emissions License applications for the 24G process of Clinvet International (Pty) Ltd
- Completion of a specialist vegetation study and report for the proposed Olifantshoek Bulk Water Supply Project in the Northern Cape Province.
- Completion of a specialist vegetation study and report for the proposed N8 gravel quarries in the Freestate Province.
- Completion of a specialist vegetation study and report for the proposed 100 ha vineyard development on the Farm Spitzkop, Prieska, Northern Cape Province.

See Appendix A for Curriculum Vitae.

2.3 PUBLIC PARTICIPATION OFFICER

The entire Public Participation Process for the Scoping as well as EIA phases will also be conducted and coordinated by Rikus Lamprecht.

2.4 DETAILS OF THE INTERNAL REVIEWER

Elbi Bredenkamp started her career as a case officer and served as an environmental specialist with the Department of Minerals and Energy gaining extensive knowledge of mining impact and attributing management mechanisms.

From 1997 to 2002 Elbi further developed her knowledge in the environmental field as a case officer working for the Department of Tourism, Environment and Economic Affairs, Free State (DTEEA). Here Elbi was responsible for reviewing environmental impact assessments and developing administrative processes & organizational structures within the department. Through ongoing dealings with Environmental Legislation Elbi familiarized herself with the National Environment Management Act (Act 107 of 1998 NEMA)/NEMA and the NEMA; EIA Regulations.

In 2002 Elbi established the company Enviroworks. As the Director of the company, Elbi gained extensive experience in the conduction of Environmental Impact Assessments, Risk Analysis, Auditing and Monitoring and compilation of Environmental Management Plans. Her departmental background and familiarity with departmental mechanisms, functionality and procedures provides significant benefit to projects reviewed by her.

Table 5: Details of the internal reviewer

Company/entity name:	Elbi Bredenkamp (on behalf of Enviroworks)
Physical address:	5 Walter Sisulu Street; Universitas; Bloemfontein; 9301
Postal address:	PO Box X 01; Suite 116; Brandhof; 9324
Contact person:	Elbi Bredenkamp
Designation:	Director
Contact number:	082 562 4134
E-mail address:	elbi@enviroworks.co.za
Qualifications:	M.Env.Sci Ecological Remediation and Sustainable Utilisation

See Appendix A for Curriculum Vitae.

3. RELEVANT ENVIRONMENTAL LEGISLATION AND GUIDELINES

This section briefly explains the environmental legislation applicable to the proposed project on a national, provincial and district/local level. It also provides an overview of the guideline documents that are relevant to this EIA process and discusses the listed activities applicable to this proposed project as per the NEMA: EIA Regulations, 2014.

3.1 CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA (ACT 108 OF 1996)

Section 24 of the Constitution of South Africa provides the main national legislative obligation towards sustainable environmental management and development. This section forms the foundation of all other subsequent environmental legislation and governance in South Africa. Section 24 states the following:

every person shall have the right -

(a) to an environment that is not harmful to their health nor 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

  (i) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

3.2 OTHER RELEVANT ENVIRONMENTAL LEGISLATION

The key environmental legislation, policies, plans and guidelines applicable to the proposed project will be discussed in this section.

3.2.1 National

3.2.1.1 National Environmental Management Act (Act 107 of 1998) (NEMA)

NEMA is the principle/framework legislation governing EIA and subsequent EA processes under the authority of the National Department of Environmental Affairs.

NEMA makes provisions for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment; institutions that will promote co-operative governance; procedures for co-ordinating environmental functions exercised by Organs of State and to provide for matters connected therewith.

Section 2 of the Act establishes a set of principles, which apply to the activities of all Organs of State that may significantly affect the environment. These include the following:

- Development must be sustainable;
- Pollution must be avoided or minimised and remedied;
- Waste must be avoided or minimised, reused or recycled;
- Negative impacts must be minimised and positive impacts enhanced; and
- Responsibility for the environmental health and safety consequences of a policy, project, product or service exists throughout its entire life cycle.

These principles are taken into consideration when a Governmental Department needs to exercise its powers for example, during the processes of granting permits or Environmental Authorisations or the enforcement of existing legislation or conditions of approval.

Section 23 of NEMA furthermore provides for general objectives of Integrated Environmental Management. In alignment with these objectives, the potential impacts on the biophysical and socio-economic environments are identified and evaluated. These potential environmental impacts have been assessed during the Scoping Report phase and mitigation measures are provided where relevant.

The subsequent Environmental Impact Assessment Regulations, 2014 (Government Notices R983, R984 and R985 in Government Gazette No. 38282 of 04 December 2014), which are also referred to as Listing Notices 1, 2 and 3 respectively, list development activities which will trigger the necessity to conduct either a Basic Assessment or a full Scoping & EIA process prior to EA being obtained for a proposed project. Listing notices 1 & 3 activities require only a Basic Assessment to be conducted while Listing notice 2 activities trigger the requirement for a full Scoping & EIA process to be conducted.

Considering the nature and scale of the development activities triggered by the proposed project, it was required that a full Scoping & EIA process be conducted to provide sufficient information to the competent authority in order for them to make an informed decision regarding the approval or rejection of the EA applied for.

Only once the EA is granted and the required supporting permits have been issued, may the applicant lawfully commence with the proposed project. The Scoping & EIA process is therefore a critical component in the feasibility and planning stage of any proposed project.

3.2.1.2 National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA)

NEMBA aims to provide for the management and conservation of the country's rich biodiversity within the framework of NEMA. It aids in the protection of species and ecosystems which warrant national protection as well as management of undesired alien and invasive species. It therefore provides for the sustainable usage of the country's indigenous biological resources.

NEMBA and its Regulations were therefore utilised for determining the ecological/biodiversity significance and value of the project area as well as the adequate management of the proposed project area with regards to ecosystems, habitats and individual species.

The Department of Environmental Affairs is responsible for the implementation and overseeing of this legislation along with the South African National Biodiversity Institute (SANBI).

3.2.1.3 National Forests Act (Act 84 of 1998) (NFA)

The aim of the NFA is to promote the sustainable usage, management and development of forests for the benefit of all in South Africa. The Act also makes special provisions for the national protection of specific forests and tree species which duly require formal protection in order to ensure their prolonged existence.

The NFA was therefore utilised to determine the potential presence of any protected forests or tree species in the proposed project area in order to ensure that the correct processes are followed for the approval of any listed activities for which a permit may be necessary regarding such forests or species, should it be required.

Permit applications in terms of the National Forests Act are lodged with the relevant national authority, which in this case is the Department of Agriculture, Forestry and Fisheries.

3.2.1.4 Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA)

CARA aims to provide for the protection and control over utilisation of the country's agricultural resources in order to promote conservation of soils, water and natural vegetation as well as the combatting of weeds and invader plants. Sustainable utilisation is a key objective.

CARA was therefore used for determining the agricultural significance, value and subsequently the adequate management of the proposed project area.

It is overseen by The Department of Agriculture, Land Reform and Rural Development in the Northern Cape Province.

3.2.1.5 National Water Act (Act 36 of 1998) (NWA)

The NWA aims to ensure sustainable use of water through the protection of the quality of water resources for the benefit of all water users. Its principal focus is the rectification and equitable allocation and use of the scarce and disproportionately distributed water resources of South Africa.
Section 21 of NWA defines the types of water uses which require a Water Use License to be applied for. Due to the flat topography of the proposed project area there are no natural drainage lines or water courses present on the footprint area. The proposed project footprint however falls within 500 m of a natural watercourse resulting in the necessity for a water use license application (WULA) to be submitted to the Department of Water and Sanitation (DWS):

The Department of Water and Sanitation is responsible for the implementation and overseeing of this legislation and is also the responsible authority for the issuing of permits for water use.

3.2.1.6 National Heritage Resources Act (Act 25 of 1999) (NHRA)

NHRA aims to provide for the integrated and interactive management and conservation of the national heritage resources in South Africa so that they may be preserved for future generations.

Section 38 of the NHRA lists categorised development processes which require the South African Heritage Resources Agency (SAHRA) to be notified and furnished with a heritage study andnimpact assessment of a proposed project area in order to obtain project authorisation. The following development processes are triggered during the construction and operational phases of the proposed project:

(1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as -
(c) any development or other activity which will change the character of a site -
    (i) exceeding 5 000 m² in extent; or
    (ii) involving three or more existing erven or subdivisions thereof; or
(d) the re-zoning of a site exceeding 10 000 m² in extent;

SAHRA has a mandate, in terms of the NHRA, to enforce the conditions of the NHRA, and hence oversees the management of heritage resources together with provincial heritage agencies.

3.2.1.7 National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA)

After consultation with the National Department of Environmental Affairs (Ms. Z. Mbili) it was determined that the Metsimatala CSP (Parabolic Trough) facility would not require a waste license in terms of the National Environmental Management: Waste Act (Act 59 of 2008). Metsimatala CSP

Solar Energy (Pty) Ltd would therefore not be required to undertake a waste license application process.

3.2.1.8 White Paper on Renewable Energy Policy in South Africa (2003)

The white paper is responsible for promoting and implementing renewable energy in South Africa. It sets a framework and vision for government's intent to meet renewable energy, policy principles, strategic goals and objectives. With a wealth of renewable resources, largely solar and wind, South Africa intends to promote the agenda of this policy. Critical outputs include meeting economic, technical and other developmental constraints, as well as fighting the effects of climate change through renewable energy activities.

In addition, through the support of renewable energy generation as supported in this policy, South Africa will make progress towards meeting their set target of 10 000 GWh of renewable energy contribution to final energy consumption by 2013 through biomass, wind, solar and small-scale hydro forms. Through this target, roughly 4 % of the national energy demand shall be met (DME 2003).

3.2.1.9 Integrated Resource Plan for Electricity, 2010 - 2013

In accordance with the National Energy Act (Act 34 of 2008) the Minister of Energy must develop and publish an integrated resource plan. To meet this requirement, the Department of Energy (DoE) and National Energy Regulator of South Africa (NERSA) assembled the Integrated Resource Plan (IRP) for the period 2010 to 2030. The critical objective hereof is to develop a sustainable electricity investment strategy for generation capacity and transmission infrastructure. Amongst other goals, the IRP is intended to improve the long term reliability of electricity supply by keeping pace with economic growth and development, as well as determining South Africa's capacity investment needs.

Objectives of the IRP include the evaluation of security of supply, and determining the lowestcost supply options and provide information on the opportunities for new investment. The plan's outcomes found that South Africa will still be dependent on coal-fired options over the next 20 years and the construction of additional base load plants will be required from 2010. Committed generation is planned for 9.6 GW of nuclear, 6.3 GW of coal, 17.8 GW of renewable (including 8.4 GW solar) and 8.9 of other generation sources.

3.2.1.10 Electricity Regulation Act 2006 (Act 4 of 2006)

NERSA, under the mandate of the National Energy Regulator Act of 2004 (Act 40 of 2004) and subordinate legislation, such as the Electricity Regulation Act (Act 4 of 2006), has the authority to

determine prices at and condition under which electricity may be supplied by licence to Independent Power Producers (IPP's). Presently, NERSA is undertaking requests for qualification and proposals for new generation capacity under the IPP procurement program, as well as updating and expanding the process in awarding electricity generation licences.

3.2.1.11 National Development Plan - 2030

The executive summary of the National Development Plan (NDP) initiates with the following paragraph, *"The National Development Plan aims to eliminate poverty and reduce inequality by 2030. South Africa can realise these goals by drawing on the energies of its people, growing an inclusive economy, building capabilities, enhancing the capacity of the state, and promoting leadership and partnerships throughout society."*

One of the significant enabling milestones of the NDP, 2013 is to:

Produce sufficient energy to support industry at competitive prices, ensuring access for poor households, while reducing carbon emissions per unit of power by about one-third. The proposed CSP facility will make a considerable positive contribution towards this milestone.

3.2.1.12 National Infrastructure Plan, 2012

In terms of the National Infrastructure Plan (NIP), the proposed CSP facility would contribute to Strategic Integrated Projects (SIP) 8*: Green energy in support of the South African economy: Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010)*.

3.2.2 Provincial

3.2.2.1 Northern Cape Nature Conservation Act (Act 9 of 2009)

In addition to the NFA, the Northern Cape Nature Conservation Act (Act 9 of 2009) also makes provision for the protection and sustainable utilisation of wild animals, aquatic biota and plants on a provincial scale in the Northern Cape Province. It is therefore used in conjunction with the NFA to determine the potential presence of any provincially protected species in the proposed project area in order to ensure that the correct processes are followed for the approval of any listed activities for which a permit may be necessary regarding such species, should it be required.

Permit applications in terms of the Northern Cape Nature Conservation Act (Act 9 of 2009) are lodged with the relevant provincial authority, which in this case is the Department of Environment and Nature Conservation in the Northern Cape Province.

3.2.2.2 Northern Cape Provincial Spatial Development Framework

The NCPSDF was formulated in 2011 to meet the requirements of the Northern Cape Planning and Development Act (Act 7 of 1998) and the Municipal Systems Act (Act 32 of 2000). Prepared in accordance with a bioregional planning approach adapted to suit the site-specific requirements of the Northern Cape, the NCPSDF recognises that no region or area should be planned and managed as an in isolation from its surroundings. Together, unit areas form part of the broader environment and the mutual relationships and linkages between adjacent units must be understood and applied.

The framework aims to act as a policy and strategy providing direction and guidance for:

- future land use,
- spatial context for provincial sectoral strategies,
- promoting a developmental state,
- alignment of environmental management priorities, and
- mobilising the overarching objective of the Northern Cape Provincial Growth and Development Strategy (PGDS) to build prosperous, sustainable and growing provincial economy to eradicate poverty and improves social development.

A focus for achieving sustainable development as discussed in the framework, requires four areas of capital, being environmental, human, infrastructure and monetary. The plan further stresses the need for integrative participation, positive interventions and innovative finance. The SDF makes specific reference to clean and sustainable energy production with the emphasis on the great potential and benefits of solar energy production in the Northern Cape Province.

The proposed project will make a significant positive contribution to various objectives of the SDF.

3.2.2.3 Northern Cape Provincial Growth and Development Strategy (NCPGDS)

The Northern Cape Provincial Growth and Development Strategy (NCPGDS) (2004 – 2014) highlights the most significant growth and development challenge as the reduction of poverty, and that only through long-term sustainable economic growth and development shall this be achieved. Important areas where growth can be achieved include agriculture and agro-processing, transport and tourism. In support of such growth areas the creation of opportunities for life-long learning, improvement of labour force skills to enhance productivity and expanding access to education and knowledge shall lead to the further realisation of such growth.

The inclusion of macro-level objectives shall mobilize these primary growth areas. Such objectives include the developing of human and social capital, improving the efficiency and effectiveness of governance and associated institutions and enhancing infrastructure for economic growth and development.

3.2.3 District and Local

3.2.3.1 ZF Mgcawu District Municipality Integrated Development Plan 2013-2014

The ZF Mgcawu District Municipality is made up of six constituent local municipalities. The Municipality envisions that the Integrated Development Plan (IDP) will enable the council to work with citizens, groups and communities of the region to identify sustainable ways of meeting their social, economic and material needs, as well as to improve the quality of their lives.

The document identifies the development priorities for the district over an extended period, with a mandate to promote a developmental municipality and promote sustainable development in the region through effective and efficient service delivery. This with the aim to improve the health and living conditions of the poor, generate local economic development and job creation.

3.2.3.2 Tsantsabane Local Municipality Integrated Development Plan 2013-2014

The Tsantsabane Local Municipality IDP recognizes and describes means to address services delivery and ancillary service needs for the municipality. A number of the key performance areas of the IDP include stimulation of local sustainable economic development through job creation and skills development as well as physical infrastructure development with specific mention to energy infrastructure for improved supply and efficiency. The proposed project will be able to contribute significantly to these objectives.

3.3 RELEVANT GUIDELINES

The table below lists the Guideline Documents that are applicable to the proposed project, and which are considered as part of the EIA process, as are required in terms of the NEMA EIA Regulations; 2014.

Table 6: Applicable guideline documents

1	**DETEA EIA Guideline and Information Document Series**
1.1	*Draft Guideline on the **Need and Desirability** in terms of the EIA Regulations of 2010*. Integrated Environmental Management Guideline Series 9, Government Notice 792 of 2012.
2	**DEA & DP EIA Guideline and Information Document Series**
2.1	*Guideline on **Generic Terms of Reference for EAPs and Project Schedules***, EIA Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning, March 2013.
2.2	*Guideline on **Need and Desirability**, EIA Guideline and Information Document Series*. Western Cape Department of Environmental Affairs & Development Planning, March 2013.
2.3	*Guideline on **Alternatives**, EIA Guideline and Information Document Series.* Western Cape Department of Environmental Affairs & Development Planning, March 2013.
2.4	*Guideline on **Public Participation**, EIA Guideline and Information Document Series*. Western Cape Department of Environmental Affairs & Development Planning, March 2013.
3	**DEA&DP Guideline Document Series for Involving Specialists in the EIA Process, and others**
3.1	*Guideline for **Environmental Management Plans***. CSIR Report No ENV-S-C2005-053 H. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town (Lochner, P. 2005).

3.4 NEMA LISTED ACTIVITIES TRIGGERED BY THE PROPOSED PROJECT

The development activities in the National Environmental Management Act (Act 107 of 1998): Environmental Impact Assessment Regulations, 2014 (Government Notices R983, R984 and R985 in Government Gazette No. 38282 of 04 December 2014) which are triggered by the proposed project are listed in the table below:

Table 7: Environmental Impact Assessment Regulations, 2014 listed activities triggered by the proposed project

Regulation	Activity	Description of trigger activity in proposed project
GN. R. 983 (Listing Notice 1)	**Activity 11** The development of facilities or infrastructure for the transmission and distribution of electricity- (ii) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.	A substation and associated transmission/distribution components will be constructed on the 500 ha footprint area.
	Activity 28 Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	Construction and operation of a CSP (Parabolic Trough) facility with associated infrastructure (power block and internal substation) with a 500 ha footprint and which will have a power generating capacity of 150 MW.
GN. R. 984 (Listing Notice 2)	**Activity 1** The development of facilities or infrastructure for the generation of electricity from a renewable resource	Construction and operation of a CSP (Parabolic Trough) facility with associated infrastructure (power block and internal

Regulation	Activity	Description of trigger activity in proposed project
	where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area.	substation) with a 500 ha footprint and which will have a power generating capacity of 150 MW.
	Activity 15 The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for - (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	Construction and operation of a CSP (Parabolic Trough) facility with associated infrastructure (power block and internal substation) on a natural area with indigenous vegetation covering a footprint area of 500 ha. The area will be cleared during construction.
GN. R. 985 (Listing Notice 3)	**Activity 4** The development of a road wider than 4 metres with a reserve less than 13,5 metres. (a) In Free State, Limpopo, Mpumalanga and Northern Cape provinces: (ii) Outside urban areas, in: (ee) Critical Biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	All site roads will require a width of approximately 5 – 6 m and drainage trenches will be installed along the sides of the internal road network. In addition, silt traps will be installed at the outfall of the drainage trenches to existing watercourses. A small portion of the proposed development footprint is classified as CBA.
	Activity 12 The clearance of an area of 300	Construction and operation of a CSP Facility with

Regulation	Activity	Description of trigger activity in proposed project
	square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with the maintenance management plan. (d) In Northern Cape: (ii) Within critical biodiversity areas identified in bioregional plans	associated infrastructure on an area with indigenous vegetation covering a footprint area of 500 ha. A small portion of the proposed development footprint is classified as CBA.
	Activity 18 The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (a) In Free State, Limpopo, Mpumalanga and Northern Cape provinces: ii. Outside urban areas, in: (ee) Critical Biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	All site roads will require a width of approximately 5 – 6 m and drainage trenches will be installed along the sides of the internal road network. In addition, silt traps will be installed at the outfall of the drainage trenches to existing watercourses. A small portion of the proposed development footprint is classified as CBA.

3.5 NEMA REGULATION 21 SCOPING REPORT INFORMATION COMPLIANCE

Regulation 21 of the Environmental Impact Assessment Regulations, 2014 (Government Notices R982 in Government Gazette No. 38282 of 04 December 2014) refers to Appendix 2 which provides the content requirements for a Scoping Report.

The table below lists the relevant requirements for the EIR as per Appendix 3 of the Regulations as well as providing cross-references to where the relevant information is located in this document and/or its appendices.

Table 8: Information required in the EIR as per Appendix 3 of GN R. 982 of the EIA Regulations, 2014

EIA Regulations 2014 - Appendix 3 – Scope of assessment and content of environmental impact assessment reports	Location in this document
(a) details of-	
(i) the EAP who prepared the report; and	Section 2.1
(ii) the expertise of the EAP, including a curriculum vitae;	Section 2.2
(b) the location of the activity, including-	Section 4.1
(i) the 21 digit Surveyor General code of each cadastral land parcel;	Section 4.1
(ii) where available, the physical address and farm name;	Section 4.1
(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Section 4.1
(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is-	Section 4.1
(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	N/A
(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	N/A
(d) a description of the scope of the proposed activity, including-	
(i) all listed and specified activities triggered and being applied for; and	Section 3.4
(ii) a description of the associated structures and infrastructure related to the development;	Section 4.2
(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;	Section 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;	Section 5
(h) a full description of the process followed to reach the proposed development footprint within the approved site, including:	Section 4.1
(i) details of the development footprint alternatives considered;	Section 4.1
(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 8
(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	Section 8

reasons for not including them;	
(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 7
(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;	Section 10
(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	Section 10.1
(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;	Section 10.2
(viii) the possible mitigation measures that could be applied and level of residual risk;	Section 10.2
(ix) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and	N/A
(x) a concluding statement indicating the preferred alternative development location within the approved site;	Section 10.4
(i) a full description of the process undertaken to identify, assess and rank the impacts the activity the associated structures and infrastructure will impose on the preferred location through the life of the activity including:	Section 10
(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process and;	Section 10.2
(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;	Section 10.3
(j) an assessment of each identified potentially significant impact and risk, including;	Section 10.3
i) cumulative impacts	Section 10.3
ii) the nature, significance and consequences of the impact and risk;	Section 10.3
iii) the extent and duration of the impact and risk	Section 10.3
iv) the probability of the impact and risk occurring	Section 10.3
v) the degree to which the impact and risk can be reversed	Section 10.3
vi) the degree to which the impact and risk may cause irreplaceable loss of resources and;	Section 10.3
vii) the degree to which the impact and risk can be mitigated	Section 10.3

(k) where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 of these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report	Section 7
(l) an environmental impact statement which contains-	Section 11.2
i) a summary of the key findings of the environmental impact assessment:	Section 11.2
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;	Section 7 Appendix B
iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Section 10.3
(m) based on the assessment and where applicable, recommendations from specialist reports, the recording of proposed management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation	Section 7
(n) the final proposed alternatives which respond to the impact management measures, avoidance and mitigation measures identified through the assessment	Section 10.4 Section 11.1
(o) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are not to be included as conditions of authorisation	N/A
(p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed	Section 9
(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 the authorisation	Section 11
(r) 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	N/A
(s) an undertaking under oath or affirmation by the EAP in relation to-	Appendix H
(i) the correctness of the information provided in the report;	
(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and	Appendix H
iii) the inclusion of inputs and recommendations from the specialist reports where relevant	Appendix H
(iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	Appendix H

(t) where applicable, details of any financial provisions for the rehabilitation, closure and ongoing post decommissioning management of negative environmental impacts	N/A
(u) an indication of any deviation from the approved scoping report, including the plan of study including-	Appendix I
i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks and	N/A
ii) a motivation for the deviation	N/A
(v) any specific information that may be required by the competent authority and	NA
(w) any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A

4. PROJECT LOCATION AND DESCRIPTION

The following section provides an overview of the proposed project location as well as a detailed description of the proposed project.

4.1 PROJECT LOCATION

The proposed project facility and associated infrastructure will be established on the Farm Groenwater No 453 which is located directly adjacent to the west of the informal settlement of Metsimatala. The specific farm portions on which the facility will be established are the Remaining Extent of Farm Groenwater No 453 as well as Remaining Extent of Portions 4 and 5 of Farm Groenwater No 453. The properties are owned by the Groenwater Communal Property Association (CPA) members and is situated approximately 22 km north-east of the town of Postmasburg and 17 km north-east of the town of Lime Acres in the Northern Cape Province. The properties are situated in the Tsantsabane Local Municipality which, in turn, forms part of the greater ZF Mgcawu District Municipality. Access to the proposed project area is obtained by way of the R 385 provincial road which lies directly adjacent to the south of the proposed project area and runs between the towns of Daniëlskuil and Postmasburg. The Groenwaterspruit lies to the West of the Farm Groenwater No 453 on a neighbouring farm, while a railroad traverses the Farm Groenwater No 453 on the Remaining Extent of Portion 4 and the Remaining Extent.

Contact details for the relevant Land Owner representative:

Contact person: Kagisho Lekwene
Contact number: 073 776 4775
Email address: kagisholekwene@gmail.com

A visual illustration of the proposed project area is illustrated in the figure below (see Appendix D for the photo report of the project area). The location of the proposed project area in relation to the nearby town, access roads and adjacent farm portions is illustrated on the locality map in the second figure below:

Figure 1: Image visually illustrating the general landscape of the proposed project area

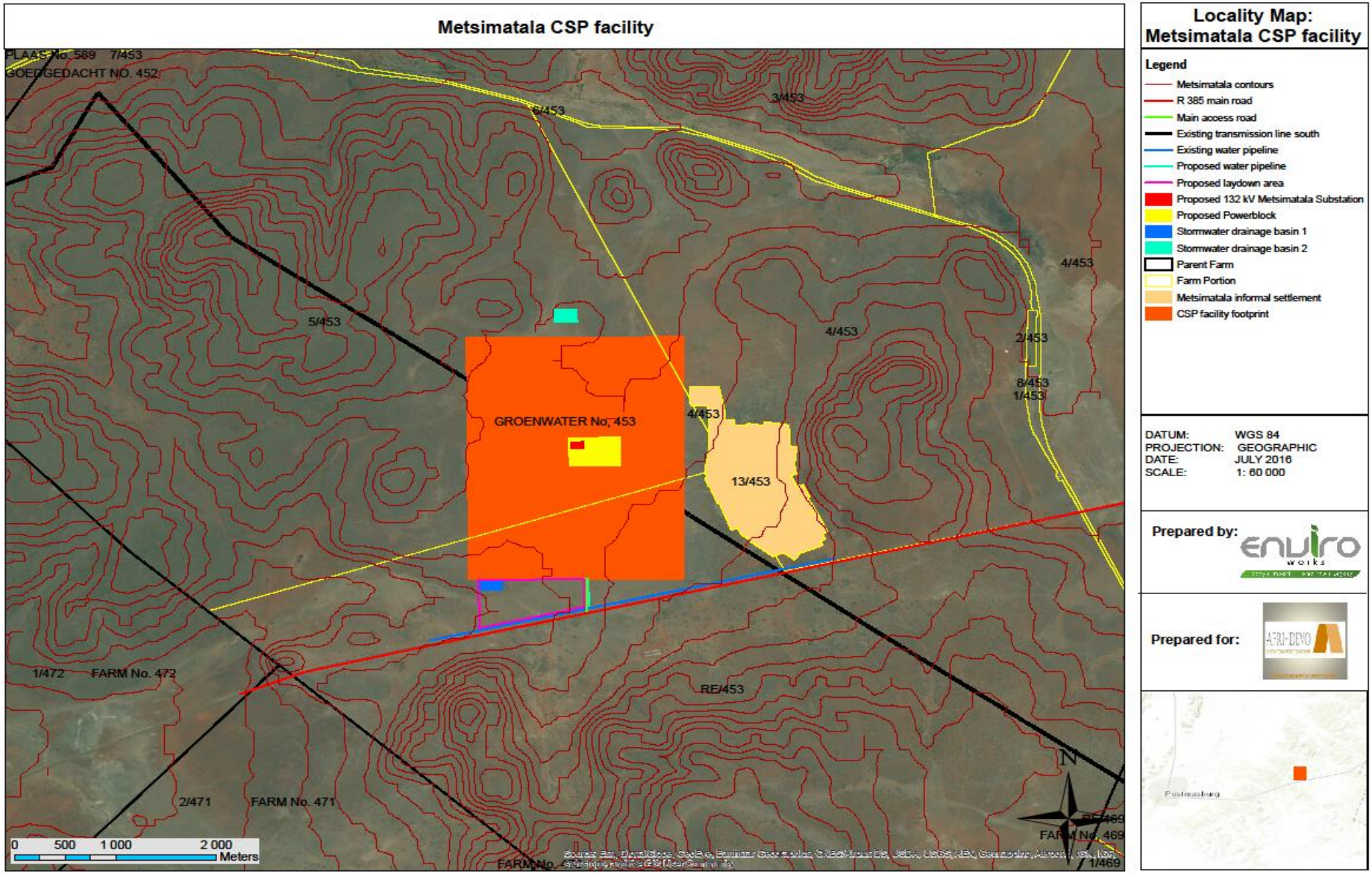

Figure 2: Locality map of the proposed project layout

See Appendix B for an A3 size version of the locality map.

Details of the farm portions on which the facility of the proposed project will be established area are indicated in the table below:

Table 9: Details of the farm portions on which the proposed project will be located

Farm Name and Number	SG 21 Digit Code	Land owner
Remaining Extent, Farm Groenwater No 453	C03100000000045300000	Groenwater Communal Property Association
Remaining Extent of Portion 4, Farm Groenwater No 453	C03100000000045300004	Groenwater Communal Property Association
Remaining Extent of Portion 5, Farm Groenwater No 453	C03100000000045300005	Groenwater Communal Property Association

(See Appendix F for the title deeds)

The four corner coordinate points for the corners of the proposed project area are as follows:

- North-western corner 28°16'23.74776"S 23°17'11.00848"E
- North-eastern corner 28°16'23.59751"S 23°18'20.35642"E
- South-eastern corner 28°17'49.02900"S 23°18'20.60042"E
- South-western corner 28°17'49.17939"S 23°17'11.23711"E

4.2 PROJECT DESCRIPTION

Metsimatala CSP Solar Energy (Pty) Ltd intends to construct a 150 MW CSP (parabolic trough) facility on the project location as discussed above. The principal objective of this project will be for the generation and supply of clean, renewable electricity into the Eskom national power grid, as part of the proposed Renewable Energy Independent Power Producers Procurement Program (REIPPPP).

The development will constitute a total footprint area of 500 ha. This will be comprised of a solar field of parabolic trough collector units connected in parallel throughout a system of insulated pipes; wiring between the CSP mirror panels; an onsite power block where the electricity will be generated; an onsite substation from where electricity will be transmitted; internal access roads; a security guardhouse at the entrance gate to regulate access; relevant office buildings and a storage area. The parabolic trough collector units of the solar field will be positioned in parallel on a north-south axis. This will enable the collector unit surfaces to be facing in an east-west direction in order for them to be able to track the east to west movement of the sun throughout the day for maximum solar radiation collection.

The proposed diversion of the existing 132 kV Blingklip transmission line, which is located inside the footprint area, will involve the decommissioning of the current line and re-establishment of a new line around the outside boundary of the proposed CSP footprint (either diverted around the southern and western boundary or around the eastern and northern boundary of the footprint). This proposed diversion process is included in a separate Basic Assessment being conducted for the development of the required new 132 kV transmission line. The newly proposed transmission line is required in order to enable the transmission of the generated electricity from the new substation on the CSP site to the Manganore substation to connect into the Eskom grid.

It is anticipated that the construction phase of the proposed project will take approximately 2 to 3 years to complete, while the operational phase will continue for a period of between 20 to 25 years.

The operational phase will be followed either by retrofitting and upgrading (preferred) or decommissioning. Continuous maintenance will be conducted on the facility in order to ensure its prolonged adequate operation. At the end of the technological lifetime of the facility, the newly available technology at that time will be reviewed and appropriate technology alternatives and improvements will be investigated. The most viable upgrading alternative for the facility will be identified and the facility can be upgraded accordingly in order to continue its efficient operations.

4.2.1 Process Description

This section will provide an overview and technical description of the relevant processes associated with the operation of the proposed CSP. An in depth discussion and explanation is available in the specialist Process Description Report in Appendix E.

The plant uses solar radiation collected and concentrated by the parabolic mirrors to transfer heat to a thermal fluid (HTF) which is used in its heated form to generate steam in a Rankine cycle with reheating. The cylinder-parabolic collector technology bases its operation on the solar tracking and capturing of incident rays through a parabolic reflector that concentrates the rays reflected onto high-efficiency tubes located along the focal line of such parabola. In these tubes the heat transfer fluid (HTF) is heated until 400ºC. This hot fluid goes to a series of heat exchangers in order to produce superheated steam. The energy of this superheated steam is converted to electrical energy using a conventional steam turbine and a power generator coupled to it.

The main components of the solar field are:

- Parabolic mirror: The aim of the parabolic mirror is to reflect and concentrate the direct solar radiation on the absorption tubes.
- Absorption tube: The absorption tube consists of two concentric tubes surrounded by a glass envelope. The receiver tube shall include a glass to metal hermetic seal and metal bellows to obtain the vacuum between the inner pipe and the outer envelope.
- Drive system: The most common drive system consists of a device that rotates around the collectors of the parabolic mirrors on an axis oriented from north to south.
- Steel structure: The aim of the steel structure of the collector is to stiffen the set of component parts.
- The energy absorbed by the HTF flows to the power block where the steam generation, the turbo-generator set, the thermal storage system and the auxiliaries of the plant are located.

The main processes and systems of the facility are:

- Solar driving system and HTF heating system.
- HTF system.
- Auxiliary HTF heating system.
- Thermal storage in molten salts tanks.
- Steam generation.
- Electrical generation.
- Exhaust steam condensation in a surface condenser.
- Condensate water preheating.

- Feed water system.
- Feed water preheating.

4.2.1.1 Solar driving system and HTF heating system

Consists of the cylinder parabolic trough collectors reflecting the sunlight onto the high efficiency absorption tubes.

4.2.1.2 HTF system

The HTF System will be a closed loop system that circulates the heat transfer fluid (HTF), by means of the HTF pumps, through the solar field, HTF supply and return piping, the Steam Generating system, Thermal Energy Storage system, expansion vessels and Ullage system.

Expansion vessels

The HTF expansion vessels provide storage, expansion and surge capacity for the HTF system. Expansion vessels will be located at the cold side of the HTF loop, at the suction side of the HTF pumps.

HTF pumps

The variable speed main HTF pumps will circulate the HTF from the expansion system through the solar field to the steam generating system and/or thermal energy storage system and then back to the expansion vessels.

Ullage system

A mixture of nitrogen, HTF gases and volatile compounds from decomposition of the HTF is vented from the expansion vessel to the Ullage system, when temperature increases HTF. In the Ullage system through a series of heaters, separation vessels and air and water coolers, the degradation products of HTF are separated and recovered. The HTF condensates for return them to the system.

4.2.1.3 Auxiliary HTF heating system

The plant has 2 heaters to heat the thermal oil. The first is actively operational while the second is a standby. The fossil fuel is used as a source of auxiliary energy in order to heat the HTF is heated to prevent HTF freezing.

4.2.1.4 Thermal storage in molten salts tanks

The solar field is overdesigned in relation to power output in order to pile up the excess energy and use it in hours without radiation. To achieve that, some of the HTF which is heated in the solar field is forwarded to the HTF-molten salt heat exchangers. These shell and tube heat exchangers have

two operating modes namely charge and discharge modes. That is why the HTF and molten salt flow are reversible.

In charge mode, the hot fluid is the HTF, it send thermal energy from the solar field to molten salts. The hot molten salts are stored in the hot molten salt tank.

In discharge mode, the hot fluid are the molten salts, they discharge thermal

4.2.1.5 Steam generation system

The hot HTF from the solar field, the thermal storage system or the auxiliary HTF heaters is directed to the steam generation system. It consists of two steam generation trains, each one with a super-heater, a steam generator with droplet separator, a preheater and, in parallel, a re-heater in order to increase the temperature of the exhaust steam of the high pressure steam turbine.

Pre-heater

The water preheater is shell and tube heat exchangers that raise the temperature of the watersteam cycle`s water near to the boiling point.

In the shell side flow the hot HTF and heat transfer to the water which flows in the tube side.

The water is forwarded from the feed water preheater to the steam generator. The HTF goes to the expansion system.

Steam generator

The steam generator is a shell and tube heat exchanger where the hot HTF flows inside the tubes. The water is preheated near saturation state and vaporized. The saturated steam generated and is forwarded to a droplet separator before entering in the superheater.

Super-heater

The super-heater is a shell and tube heat exchanger that superheats the steam from the steam generator.

Re-heater

The function of the re-heater is to increase the exhaust steam temperature from the high pressure steam turbine in order to be expanded again in the low pressure turbine. In this way the efficiency of the plant increases.

4.2.1.6 Electrical generation

The steam from de steam generation train is expanded up to the condensing pressure in the steam turbine. The steam turbine converts the thermal energy of the steam flow into mechanical energy, producing electricity in this way.

4.2.1.7 Air cooler condenser

The exhaust steam flows to the air cooler condenser.

Condensate is collected in tank under air cooler condenser and then is pumped to the feed water system by the condensate pumps.

4.2.1.8 Condensate water preheating

The low pressure preheaters are shell and tube heat exchangers. These preheaters take water from the gland steam condenser which is preheated or dispatched to the feed water system.

4.2.1.9 Feed water system

The preheated condensate is introduced into the de-aerator. Make up water of the water – steam cycle may be introduced in the deaerator. The purpose of the de-aerator is to dispose of undesired gasses in the condensate.

4.2.1.10 Feed water preheating

The high pressure preheaters are shell and tube heat exchangers and heating the water from the feed water tank. The steam from the bleeds of the high pressure steam turbine flows by the shell side and the water by the tubes. After that, feed water preheated is directed to the steam generation system.

The main auxiliary systems of the facility are the following:

- Auxiliary Fuel System.
- Water Treatment to produce the necessary demineralized water for the steam cycle.
- Compressed Air generation and distribution for instrument and services.
- Nitrogen System.
- HTF Venting and Reclaim System.
- Cooling water system.
- Chemical Injection System.
- Sample System.
- Electrical transmission and distribution System.
- DCS System to register, evaluate and measure the relevant data in order to control the facility.
- Fire System.
- Waste Water Treatment System to fulfil the discharge limits. The generated effluents are divided depending on its nature into industrial water, rain water and faecal water.

4.2.1.11 Auxiliary Fuel System

The functions of the Auxiliary Fuel System are the following:

- To storage auxiliary fuel and his distribution to the consumers.
- To channel the auxiliary fuel from the storage to the consumption points.
- To regulate the flow and the pressure of the fuel.
- The battery limits of this system are the following:
    - The connection valve of truck unloading.
    - Connection with each burner.

4.2.1.12 Water treatment

At this facility the water supply is available from the public potable water network. For human consumption, it is not considered drinking water storage because it is considered a safe supply and will be connected directly to the buildings where it is necessary. The existing Vaal Gamagara water pipeline and infrastructure is present directly adjacent to the proposed project boundary. The project will tie into this existing infrastructure in order to obtain the water required for the project. This is the most practical and financially viable option for adequate water supply. No other water sources were therefore considered. Sedibeng Water has confirmed that they will be able to adequately supply the required water quantities. See the PPP Report in Appendix C for a copy of the water supply agreement letter with Sedibeng Water.

4.2.1.13 Compressed air generation

In the power plant two different uses of compressed air exist, services air and instrumentation air.

4.2.1.14 Nitrogen system

In order to reduce oxidation of the HTF and consequent solids formation and fouling, nitrogen blanketing of the expansion vessels shall be provided. The purpose of the nitrogen gas is to maintain a non-reactive and pressurized atmosphere in the vapour space of the expansion vessel, preventing the entrance of air and moisture. Also is necessary nitrogen supply to the thermal storage system, to prevent deterioration of the molten salts and as coolant pumps salts. To this end, nitrogen cryogenic tanks, evaporators, gas filters, valves and piping connections shall be installed for its proper functioning.

4.2.1.15 HTF Venting and Reclaim System

The HTF system is a closed system which is subjected to at least one thermal cycle daily, expanding in the expansion vessels which have an inert atmosphere in order to avoid the oxidation of the thermal fluid. During these cycles the vapours are pushed to the HTF Venting and Reclaim

System (Ullage system), where the mix of nitrogen, HTF vapours, and the light product degradation are subjected to a double condensation to minimum temperature available. After condensation stage, the effluent is passed through a activated carbon filter to adsorb traces of hydrocarbons which may be in nitrogen stream, before the final discharge to the atmosphere, in order to fulfil the allowable atmospheric discharge limits.

4.2.1.16 Auxiliary Cooling System

Besides condensing the outlet steam of the steam turbine with an air cooler condenser, it is necessary to cool other auxiliary systems or components of the facility. The auxiliary cooling system chosen in this project is an air cooler.

4.2.1.17 Auxiliary steam boiler

It is necessary to have a reliable source of steam supply to the seals system of the turbine. Since this type of facility is discontinuously operated, it is necessary to have an extra steam generator.

4.2.1.18 Chemical Injection System

To maintain the water quality inside the pipelines and conserve the integrity of the different systems, chemicals have to be injected in order to remove the oxygen dissolved, adjust the pH above the corrosion values and avoid incrustations and salt deposits.

4.2.1.19 Sample system

The facility will be provided with a continuous analytical control system in order to ensure the water-steam cycle quality is maintained.

4.2.1.20 Electrical system

The electrical system shall provide all the necessary elements to carry out the following functions:

- Transport the generated electrical energy in the steam turbine-generator to the grid.
- Provide electrical power to the main and auxiliary services of the power plant at different voltage levels.

4.2.1.21 Control system

The Distributed Control System (DCS) shall consist of the set of hardware, software, wiring and communication networks that will constitute the man-machine interface for control of the plant under all operating conditions and safety, including the control of packing units (or subsystems) that must be fully integrated into the system.

4.2.1.22 Fire system

The fire system shall guarantee enough water reserve (generally with 120 minutes range) and supply to assist with fire combating, at least operating at required flow and pressure. The system shall be in accordance with the local fire code rules and NFPA rules. The fire water will be stored in a tank.

4.2.1.23 Waste Water Treatment System

Industrial waste water

The plant will generate the following industrial effluents:

- Water-steam cycle drains.
- Water treatment drains.
- Effluents polluted by oil.

These different flows are collected in homogenization pond before discharge.

Rain water

The plant will be provided channels and underground ducting system to direct rain water to the discharge point.

Faecal water

A treatment system by a biological filter shall be installed in order to treat this kind of water. This system consists of glass-fiber reinforced polyester (GRP) compact construction. The maximum flow of sewage discharges is estimated to be 6.3 l/s and the average daily 0.27 m3/h of flow. The capacity of this system will be for 70 inhabitants and is divided in the following parts: a decanter, a clarifier and a biological filter. The system reduces the DBO5 efficiency to 75% and the sedimentable solids to 80%. After the treatment the clarified water will be filtered to the ground.

The raw material and consumables required for efficient running of the plant are as follows:

4.2.1.24 HTF

The HTF is supplied by lagging trucks, which unload in the expansion vessels. To this end, the truck is fed with nitrogen under pressure in order to get out the transported HTF and direct it to the expansion vessels by a flexible hose. Once the expansion vessels are filled, the filling of the other parts of the HTF system will commence.

4.2.1.25 Molten salts

In order to store thermal energy, molten salts are used. These salts consist of a mix of sodium nitrate (60%) and potassium nitrate (40%). A preheating tank and a salts treatment and provisional melting systems shall be provided in order to discharge the salts into the system. Through this system, the temperature of the tank will increase. Sodium and potassium salts shall be supplied separately in solid phase. The total mass of the molten salts in the system shall be approximately 56,455 tons.

4.2.1.26 Water

The water supply is available from the public potable water network.

- Potable water for human consumption.
- For industrial uses.

The anticipated water consumptions are as follow:

- Drinking water (150 l/day/hab equiv. and 70 hab equiv.): 3,840 m3/year
- Raw water for demi water production: 140,000 m3/year (30 m3/h)
- Services water: 200 m3/year (0.02 m3/h)

The existing Vaal Gamagara water pipeline and infrastructure is present directly adjacent to the proposed project boundary. The project will tie into this existing infrastructure in order to obtain the water required for the project. This is the most practical and financially viable option for adequate water supply. No other water sources were therefore considered. Sedibeng Water has confirmed that they will be able to adequately supply the required water quantities. See the PPP Report in Appendix C for a copy of the water supply agreement letter with Sedibeng Water.

4.2.1.27 Fossil fuel

To maintain the temperature of the HTF higher than the freezing temperature during non-productive time it is necessary to install heaters which will use fossil fuels. The fossil fuel will be either LNG or oil.

4.2.1.28 Nitrogen

The purpose of the nitrogen gas is to maintain a non-reactive and pressurized atmosphere in the vapour space of the expansion vessel, keeping the entrance air and moisture free.

Nitrogen supply to the thermal storage system is also necessary, to prevent deterioration of the molten salts and as coolant pumps salts.

4.2.1.29 Activated carbon

As filler material in the adsorption filters is used, activated charcoal is required to retain traces of light hydrocarbons that may remain in the final stream.

4.2.1.30 Lubricants

The generator is the most demanding when it comes to lubricants. The tank will have a capacity of 15 000 litres. To ensure its properties are maintained, samples are taken every three months (depending on the manual of the supplier). Other equipment shall also require various lubricating oils and greases.

4.2.2 Facility and Associated Infrastructure Description

A Parabolic Trough plant produces electricity by capturing solar energy and converting it into thermal energy. The fluid/HTF transfers the thermal energy into the turbine system which is then converted into mechanical energy. Part of the thermal energy contained in the HTF/transfer fluid can be stored and recovered at a later stage.

The Parabolic Trough CSP plants use parabolic trough-shaped mirrors to concentrate solar energy onto linear tubes. The main steps are described below.

Because of their parabolic shape, troughs can focus the sun at 30-60 times its normal intensity on a receiver pipe located along the focal line of the trough.

Synthetic Heat Transfer Fluids capture this heat as it circulates through receiver tubes which are heated by the solar concentration. The HTF can reach temperatures of up to 400°C. The hot HTF is pumped to a generating station and routed through a heat exchanger to produce steam. Steam is then converted to electricity through conventional steam turbine-generators.

Thermal Energy Storage (TES) stores thermal energy/heat in a body of molten salts (60% of sodium nitrate and 40% of potassium nitrate) before it is converted to energy. The stored heat enables the plant to continue to operate when there is insufficient radiation or after sunset.

The use of TES is the major advantage of CSP technology over other renewable energy technology options. When the thermal energy captured by the solar system is greater than the energy needed to power the turbine, the hot HTF is diverted to a heat exchanger where its thermal energy is transferred to a molten salt solution flowing from the cold tank. This salt is heated up and stored in the hot tank, to be recovered and used when solar irradiance is low.

The proposed facility will have a capacity of 150 MW with a 4.5 hour molten salt storage. The total footprint of the CSP plant will be approximately 500 hectares (including associated infrastructure).

The plant layout consists of a solar field and a power block within which all the equipment and components necessary for the production of electricity are located. The majority of the CSP footprint area is taken up by the solar field which surrounds the power block. This configuration allows for optimization of the plant piping in terms of heat loss and total length. The power block placed at the centre of the field is designed in order to have all the areas necessary to fully enable operation and maintenance activities. A series of internal road networks within the CSP footprint will enable adequate movement and transport inside the facility boundary.

For detailed elaboration and clarification of the technical and layout aspects regarding the proposed facility please refer to the specialist Technology Overview report in Appendix E. The main infrastructure components of the proposed project are listed below:

Table 10: Description of proposed project infrastructure

Main Infrastructure	Description
Solar field	The basic component of the solar field is the Solar Collector Assembly (SCA). Each SCA is an independently tracking parabolic trough collector made up of parabolic reflectors (mirrors), the metal structure, the receiver tubes, and the tracking system that includes the drive, sensors, and controls. The SCA's rotate around the axis to track the sun as it moves through the sky during the day. The parabolic trough will be Eurotrough which has demonstrated to be cost effective and highly efficient in terms of performance in numerous commercial power plants in operation. Metsimatala Solar Collector Assemblies Field is divided in a first stage into 8 sections of 47 loops each respectively aligned on a north-south horizontal axis. The dimensions of the solar field are 2302 x 1910 m. Each loop contains 4 SCAs of 150 m in length. Every SCA of 150m long has 12 modules and every module has 28 mirrors and 3 tubes. The solar field comprises approximately 760 solar parabolic trough (PT) collectors units that are connected in parallel throughout a system of insulated pipes. The development of larger PT collectors is a trend

	within the CSP industry, leading to the use of fewer collectors. In the solar field, the cold header piping delivers the HTF from the power block. HTF is heated in the loops and enters the hot header, which returns the HTF from the solar field to the power block. The outlet temperature is approximately 393°C to ensure that the fluid (HTF) does not surpass the maximum working temperature (± 400°C).
HTF system	The HTF system is a closed loop system used to circulate the HTF across the solar field and the power block. In the absorber tubes, the HTF reaches temperatures near 393°C by absorbing the solar irradiation. Then it is used to generate steam within a series of heat exchangers that form the solar steam generator. Hot' HTF is further used to generate, superheat and reheat steam as well as to preheat feed water. The steam will be used for mechanical turbine movement generation. The HTF system is comprised of the following key equipment: Thermal oil; HTF piping; HTF Freeze protection system; HTF main pumps; Ullage system; Oil storage system; Expansion system; HTF insulation; Leak protection system; Nitrogen system; Filters; and Sample taker.
Tracking system	A single axis tracking system aligned in a north-south orientation is envisaged for the solar field. This north-south alignment is essential to maximize the capture of solar energy and to achieve a constant output over most parts of the day. This orientation provides maximum energy in the summer period, and best aligns outputs with the peak-period power demands of the electricity off-taker.
Power block and auxiliary systems	Steam is generated and superheated in several parallel steam generating trains each consisting from feed water preheater, steam generator, super-heater and re-heater in parallel. The heat exchangers are arranged and sized for effective absorption of the heat contained in the HTF. At the inlet to the steam generating train, the HTF is split into both parallel trains of heat exchangers. Each train is comprised of a steam super-heater; steam generator (evaporator) and feed water preheater which are connected in series and of a steam re-heater, which is connected in parallel to the steam generating trains. Blow down from steam generators is piped to the installed flash tank. At the

	steam generating train outlet the HTF is mixed and piped to the expansion vessel. The steam turbine-generator will consist of one double-casing steam turbine, coupled to the generator shaft and all associated auxiliary equipment. The Air Cooled Condenser (ACC) is a direct dry cooling system where the steam is condensed inside air-cooled finned tubes. The Air Cooled Condenser (ACC) is made of modules arranged in parallel rows. Each module contains a number of fin tube bundles. An axial flow, forced-draft fan located in each module forces the cooling air across the heat exchange area of the fin tubes. The condensate system condenses the steam turbine exhaust and other reclaimable steam. The condensate and reclaimable cycle drains collected in the hotwell are pumped, via the common condensate pumps, to the LP Heaters. The condenser removes non-condensable gasses during operation and deaerates the cycle makeup water. Condensate is also supplied to the STG seal steam de-superheater, condenser spray curtain, and the sampling systems. There will be several (N +1 standby configuration) Feedwater Pumps with Variable Speed High Efficiency Electric Drives (VFD). Each pump shall deliver at top speed a minimum of 50% of the Feedwater System capacity at maximum power output of the Steam Turbine/Generator The de-aeration equipment shall achieve the required feedwater air removal rate as per applicable codes, by using turbine extraction steam for. There will be a sufficient Feedwater Storage capacity to assure adequate feedwater supply to the steam generation train during emergency shutdown conditions according to applicable standards. The footprint of the power block will be near the centre of the CSP footprint area and is approximately 626 x 359 m in size.
Thermal Energy Storage system	The thermal energy storage medium is a mixture of 60% (weight) sodium nitrate (NaNO3) with 40% potassium nitrate (KNO3) It is stable

	in air and has a low vapor pressure. The (pure and fresh) mixture melts at 221°C and starts to crystallize at 238°C. Therefore all tanks, pipes, heat exchangers and other components containing molten salt require (electric) emergency heating to prevent the salt from cooling below 240°C. When the Thermal Energy Storage System (TES) is completely charged, one of the two tanks is filled with hot molten salt at 385°C, and the other tank is emptied down to a certain minimum filling (about 10% of the active portion) to cover the bottom heating coils. During discharging of the TES, the hot salt is carried through the heat exchanger array, cooled down to 290°C and deposited in the cold tank. An array of several counter current HTF-to-salt heat exchangers connected in a series will be situated at a level above the upper covers of the molten salts tanks. The ground area of the storage tanks is enclosed by a bund wall which will sufficiently contain the total molten salt volume + 10 % in case of the tank bursts. The TES system envisaged for the Project is a single indirect 2-tank concept with molten salt as storage media and an equivalent full load storage capacity of around 4.5 equivalent hours of TES capacity. The HTF solar thermal energy heats the TES system throughout HTF/Salt heat exchanger (HE) trains. The TES system comprises of the following key equipment: Two Hot Salt Tanks; Two Cold Salt Tanks; One Drain Tank, Three Cold salt pumps per tank (2W+1S) per tank total 6 numbers; Three Hot salt pumps per tank (2W+1S) per tank total 6 numbers; Two (2) HTF electric heaters Trains of HTF-Salt heat exchangers (HE); Interconnecting piping; Eight (8) electrical heaters per tank; Heat Trace System; Filters, and Nitrogen System. The system proposed for the Project has been demonstrated commercially.
Associated Infrastructure	**Description**
Balance of Plant	Equipment and Systems of the Balance of Plant, BoP, include Water Storage, Raw Water Pre-treatment and Treatment systems, Waste Water Treatment system, Compressed Air System, Power Delivery

	Substation and equipment, Plant Service electrical systems and substations, Plant Control System and DCS, Fire Protection system, Nitrogen System, utility systems and facilities as needed for plant proper maintenance and storage of spare parts and consumables.
Administrative and control building	Building will be situated in the vicinity of the power block and will be where all technical/administrative management is conducted. This will include all digital Information Technology (IT) process management and electrical control of the plant. The plant shall employ a microprocessor-based Distributed Control System (DCS) for a high degree of automation and centralized control and monitoring of the entire Facility to minimize staffing requirements. The control of some auxiliary plants (or subsystems) will be established in Programmable Logic Controllers (PLC) becoming part of the main controllers to allow the centralized operation of the plant. The operation of the Power Plant (generation systems, solar field, turbine, electrical equipment) will be made from a Main Control Room. Despite this, some of the subsystems in the plant could also have the possibility to be controlled locally (Water treatment system, Air Compressors, Auxiliary Gland Steam Generator).The control system will be designed for the maximum availability, reliability and security of operation.
Substation	The distribution substation will be approximately 173 m X 173.5 m in size and will ideally be located in close proximity to the existing power lines and therefore within the power block footprint area. The distribution substation will include transformer bays which will contain transformer oils. Bunded racking will be constructed to ensure that any oil spills will be adequately attenuated and prevented from release into the environment. For health and safety purposes, the substation shall be securely fenced to prevent unauthorized access. Where the substation is beside the line, the connection to the line will be connected via drop down conductors. Where the line is remote from the substation the connection will be by MV 66/132 kV overhead line, using either pole or pylon construction depending on the voltage. The Substation will include the following; - 3 bay switching station, and - Control Plant with protection, metering, telecontrol and SCADA (Supervisory Control and Data Acquisition), DC and Telecomms.

Roads	The R 358 Provincial road between Daniëlskuil and Postmasburg passes outside the southern boundary of the proposed CSP facility. An access road to the facility entrance, which is approximately 370 m in length from R 385 to the proposed facility, will be constructed. In addition, the facility's road network will be constructed to provide direct access to the solar field, power blocks, substation and offices. This entire road network will fall inside the 500 ha footprint area. The facility site roads will require a width of approximately 4 – 6 m and drainage trenches will be installed along the side of the internal road network. In addition, silt traps will be installed at the outfall of the drainage trenches to existing watercourses.
Fencing	For safety and security reasons, the facility shall be fenced off from the surrounding community with 2.5 to 3 m high perimeter electrical fencing with CCTV at strategic points. This boundary fence will effectively separate the 500 ha footprint area from the adjacent natural environment.
Temporary laydown areas	A lay down area of approximately 38.8 ha adjacent to the access road and to the south of the site will be constructed. Of this, 38.5 ha will be temporary in nature and associated with the construction phase, comprising a site office. The workshop areas required for small maintenance on equipment will form part of this infrastructure and will comprise approximately 30 000 m²/ 30 ha inside the 500 ha footprint area. The workshop area will however form an aspect of the permanent infrastructure and would not be dismantled after construction has been completed. Labour shall be locally sourced in the Metsimatala community and any additional labour force shall be accommodated in the confines of the Metsimatala village boundaries. High-skilled labour shall commute from Postmasburg. Construction equipment, vehicles and machinery shall be kept in a construction storage area.
Water supply	For the purpose of the proposed Metsimatala parabolic trough 150 MW facility, it is intended to make use of the Vaal Gamagara pipeline. The existing Vaal Gamagara water pipeline and infrastructure is present

	directly adjacent to the proposed project boundary. The project will tie into this existing infrastructure in order to obtain the water required for the project. This is the most practical and financially viable option for adequate water supply. No other water sources were therefore considered. Sedibeng Water has confirmed that they will be able to adequately supply the required water quantities. See the PPP Report in Appendix C for a copy of the water supply agreement letter with Sedibeng Water. The water abstracted from this pipeline will be utilised for the cleaning of the parabolic collectors/mirrors when necessary through the use of water bowsers as well as running of the CSP facility and human consumption in the offices.
Warehouse	Storage facilities for all necessary components and spares required during the constriction, management and maintenance of the facility.
Access control building	Access control building and regulation components will be erected at the entry point to the facility in order to manage and regulate access into and out of the facility on a daily basis.
Fire protection facility	The fire system shall guarantee enough water reserve (generally with 120 minutes range) and supply, at least operating at required flow and pressure. The system shall be in accordance with the local fire Code rules and NFPA rules. The fire water will be stored in a tank. The pump unit consists of an electrical pump, a diesel pump and a jockey pump to maintain the pressure in the pipelines. The active fire system consists of the following subsystems: • Electrical system of fire system having own power supply. • Fire detection and alarm with alarm buttons and loss energy supply pushbuttons. • External network hydrants and hose reels for the inside of buildings. • Foam monitors extinguishing system in HTF • Spray water system for oil filled transformers, expansion vessels and buffer tank. • Foam-Water system to protect the HTF pumps and the steam turbine oil system

	• The possibility of installing a pre-action system for electrical rooms, control and rooms with flammable products shall be examined. • Portable fire extinguishers • Vehicle equipped with tools and generator for lighting The fire system is completed with the detection and alarm system, sending the electrical signals to the fire control panel.
Change houses	This facility will provide temporary and permanent employees with the facilities for dressing, washing, eating and resting during work periods. Safety and Personal Protective Equipment preparation will also occur here. It will fall inside the 500 ha footprint area.
Sewage treatment facilities	During construction phase, the contractor Sanitech will be responsible for the sewage handling. The contractor will remove sewage on a regular basis as required on site. The following applies to operational phase handling of sewage: Three sewage reticulation systems were considered but the package plant system is considered the preferred option due to the final effluent being recyclable and of high quality: • Soak-away system; Generally this system consists of a septic tank and associated seepage trench. The proposed system for each site is a Calcamite or similar approved septic tank and associated seepage trenches. This system is not favoured for this particular site due to: - the relatively high daily flows; and - the effluent cannot be recycled and used for irrigation purposes. • Conservancy tank system; The conservancy tank system comprises the collection of effluent within a conservancy tank from where the effluent is pumped by means of a vacuum tanker. Effluent can then be discharged into Tsantsabane

	Local Municipality's existing WWTW. This system is not favoured for this particular site due to: - The volume of the conservancy tank is calculated on an emptying cycle of seven days and the estimated quantity of effluent generated; - This option may involve a slightly lower capital expenditure, but fairly large operational cost in terms of running the vacuum tanker; and - The volume of effluent expected for this development will involve at least one or two truckloads per day to the WWTW plant. • Package plant system (preferred option). Package plants can potentially offer the most practical and cost effective method for treating effluent of the nature and quantity expected from the development. Water recycling can also be managed more efficiently in comparison to the other options. Package plants involve off-site construction and manufacturing, where after the plant is transported to the site and installed and commissioned for use. Manufacturers use different techniques to make their product less expensive, and the most frequently used method is to incorporate the use of pre-made fiberglass panels as a substitute for the expensive concrete work. A myriad of options and permutations are available on the market and an investigation was done to determine the most appropriate option. It is foreseen Metsimatala CSP Solar Energy (Pty) Ltd will opt for the package plant system, specifically the Biozone STP 5 Sewage Treatment Plant. The possibility of this system to trigger either the National Water Act (Act No 36 of 2008) Section 21(f) or the National Environmental Management: Waste Act, 2008 (Act No.59 Of 2008) were investigated. After consultation with the supplier and the relevant Departments, it was concluded that the quality and quantity of the effluent will be such that neither the National Water Act (Act No 36 of 2008) Section 21(f) or the National Environmental Management: Waste Act, 2008 (Act No.59

	Of 2008) are triggered.
Solid Waste and Hazardous Waste Disposal	Waste is generated from the start to the decommissioning of a project. It is proposed that the waste that would be generated on site would be managed by reducing, reusing and recycling as far as possible. An accredited contractor will be appointed to manage and transport waste from site. All solid waste collected shall be disposed of at the registered/licensed municipal landfill site. Skip waste containers and waste collection bins will be maintained on site and the contractor will arrange for them to be collected regularly when needed and transported to the licensed landfill site. Waste separation will be implemented. Under no circumstances will waste be burned or buried on site. The Tsantsabane Local Municipality has indicated that it shall be able to accommodate general waste at its landfill site. The National Environmental Management: Waste Act, 2008 (Act No.59 Of 2008) will not be triggered as general waste quantities will fall below the threshold. It is not anticipated that any significant hazardous waste will be generated during the construction or operational phases. An accredited hazardous waste contractor will however be appointed to manage and transport hazardous waste from site. All hazardous waste collected shall be disposed of at an appropriate registered/licensed hazardous waste landfill site. Clearly marked (hazardous waste) skip waste containers and waste collection bins will be maintained on site and the contractor will arrange for them to be collected regularly when needed and transported to the licensed landfill site.
Non-hazardous & hazardous water storage and treatment facility	**Industrial waste water** The plant will generate the following industrial effluents: • Water-steam cycle drains. • Water treatment drains. • Effluents polluted by oil. These different flows are collected in homogenization pond before

	discharge. **Water-steam cycle drains** This drain is due to the salt concentration because of evaporation produced in the system, which content must be controlled in order to avoid incrustation inside the pipelines. Nevertheless, the removed water has lower salt contents than the raw water. In essence, it is osmosis water with decaling products. This stream contributes to dilute the salt concentrations of the total discharge of the plant. **Water treatment effluents** The water treatment system will generate the following effluents • Discharges by cleaning bed filters. • Discharges of rejects of reverse osmosis. • Discharges by cleaning of the EDI system. Reverse osmosis rejections reaches 25% (approx.) with respect to the inlet flow of water. This discharge has the same type of raw water salts, but four times more concentrated. **Effluents polluted by oil** The effluents polluted by hydrocarbons could come from areas of the transformers, steam turbine oil system and HTF system. These effluents shall be treated by an oil separator with coalescent plates. The sediments and the hydrocarbons collected during maintenance and cleaning are stored in containers and handled by an authorized waste manager. The treated effluent shall be collected in a sump (1 m^3 approx.) where the presence or absence of HTF dissolved in water will be checked. In case the HTF will not be detected or its concentration will be less than 1 ppm, the effluent will be pumped to the homogenization pond. Otherwise, the effluent shall be handled by an authorized waste manager.

	Water treatment For water demineralization treatment it is necessary to use the following chemicals: • Sodium hypochlorite: 130 m³/year of commercial product (15%). • Sodium metabisulphite: 30 m³/year of commercial product. • Disperser: 5.5 m³/year of commercial product. • EDI cleaning additives: HOLD • RO membrane cleaning Additives: HOLD **Water-steam cycle** To ensure the quality of the water and the steam, the plant will be provided with a low pressure chemical injection system and high pressure chemical injection system. In the feed water system, oxygen scavengers (carbohydrazide) and products for controlling the pH (volatile amines) shall be injected in order to adapt the characteristics of the feed water. Also alkalinizing agent shall be injected (phosphates) in the steam generator in order to control the water pH and maintain the value of the phosphates in safety parameters to pipelines protection. The estimated annual consumptions are: • Carbohydrazide: 2,850 litres of pure product/year. • Volatile amines: 23,700 litres of pure product/year. • Phosphates: 9,000 litres of pure product/year. **Closed cooling water system** A corrosion and antifouling inhibitor in the initial filling is added in order to maintain the conditions in the closed cooling water system. In the initial filling, needs to add the concentration of 3000 ppm of product in the system. The concrete quantity depends on the volume of the system. The annual consumption in normal conditions is estimated to be 70 litres. To avoid freezing into the water closed circuit shall be necessary to additive antifreeze (e.g. glycol) in winter, when the temperature goes below zero. Every month the presence of waste products is checked by an

	analysis. In case of leaks, reparations or pollution, additives will be added as necessary.

Table 11: Facility building dimensions

Description	Quantity
Mirror Assembly Lines	145 x 72 x 11.25
HCE Assembly Hall	40 x 20 x 4.5
Swivel Joint and ICP Welding Shop	40 x 20 x 4.5
Storage Areas for Contractors and Subcontractors	500 x 100 = 50 000 m²
Site Offices for Owner / Alfanar and their Engineers	1000 m²
Site Offices for EPC Contractor	1200 m²
Site Offices for Contractors / Subcontractors	1400 m²
Canteen / Kitchen / first aid	400 m²
Temporary Gate Houses and Other Security Facilities	200 m²
Steam Generator Chemical Dosing Shed	10 x 4.5 x 4.5 = 45 m²
Auxiliary Cooling Tower Chemical Dosage Shed	4.5 x 3.5 x 4.5 = 15.75 m²
Transformers 2.5 MVA (5 nos. / to be confirmed) for TG	24 x 6 = 144 m²
Transformers 2.5 MVA (2 nos. / to be confirmed)) for HTF/Oil	10 x 6 = 60 m²
132 kV substation	60 x 30 = 1800 m²
Transformer yard (near TG building)	35 x 12 = 420 m²

Electrical and Control Building	34 x 39 x 5 = 1326 m²
Electrical building TES (Thermal Energy Storage) area	13 x 19.5 x 5 = 253.5 m²
Steam Turbine Generator Building	24 x 48 x 20 = 1152 m²
Raw Water Pump House	5 x 10 x 5 = 50 m²
Water Treatment Plant Building	24 x 24 x 5 = 576 m²
Fire Water Pump House	21 x 10 x 6 = 210 m²
Plant Compressor Building	15 x 6 x 4 = 90 m²
Chemical Laboratory	18 x 10 x 4 = 180 m²
Laboratory near Water Treatment Plant Area	7 x 5 x 4 = 35 m²
Diesel Pump House	24 x 10 x 5 = 240 m²
Waste Water Treatment Plant Building	30 x 12 x 5 = 360 m²
Dosing Plant Building	24 x 10 x5 = 240 m²
Administration Building (incl. Main Staff and First Aid Facilities. Maintenance Staff and Canteen)	30 x 20 x 4 = 600 m²
Main Gate House and Security Building	20 10 x 3.5 = 200 m²
Fire Station	10 x 15 x 6 = `150 m²
Parking Shelters inside the Plant Area (for 30 cars and 2 bus)	13 x 48 x 5 = 624 m²
Parking Shelters outside the Plant Area (for 40 cars and 3 bus)	13 x 66 x 5 = 858 m²

All infrastructure will be located within the boundary of the 500 ha proposed project footprint area. For further elaboration and clarification of the technical and layout aspects regarding the proposed

facility please refer to the specialist Process Description and Technology Overview reports in Appendix E.

Figure 3: Image illustrating the overall plot plan (see Appendix E on CD for digital version)

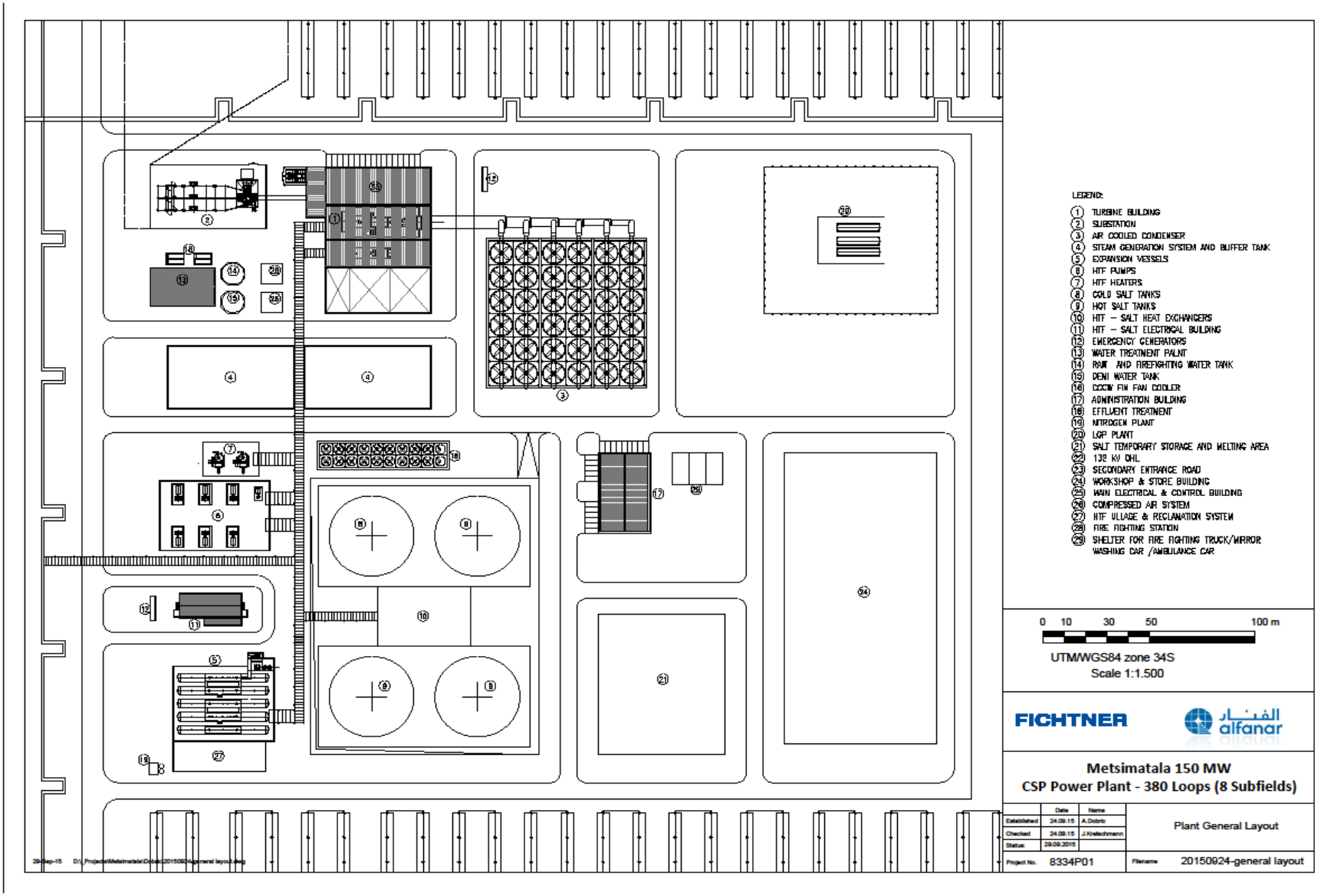

Figure 4: Image illustrating the general plant layout (see Appendix E on CD for digital version)

5. NEEDS AND DESIRABILITY OF THE PROJECT

Various key factors must be taken into consideration as motivation/incentive for the potential benefits involved with the proposed project. These factors have been summarised below:

Alignment with National commitments to address Climate Change

Solar Power Facilities is a renewable energy technology which displaces/decreases the necessity for fossil fuel derived energy and therefore aids in the reduction of the country's CO_2 emissions.

Alignment with National commitments towards Renewable Energy Generation

South Africa has made commitments towards promoting the generation of energy derived from renewable resources. One of the programmes to promote renewable energy is the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP). Concentrated Solar Power is listed as one of the recommended technologies in the REIPPPP which is committed to be generating at least 1000 MW of electricity by the year 2030. The proposed project will contribute significantly to this national commitment which in, turn, therefore acts as strong motivation for the development of the proposed project.

Viable alternative development of the farm portion

Although the proposed project area is currently being used for small scale subsistence farming activities, the area is degraded and has a low potential for agricultural activities. The carrying capacity of the vegetation is low and the land types and associated soils and soil depths present on the entire farm area are also not conducive for irrigation and therefore unfavourable for commercial agricultural practices. The financial benefit of attempting to utilise this area for agricultural purposes is therefore not viable.

The suitability of the property for alternative uses was investigated and with the high necessity for electricity generation for the national grid and the immediate local vicinity, solar power generation was determined to be the most viable option and form of renewable electricity generation as opposed to other potential renewable methods which were investigated in the Scoping Report.

Economic stimulus to the local economy, and subsequent social benefits to local communities and the Metsimatala informal settlement

The local informal settlement of Metsimatala on whose farm property the proposed facility will be constructed is a poor community with the majority of residents living under the minimum living level (MLL). The community has a high unemployment rate and adult and youth dependency ratio. Residents also have limited access to adequate electricity and other basic needs. This settlement is

therefore in dire need of assistance in order to improve their livelihood and quality of life as these relate to basic human rights. Statistics South Africa reports in their results from the third quarter of 2015 that the working-age population unemployment rate is at 25.5 % (5.4 million individuals). The REIPPPP requires significant local employment and incentivises projects to maximise these numbers.

Construction and operational phase job creation (local employment) and sustainable capacity building (skills, experience and resources development) in order to aid in immediate and continuous local community upliftment and poverty alleviation are significant benefits associated with the proposed project. The duration of the construction phase of the proposed project will last for a period of approximately 2 to 3 years and will result in the creation of an estimated 1200 construction related job opportunities of which the majority will be locally sourced (60 % unskilled; 20 % semi-skilled and 20 % skilled). The construction phase will also result in sustainable skills transfer to the local communities and significant stimulus to the local economy. An estimated 120 permanent job opportunities will subsequently be available for the operational phase of the proposed project which is envisioned to last for 20 to 25 years. The locality of the proposed project directly adjacent to the Metsimatala informal settlement is also favourable from a logistic perspective as local workers will not need transport to work which will reduce their living out cost commitments related to their employment.

The proposed project will therefore provide a significant direct financial boost to the residents of the specific settlement. The local informal settlement which is the only one in the immediate vicinity will benefit directly from this proposed project for the initial construction phase and then also during the subsequent operational phase. The REIPPPP requires minimum levels of community ownership (2.5 %) and South African products to be utilised for a project (40 %) which will enable the proposed project to add further local socio-economic benefits. Furthermore the DoE requires that a minimum of 1.5 % of project revenues are spent on socio-economic development in local communities which could equate to approximately R 117.53 million. Enterprise Development in the local communities will also receive 0.6 % of revenue which equates to approximately R 46.89 million. A 7.5 % shareholding will be accrued by the local community trust within a 50 km radius for then previously disadvantaged. These revenue streams will go towards Corporate Social Investment programmes.

Additionally, electricity supply will be improved to this settlement which is a crucial necessity for the specific local community. The provision of this basic service will further enable various opportunities and beneficial prospects for the residents of the settlement to develop and improve the current socio-economic and infrastructural condition of their community.

6. ALTERNATIVES CONSIDERED

According to Chapter 1 of NEMA EIA Regulations 2014, Notice R982, *"Alternatives"*, in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to-

*(a) The **property** on which or l**ocation** where it is proposed to undertake the activity;*
*(b) The **type** of activity to be undertaken;*
*(c) The **design** or **layout** of the activity;*
*(d) The **technology** to be used in the activity;*
*(e) The **operational** aspects of the activity; and*
*(f) The option of **not implementing** the activity.*

These NEMA EIA Regulations 2014, Notice R982, recognises that, details on alternatives need to include *"a description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity".*

The consideration of alternatives is therefore a key component of an EIA process. While an EIA process should investigate and comparatively ***consider*** all alternatives that have been identified, only those found to be "feasible" and "reasonable" must be comparatively ***assessed***, in terms of the advantages and disadvantages that the proposed activity and alternatives will have on the environment and on the socio-economic aspects of communities that may be affected by the activity.

The "feasibility" and "reasonability" of an alternative are measured by:

- the general purpose and requirements of the activity;
- the need and desirability of the activity;
- opportunity costs;
- the need to avoid and/or minimise negative impacts;
- the need to maximise benefits; and
- how it impacts on the community that may be affected by the activity (DEA&DP, 2013b).

6.1 SCOPING PHASE ALTERNATIVE TECHNOLOGY INVESTIGATION

During the Scoping phase it was determined that although the proposed project area is currently being used for small scale subsistence farming activities, the area is degraded and has a low potential for agricultural activities. The suitability of the property for alternative uses was therefore investigated and with the high necessity for electricity generation for the national grid and the

immediate local vicinity, solar power generation was determined to be the most viable option and form of renewable electricity generation as opposed to other potential renewable methods.

The following technology alternatives for the establishment and operation of a solar power plant were considered and their impacts evaluated during the Scoping phase in order to determine and compare their potential effects on the surrounding natural environment and identify adequate mitigation measures:

Concentrated Solar Power technology (CSP) was determined to be the most favourable and preferred technology option due to it having significant storage capability which enables it to continuously generate electricity during the night or times of lower solar radiation levels. Two alternatives within the CSP technology were considered and investigated during the Scoping phase in order to determine the most viable option with regards to potential environmental impacts and mitigations. The Parabolic Trough System was compared to the Central Tower/Receiver System.

The results from the Scoping phase evidently and concisely demonstrated that the environmental impacts associated with the Central Tower/Receiver System were significantly higher than those of the Parabolic Trough System and that the implementation of the required mitigation measures for the former would not be viable in adequately reducing the effects to acceptable levels. The Parabolic Trough System was therefore chosen/recommended as the preferred alternative due to its significantly lower environmental impact as well as its more efficient surface area: energy generation ratio.

The Scoping Report was accepted by the competent authority and this EIA process has therefore continued to investigate the preferred technology alternative.

6.2 LOCATION ALTERNATIVES

An alternative viable site location was not identified and evaluated. The specific proposed location for the footprint area of the project was determined to be the most suitable on the basis of the following information:

- The property (Farm Groenwater 453) upon which the proposed project location is situated belongs to the Groenwater Communal Property Association with whom an agreement was reached by the applicant for the utilisation of the desired piece of land for the proposed project. No other farm properties in the area belong to the Groenwater CPA and were therefore negotiated for. Due to its close proximity from the Metsimatala informal settlement, the utilisation of this specific position on the farm Groenwater 453, which is situated directly adjacent to the settlement, will provide significant socio-economic benefits to the local

community with regards to job creation and development opportunities (see specialist report in Appendix E).

- The footprint of the proposed facility needs to be situated in close proximity to the R 385 provincial road as well as municipal water provision infrastructure/piping for efficient and cost effective project operational purposes. For this reason the proposed footprint area is situated directly adjacent to the road.
- The establishment of a CSP facility is highly dependent on and sensitive to the topography and slope of an area. A virtually flat area is required in order to optimise the operational processes and to increase the generating efficiency of the facility. The proposed project area is preferred due to it being the only area of adequate size on the entire farm property with sufficient and favourable topography with virtually no slope as opposed to rest of the farm property and other areas in the vicinity which are characterised by undulating hills and water drainage lines (see the locality map under heading 4 for illustration of the topographic contours).
- The proposed footprint area is located in an extremely high and favourable solar radiation area of the country resulting in favourable conditions/opportunities for solar power generation. The methodology and criteria utilised during a potential location evaluation is indicated in the site identification specialist report in Appendix E.
- The proposed project footprint area was adequately evaluated by numerous specialists (see heading 13 and Appendix E) who found the footprint area to be of low ecological significance/sensitivity as well as of having low agricultural potential. Due to the flat topography, no significant watercourses, drainage catchments or wetland areas were identified on the proposed project footprint by the ecologist. The land types and associated soils and soil depths present on the entire farm area are also not conducive for irrigation and therefore unfavourable for commercial agricultural practices as per the soil and land capability specialist.
- No other viable area on the farm could therefore be identified which would result in significantly lower environmental impacts and which could therefore be deemed a more environmentally favourable option as opposed to the chosen preferred project area footprint.

For all the above reasons, this positioning of the proposed solar project is deemed to be the best taken into account the various factors. The area as a whole is known for high solar radiation. This specific position of the project is in an environmentally low sensitive area and therefore poses a relatively low environmental impact. It was chosen due to the suitability and size as it is a flat area of sufficient size in close proximity to existing associated infrastructure. The proximity relative to required infrastructure also prevents the creation of unnecessary additional extra environmental

impacts due to potential construction of longer transmission lines and roads. Due to all the above discussed factors it is evident that no other viable area on the farm could therefore be identified and deemed to be a more environmentally favourable and practical/feasible option as opposed to the chosen project area footprint.

6.3 TECHNOLOGY ALTERNATIVES

The CSP (Parabolic Trough) system was chosen/recommended during the Scoping phase as the preferred alternative due to its significantly lower environmental impact as well as its more efficient surface area: energy generation ratio in comparison to other technology alternatives.

The Scoping Report was accepted by the competent authority and this EIA process has therefore continued to investigate the preferred technology alternative.

This CSP (Parabolic Trough) system uses lenses or mirrors and tracking systems to concentrate a large area of sunlight, or solar thermal energy, onto a liquid filled piping system. Electrical power is produced when the concentrated light is converted to heat which drives a heat engine (usually a steam turbine) connected to an electrical power generator.

Technical description of the CSP (Parabolic Trough) system

The Parabolic Trough System functions as follows:

- Large rectangular u-shaped (parabolic) mirrors are arranged and connected in long rows facing the sun and aligned on a north-south axis. Numerous parallel rows of connected mirrors are placed on mobile pivoting systems enabling them to continuously track the movement of the sun from east to west throughout the day to optimise the solar radiation they receive.
- The light/heat of the sun is reflected off the mirrors and due to the curved shape of the mirrors; the majority of the light/heat is concentrated to a specific focal line position in front of the mirrors.
- A receiver tube/piping system is placed in this concentrated focal solar line which runs the length of the connected rows of mirrors. The receiver tube is a stainless steel tube with a special sunlight absorbing surface and is mounted inside an anti-reflective outer glass tube with a vacuum separating the two tubes.
- The tube is filled with a molten salt fluid mixture of sodium nitrate (60%) and potassium nitrate (40%) known as the Heat Transfer Fluid (HTF) which is able to contain and transport the heat energy of the sun well. The molten salt must be kept at a temperature of about 290 °C to keep

it fluid as the salt freezes (becomes lumpy with solids) below 220 °C. This means that special care must be taken to ensure that the salt does not freeze in the field piping during the night.

- The very hot liquid from the receiver tube then heats water in a heat exchanger turning the water to steam.
- The steam is then sent to a conventional steam turbine where the steam spins the turbine which in turn spins a generator which generates electricity.
- Once the fluid has transferred its heat, it is recycled to be re-used in the process. The steam is also cooled until it condenses back to water and can be recycled for re-use in the process.
- Another huge advantage of the molten salt is that it can retain its heat for up to 4.5 hours when stored in specially designed storage tanks. This means that power is still available for up to 4.5 hours after the sun goes down and no solar radiation is available - enough to cover the period of peak electrical demand.
- Because the trough solar power approach uses conventional steam turbines, it is easy for the system to integrate seamlessly into the electrical grid. And having storage ability, it can compensate for moving cloud cover and other weather phenomenon causing less solar radiation.
- See figures below illustrating the basic functionality of the system.

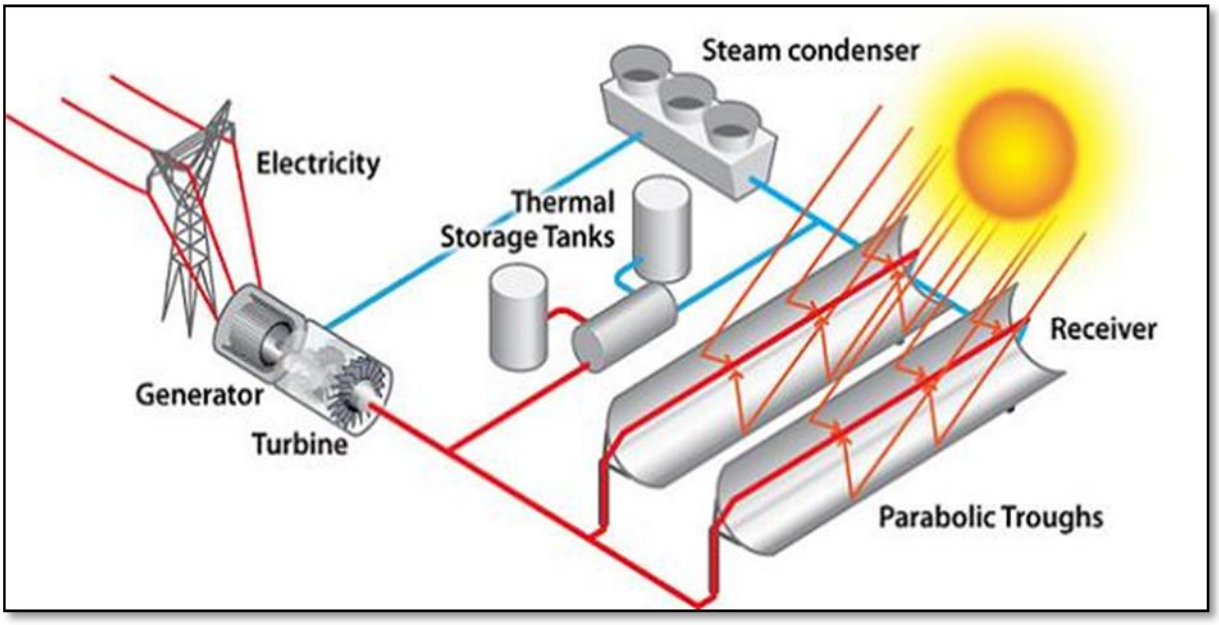

Figure 5: Illustration of the functionality of a Parabolic Trough System

Figure 6: An example of the layout of a Parabolic Trough System

Advantages

- The technology is more proven than others and has been successfully implemented at other locations in South Africa as well.
- The technology requires approximately half the size of land for the same generation output compared to the other technology alternative investigated during the Scoping phase (Central Tower/Receiver system). It is therefore a very cost effective system of low complexity to operate with a smaller environmental footprint and subsequent negative impacts.
- The technology is water use efficient when compared to other technologies.
- The technology has a significantly smaller and shorter distance visual impact compared to other technologies to the reduced height of the components and infrastructure.

6.4 "NO-GO" OPTION

Advantages

The negative environmental impacts associated with the proposed project as discussed later in this document will be avoided if the proposed project is not implemented.

Disadvantages

If the proposed project however does not go ahead, the local communities and informal settlement will forego the significant economic benefits which the project will have on the area such as immediate additional employment opportunities and revenue streams and most importantly, sustainable capacity building (skills, experience and resources development) for the future. The development of alternative renewable energy sources is crucial within the context of South Africa's current energy crisis as well as the commitment towards greenhouse gas emission reductions. Without the implementation of the proposed project there will also be no net gain of an additional 150 MW of renewable electricity (as per the REIPPP) supplied Eskom's, already under-stressed, national electricity grid.

It is therefore imperative that the implementation of the proposed project be authorised.

7. DESCRIPTION OF THE ENVIRONMENT

The following section provides an overview of the bio-physical as well as the socio-economic environments of the proposed project. The table below indicates the list of specialist studies that were conducted during the assessment process:

Table 12: List of Specialist Studies Conducted

Specialist Name	Organisation	Specialist Assessment Type
Andrew Pearson	Arcus Consulting	Avifaunal Impact Assessment
Prof. Johann du Preez	Enviro-Niche Consulting	Ecological Impact Assessments (Fauna & Flora) Wetland Impact Assessment & Delineation
Dr. Karen van Ryneveld	ArcheoMaps	Archaeological Impact Assessment
Dr. Lloyd Rossouw	Palaeo Field Services	Palaeontological Impact Assessment
Dr. Francois Retief	Global Green Environmental Consultants	Socio-economic Impact Assessment
Dr. Piet Le Roux	Digital Soils Africa	Soil and Land Capability Assessment
Dr. Dawie Janse van Rensburg	MetroGIS	Visual Impact Assessment

7.1 BIO-PHYSICAL DESCRIPTION

7.1.1 Climate

The region experiences summer and autumn rainfall with very dry, cold winter periods (frost is of regular occurrence during the winter). The Mean Annual Precipitation (MAP) of the area is between 200 mm – 500 mm (Mucina & Rutherford, 2006). The average monthly midday temperature for the month of January for the nearby town of Postmasburg is 32°C and the average night temperature is 17°C for January.

7.1.2 Geology and Soils

According to Mucina & Rutherford, 2006, the majority of the area is located on red aeolian sand with silcrete and calcrete and some andesitic and basaltic lava of the Griqualand West Supergroup.

Hutton soils which can be deeper than 1.2 m are mostly present on a dominant Ae and to a lesser extent Ah land types.

7.1.3 Topography

The proposed project area is mainly characterised by wide, flat open plains with the area moving into undulating hills in the north-western part of the proposed project area (Mucina & Rutherford, 2006). The topography of the area varies between 1100 to 1800 MASL according to Mucina & Rutherford, 2006.

See the locality map for topographic contour indications.

7.1.4 Ecological and Wetland Impact Assessment

An Ecological and Wetland Impact Assessment was conducted for the proposed project area in order to determine the ecological value/significance and subsequent conservational importance and sensitivity of the area. The potential impacts that the proposed project will have on the ecology of the area were identified and evaluated to determine possible mitigation measures which could be implemented in order to reduce the significance of the associated impacts. An overview of the ecological aspects surrounding the proposed project is provided in the section below:

7.1.4.1 Terrestrial

The majority of the proposed project area is situated inside the Olifantshoek Plains Thornveld vegetation type (SVk13) which is characterised by wide plains with open tree and shrub layers and a sparse grass layer while a small portion in the north-western part of the study area falls into the Kuruman Mountain Bushveld (SVk 10) which is characterised by rolling hills with gentle to moderate slopes with an open shrubveld and a well-developed grass layer (Mucina & Rutherford, 2006). These two vegetation types form part of the Eastern Kalahari Bushveld Bioregion which, in turn forms part of the greater Savanna Biome of South Africa (Mucina & Rutherford, 2006). Both vegetation types are categorised as least threatened by Mucina & Rutherford, 2006.

Ecological condition

The vegetation on site is mostly comprised of natural degraded savanna with some significant disturbance due to overgrazing, vehicle tracks & fire breaks. The largest concentration of alien species is found in trampled areas and camps where domestic animals are concentrated The most commonly found alien and invasive species on the proposed project site are Prosopis (*Prosopis glandulosa*) which is listed as a Category 3 invasive in the Northern Cape Province and Pepper Trees (*Schinus molle*) which is not listed but is not indigenous.

The significant weeds noted on the proposed project site are *Verbesina encelioides, Tridax procumbens*, *Argemone mexicana* (Category 1 b invasive species)*, Datura stramonium* (Category 1 b invasive species), *Tagetes minuta, Bidens bipinnata and Conyza bonariensis*.

The ecological condition of the area is therefore mostly degraded.

Plant community description

The savanna community present on the proposed project site is comprised of patches of Driedoring (*Rhigozum trichotomum*). Grasses such as *Enneapogon desvauxii, Cynodon dactylon, Aristida canescens, Aristida congesta* and *Eragrostis lehmanniana* dominate the herbaceous layer. All of these grasses are pioneer grasses which confirm the statement regarding the degraded state of the vegetation. Other herbaceous species present in this layer include *Felicia muricata, Oropetium capense, Pentzia spaerocephala, Gnidia polycephala, Chrysocoma ciliata* and *Eriocephalus merxmuelleri*. The savanna area is free of alien invasive species with the exception of a few individuals of Prosopis (*Prosopis glandulosa*) (listed as a Category 3 invasive in the Northern Cape Province).

On the rocky outcrops woody tree and shrub species such as *Acacia tortilis, A. mellifera, A. hebeclada, Tarchonanthus camphoratus and Olea europaea* subsp. *africana* are present. The grass species *Heteropogon contortus, Aristida congesta, A. canescens and A. adsencionis* and *Themeda triandra* occur.

Current land use

There are no areas of significant current or previous cultivation at or near the proposed project site. The only cultivated areas are small areas close to the dwellings used for subsistence agriculture. The proposed project area is currently mainly being used for small scale subsistence stock farming activities.

Red Data Listed and Protected species

The assessment of the proposed project site revealed no Red Data listed individuals of plant or animal species to be present on the site.

The only nationally protected tree species in terms of the National Forests Act (Act 84 of 1998) potentially occurring on the proposed project area are the Shepherd's Tree (*Boscia albitrunca*) and the Camel Thorn tree (*Acacia erioloba*). No individuals of these two species were however encountered on the proposed project site. If any of these protected individuals are however encountered during the construction phase, removal permits will firstly have to be applied for and

obtained from the Department of Agriculture, Forestry and Fisheries (DAFF) and the Northern Cape Department of Environment and Nature Conservation (DENC) prior to removal.

Six provincially protected species occur in the plant communities present on the proposed project site. They are all categorised in Schedule 2 of the Northern Cape Nature Conservation Act (Act 9 of 2009). Removal/relocation permits will firstly have to be applied for and obtained from the Northern Cape Department of Environment and Nature Conservation (DENC) prior to removal

7.1.4.2 Aquatic

Streams & Wetlands

The topography of the area is relatively flat and contour lines are wide apart. No well-developed or seasonal drainage lines therefore occur on the proposed project site. No wetlands or wetland vegetation is also present on the proposed project site.

7.1.4.3 Conclusion and Recommendations

Although the proposed project will completely transform the ecology of the site, the area is situated on a flat, degraded plain devoid of water courses and with little ecological value/significance. The site is not situated in any sensitive ecosystem or plant community and the general area is only classified as other natural areas in accordance with the Provincial Spatial Biodiversity Plan (see sensitivity map below). The species richness of the vegetation of the study area is relatively low with a total of only 33 species. No Red Data listed species were found to occur on the site although a small number of provincially protected species occur.

The following is recommended:

- An Environmental Control Officer (ECO) must be appointed to oversee and ensure that national and provincial permits are applied for and obtained from the relevant departments prior to any restricted activities potentially being carried out on any protected species.
- Measures to control erosion must always be applied.
- No dumping of building waste or spoil material from the development should occur on other areas other than a licenced landfill site.
- Weed control measures must be applied to eradicate the noxious weeds on disturbed areas

See specialist report in Appendix E for a list of the provincially protected species.

The location of the proposed project area in relation to the various vegetation types as well as potential ecologically sensitive features in the area is illustrated in the vegetation and sensitivity maps below:

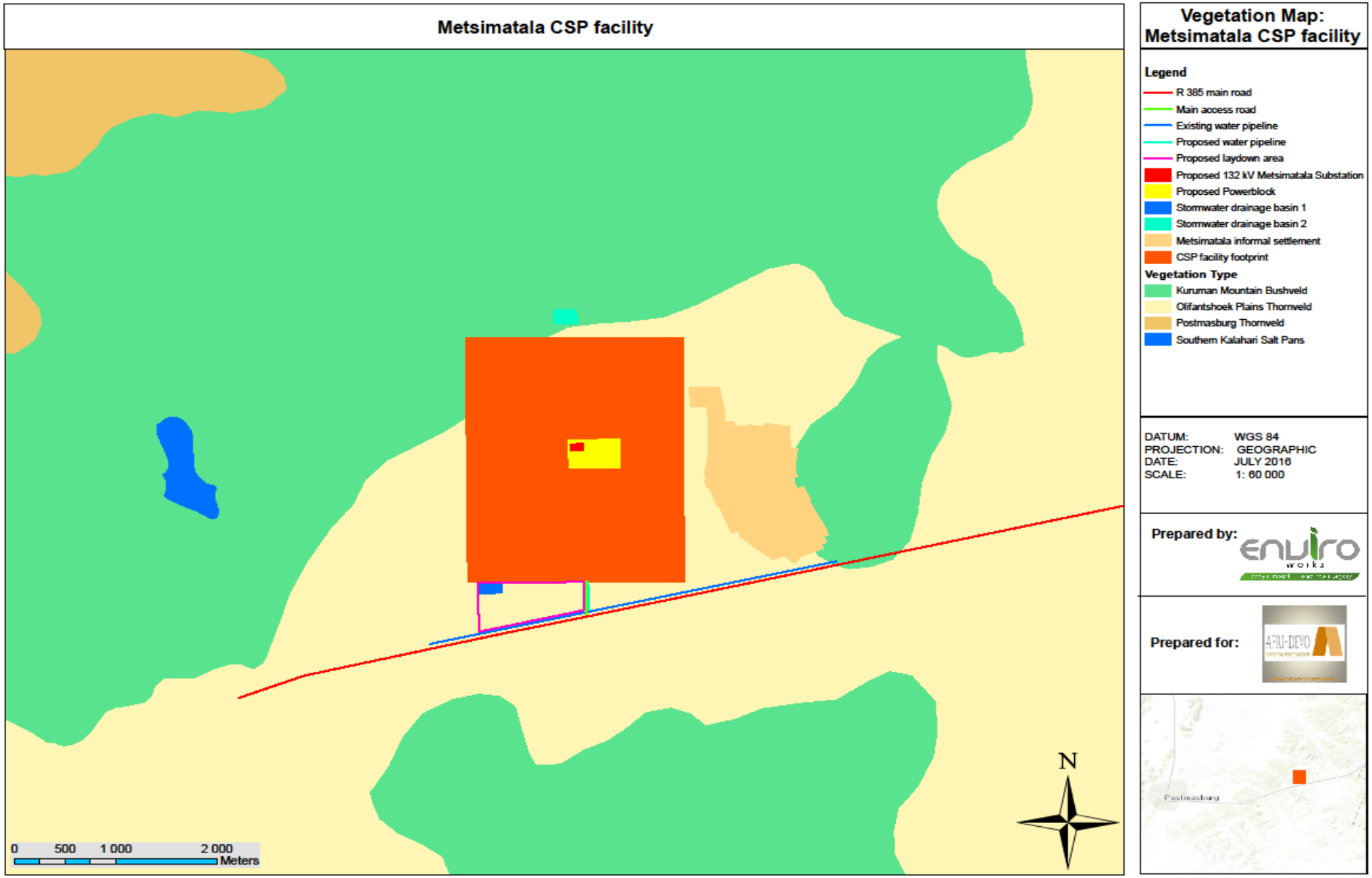

Figure 7: Vegetation map of the proposed project layout

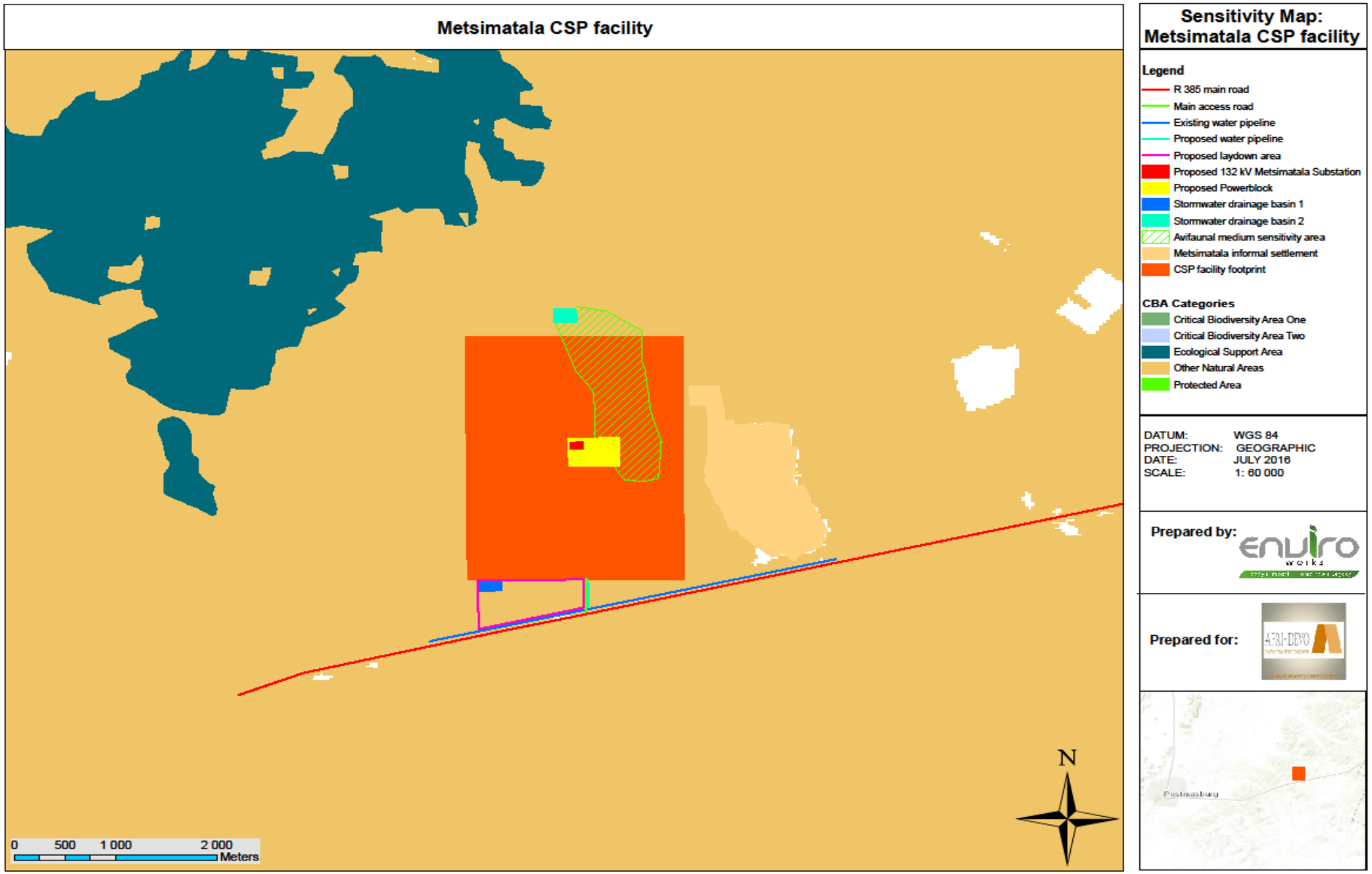

Figure 8: Ecological sensitivity map of the proposed project layout

See Appendix B for A3 sizes version of the sensitivity maps.

7.1.5 Avifaunal Impact Assessment

Southern African Bird Atlas Project 1

The SABAP1 data was collected over an 11 year period between 1986 and 1997 and remains the best long term data set on bird distribution and abundance available in South Africa at present. This data was collected in quarter degree squares, with the proposed CSP facility falling into square 2823AD. The table below indicates the reporting rate for all raptors and priority species recorded by the SABAP 1 data within this square associated with the proposed study area, as well as giving a total number of species recorded in the square. The SABAP1 project recorded a total of 168 species.

Table 13: Raptors and Priority Species recorded by SABAP1 in the Quarter Degree Square (QDS) covering the proposed project site

Species	Regional Red Data Status	Priority species score	Report rate (%) ** QDS 2823AD
Total species			*168*
Number of cards submitted			*77*
Barn Owl			4
Black-chested Snake-Eagle*		230	1
Black Harrier*	Endangered	345	1
Black Korhaan (Northern)*			34
Black Stork*	Vulnerable	330	5
Black-shouldered Kite*		174	69
Blue Crane*	Near-threatened	320	6
Booted Eagle*		230	4
Burchell's counsellor	Vulnerable	210	1
Common Buzzard*			1
Double banded Courser	Near-threatened	204	8
Gabar Goshawk			6
Greater Flamingo*	Near-threatened	290	5
Greater Kestrel*		174	12
Kori Bustard*	Near-threatened	260	1

Species	Regional Red Data Status	Priority species score	Report rate (%) ** QDS 2823AD
Lesser Kestrel*		214	13
Maccoa duck	Near-threatened		34
Martial Eagle*	Endangered	350	6
Northern Black korhaan		180	34
Pale Chanting Goshawk*		200	39
Rock Kestrel			79
Secretarybird*	Vulnerable	320	9
Spotted Eagle Owl*		170	1
Steppe Buzzard		210	1
Tawny Eagle*	Endangered	290	1
Verreaux's Eagle*	Vulnerable	360	55
White-backed Vulture*	Critically Endangered	300	17

* Priority species (Retief et al. 2011, updated 2014). **Report rates are essentially percentages of the number of times a species was recorded in the square, divided by the number of times that square was counted. It is important to note that these species were recorded in the entire quarter degree square in each case and may not actually have been recorded on the proposed project site.

The SABAP1 data considered showed that 13 Red Data Species have been recorded of which only one species, Maccoa Duck, is not considered a priority species. Of the Red Data Species, one is regarded as Critically Endangered, namely White-backed Vulture and three as Endangered, namely Black Harrier, Martial Eagle and Tawny Eagle. These three species all had relatively low report rates. Twenty one priority species were recorded, including nine species that are not Red data species.

Southern African Bird Atlas Project 2

This project is part of an ongoing study by the Animal Demography Unit (ADU), a research unit based at the University of Cape Town (UCT). SABAP2 records data in pentads, which are roughly 8 km x 8 km squares, and smaller than the quarter degree squares used in SABAP 1. Only one count (card^2) is available for the pentad that the proposed CSP facility lies in (2815_2315). Data were examined for this pentad combined with the neighbouring pentad to the south (2820_2315), as well as the combined data for all 9 pentads within the quarter degree square that covers the project site (2823AD). Due to the inherent mobility of birds, species recorded in these pentads may be present on the project site.

While SABAP2 coverage of the proposed CSP site is poor with only a single card[1] submitted, some of the pentads within the quarter degree square investigated have very good coverage, with one pentad having 156 cards submitted.

A total of 202 species of birds were recorded in the pentads inside the quarter degree square covering the project site, and 51 species were recorded in the single count of the pentad that covers the project site (2815_2315).

Table 14: Raptors and Priority Species recorded in the SABAP 2 Pentad Squares Covering the proposed project site and the immediate south of the project site

Species	2815_2315 (1 card)	2820_2315 (2 cards)
Total Species	*51*	*52*
Northern Black Korhaan*	x	
Pale Chanting Goshawk*		x
Rock Kestrel		x

Table 15: Raptors and Priority Species recorded in the 9 SABAP2 Pentad Squares in the Quarter Degree Square covering the proposed project site

Species	Regional Red Data Status (Taylor *et al.* 2015)	Report rate (%) ** QDS 2823AD
Total species		*205*
Number of cards submitted		*196*
African Fish Eagle*		2.04
Barn Owl		0.51
Black-chested Snake Eagle		3.06
Black-shouldered Kite*		16.33
Blue Crane*	*Near-threatened*	2.04
Common Buzzard *		2.04
Gabar Goshawk		25.00
Greater Flamingo *	*Near-threatened*	1.53
Greater Kestrel*		9.18

Species	Regional Red Data Status (Taylor *et al.* 2015)	Report rate (%) ** QDS 2823AD
Lanner Falcon*	*Vulnerable*	2.04
Lesser Flamingo*	*Near-threatened*	6.63
Lesser Kestrel*		3.57
Ludwig's Bustard *	*Endangered*	2.04
Martial Eagle*	*Endangered*	0.51
Northern Black Korhaan*		18.88
Pale Chanting Goshawk*		14.29
Pearl-spotted Owlet		0.51
Rock Kestrel		23.00
Spotted Eagle Owl*		2.55
Secretarybird*	*Vulnerable*	1.53
Tawny Eagle*	*Endangered*	0.51
Verreaux's Eagle*	*Vulnerable*	3.57
White Stork		1.53
White-backed Vulture	*Critically Endangered*	1.53

Coordinated Waterbird count (CWAC) Data

There are four registered CWAC sites within 50 km of the proposed project site. Danielskuil, Great Pan and Rooipan are approximately 30 km from the project site, and Soutpan is approximately 50 km from the project site.

At Danielskuil 21 species of water associated birds have been recorded to date, none of which were priority species or raptors. No data was available for Great Pan and Rooipan. At Soutpan 25 species of water-associated birds were recorded, including one priority species (Greater Flamingo).

Important Bird Area project (IBA)

The proposed development is not situated within any IBA's and there are no IBA's within 100 km of the proposed project site.

Proposed Humansrus Solar Thermal Energy Power Plant Specialist Avifaunal Impact Assessment

This study, conducted by the Endangered Wildlife Trust (EWT), was authored by Andrew Pearson in 2011. The study covered an area less than 5 km to the east of the project site. The study was a

desk top assessment and included a single site visit. The study highlighted the species as being potentially important (although not necessarily recorded on the site during the study), including: Martial Eagle, Lesser Kestrel, Blue Crane, White-backed Vulture, Secretarybird, Greater Flamingo, Verreaux's Eagle, Black-shouldered Kite, Pale Chanting Goshawk, Rock Kestrel, Northern Black Korhaan, Double-banded Courser, Namaqua Sandgrouse, White-rumped Swift, Barn Swallow, Namaqua Dove, Sociable Weaver, Kalahari Scrub-robin, Red-billed Quelea and Yellow Canary. The study did not report on any additional species or data not already recorded in the other data sources considered in this scoping report.

Metsimatala CSP Facility Pre-construction Avifaunal Monitoring

Three five day avifaunal seasonal surveys were conducted by the specialist for the compilation of the specilsist report.

First survey – November 2015

A total of 69 bird species were recorded during the first avifaunal survey from 16 – 20 November 2015. This included six raptors (Black-chested Snake Eagle, Booted Eagle, Gabar Goshawk, Lanner Falcon, Pale Chanting Goshawk and Greater Kestrel). No endemic or range-restricted species were recorded. One species recorded was a near-endemic (Fiscal Flycatcher). Northern Black Korhaan was the only large terrestrial species recorded. One Red Data species (Taylor *et al.* 2015) regionally listed as *Vulnerable* was recorded (Lanner Falcon).

During VP surveys a total of 12 species were recorded in 25 flights. This included the raptors Black-chested Snake Eagle, Booted Eagle, Gabar Goshawk, Greater Kestrel, and Lanner Falcon. Northern Black Korhaan, Crowned Lapwing, Western Cattle Egret, Pied Crow and Namaqua Sandgrouse were also recorded. The remainder were passerine species (Cape Turtle Dove, Namaqua Dove).

Second survey – February 2016

A total of 90 bird species were recorded during the second survey conducted from 25 - 29 February 2016. Raptors recorded were Black-chested Snake Eagle, Booted Eagle, Steppe Buzzard, Greater Kestrel, Jackal Buzzard, Lanner Falcon, Martial Eagle, Pale Chanting Goshawk and White-backed Vulture. Three Red Data species (Taylor *et al.* 2015) were recorded. These were White-backed Vulture (*Critically Endangered*), Martial Eagle (*Endangered*) and Lanner Falcon (*Vulnerable*). Six recorded species were near-endemics (Jackal Buzzard, Karoo Eremomela, Large-billed Lark, Karoo Prinia, Namaqua Warbler and Cape Weaver).

During vantage point surveys a total of 13 species were observed in 35 flights. This included the raptors Black-chested Snake Eagle, Booted Eagle, Common Buzzard, Greater Kestrel, Jackal Buzzard, Martial Eagle and Pale Chanting Goshawk. Hadeda Ibis, Namaqua Sandgrouse, Pied Crow, Spur-winged Goose and Namaqua Dove were also recorded.

Avifaunal sensitivity zones

Avifaunal sensitivity zones were identified at both a desk-based level as well as from observation during the seasonal site visits. No 'fatal flaws' or High Sensitivity 'No-go' areas in terms of avifauna were identified either on or around the CSP facility area. Only medium sensitivity zones were identified on the CSP footprint.

Conclusion

201 bird species were recorded in the SABAP 2 data examined, of which 108 were recorded on and around the project site by the three seasonal surveys. The specialist recorded eight species while monitoring that were not recorded in the SABAP data, and therefore a total of 116 positively identified species were recorded during the three seasonal surveys conducted. This includes 10 priority species, three Red Data species and five endemic or near endemic species. Sixty-nine species were recorded during the spring survey, 88 during the summer survey and 61 during autumn.

The full species list of all birds recorded by the monitoring surveys and SABAP 2, indicating their conservation status, endemism, priority species score and where a species had been recorded is provided in the specialist report in Appendix E. Consideration of SABAP 1 and SABAP 2 data found that up to 17 Red Data species are potentially present, three of which were recorded by the monitoring surveys. Six Red Data species may possibly occur and/or are likely to occur, at least with some regularity, on the CSP site. They are Burchell's Courser, Secretarybird, Lanner falcon, Marshall Eagle, Ludwig's bustard and White backed vulture.

7.1.6 Soil and Land Capability Assessment

A Soil and Land Capability Assessment was conducted for the proposed project area in order to determine the agricultural value of the area as well as identify and evaluate the potential impacts that the proposed project will have on the agricultural potential of the area. This information was then used to determine possible mitigation measures which could be implemented in order to reduce the significance of the associated impacts. An overview of the agricultural aspects surrounding the proposed project is provided below:

7.1.6.1 Land Types

Land Types are units which are generally comprised of areas with homogeneous climate, geology and topography. The proposed project area falls within two identified Land Types namely Ae 214 and IB 237. A brief summary of the geology, topography and soils of the relevant Land Type will follow.

Ae 214

The underlying geology is amygdaloidal andesitic lava with interbedded tuff, agglomerate, chert and red jasper from the Ongeluk Formation, Cox Group. The topography is mostly relatively flat, with slopes below 5 degrees, but there are a few hills where the slopes reach up to 10 degrees. The soil forms present are Hutton, Oakleaf and Valsrivier, with Hutton being the dominant soil form. Some areas are also covered with bare rock. Thirty-eight percent of the area could be overlain with potentially irrigable soils, being deeper than 1.2 m.

Ib 237

The underlying geology is Yellow-brown banded or massive jaspilite with crocidolite; banded ironstone with subordinate amphibolite, crocidolite and ferruginized brecciated banded ironstone (blinkklip breccia) at base at places; brown jaspilite and chert at top. It forms part of the Asbestos Hills Formation. It has a hilly topography, with slopes reaching 20 degrees. Although Hutton soils are the most prominent soil form most of the area is covered with bare rock. There are no irrigable soils present on this Land Type.

7.1.6.2 Current land-use

The current land-use is restricted to low intensity grazing. The low rainfall, high potential evaporation, high maximum and low minimum temperatures coupled with shallow soils covering most of the site, limit any additional/alternative land-use activities such as agricultural crop growing. If a constant water source could be found, there is a possibility for some irrigation but this is unlikely. A number of non-perennial streams are present in the area, but the dominant source of water for agricultural purposes is groundwater.

7.1.6.3 Soil and Agricultural Potential

From the bio-physical and soil characteristic calculations and subsequent soil mapping it was concluded that the proposed project area was mostly covered by shallow Mispah soils with occasional rock outcrops and lime deposits. Within perennial streams, Tukulu soils on soft lime could be found. Overall the area has shallow soil with very low agricultural potential, and very low potential for irrigation. Furthermore, there is a risk of soil erosion as is evident from the signs of erosion already present in the area. The entire proposed project area is therefore only suited for

rangeland agriculture, with low potential grazing capacity. The vegetation was also degraded at all observation points and clear signs of sheet erosion were noted.

Figure 9: Image indicating the degraded status of vegetation

7.1.6.4 Potential Environmental Impacts

The following activities related to the proposed project are likely to impact on the soil and agricultural resources of the area:

- Construction of CSP Facility and associated infrastructure (buildings and sub-stations)
    - Although construction of required infrastructure will completely transform and displace the current natural landscape and vegetation, the actual impact on the agricultural potential is low due to the current agricultural potential already being poor.
    - Mitigation measures should however include strictly limiting development and construction to the proposed project footprint as well as placing adequate erosion control measures in place for the developed areas to limit further soil loss from the area.
- Construction of additional access roads
    - The main access road to the proposed project area is already in place and will not be widened or altered. Therefore, with the exception of additional roads being created inside the development footprint for accessibility to all required parts of the facility during the construction and operational phase, the impact on the current agricultural potential of the area will be low. Once again also due to the already poor current potential.

- Mitigation measures should include using existing roads as far as possible and limiting the number of additional roads to be constructed. Adequate erosion control measures should also be put in place to limit further soil loss from the area. A dust management plan must also be implemented to manage and reduce undesired dust emissions.

- Dust generation and emissions during construction and operational phases
  - Increased vehicle and machine activity will result in a significant increase in dust emissions into the surrounding environment. This could have a negative impact on adjacent sheep farmers as excessive dust fallout could result in the value of wool decreasing or potential health implications.
  - Dust Management as well as Traffic Management measures must be implemented as mitigation in order to manage and reduce unnecessary traffic movement in the area and subsequently decrease undesired dust emissions.

7.1.6.5 Conclusion

The arid climate of the study area, coupled with shallow soils, limits the agricultural potential to low intensity grazing. The impact of the proposed project on the agricultural resources is therefore considered to be low due to the degraded condition and already low current status of the area. It is however important that the direct footprint of the facility and associated infrastructure be kept to a minimum and that adequate dust and erosion control measures and mitigation strategies be implemented in order to ensure that the proposed project and current agricultural practices in the area continue in a sustainable manner.

7.1.7 Heritage Impact Assessment

A Heritage Impact Assessment was conducted for the proposed project area in order to determine the heritage value of the area as well as identify and evaluate the potential impacts that the proposed project will have on any areas of historical significance. This information was then used to determine possible mitigation measures which could be implemented in order to reduce the significance of the associated impacts. An overview of the heritage aspects surrounding the proposed project is provided in the two sections below:

7.1.7.1 Archaeology

Only a single significant archaeological and cultural heritage site, as defined and protected by the NHRA 1999 was identified. Site MVIA3, a Later Iron Age (LIA)/contemporary cemetery is situated adjacent to the proposed project site at the northern perimeter of the Metsimatala informal settlement. The site however falls outside the 500 ha footprint of the proposed project and will therefore not be impacted by development.

The general terrain of the 500 ha footprint is characterised by a number of low rising dolerite outcrops, with the geological substrate, also the inferred anthropogenic basal member, a combined dolerite and banded iron stone 'pebble' member surfacing at intervals. A low density of Stone Age artefacts are present on the surface of the site, mainly found within the surfacing 'pebble' member. Artefact densities are too low to ascribe an artefact ratio (artefacts: m^2) to the occurrence. Artefacts are primarily ascribed to the later Middle Stone Age (MSA) and the macrolithic Later Stone Age (LSA) based on typology and artefact size. Artefacts are produced from mixed raw material sources, including medium to fine grained dolerite, banded iron stone, jasperlite, baked shale, quartzitic material and including a few siliceous pieces. A borrow pit (BP – S28°18'01.0"; E23°17'43.1") towards the south of the study site indicates that low densities of artefacts may well be encountered to a level of approximately 30 - 40cm in depth, following the sub-surface dip of the geological substrate. It is recommended that development proceed across the proposed 500 ha of the Metsimatala CSP facility without the developer having to apply for a SAHRA Site Destruction Permit for the low density Stone Age occurrence.

Site MVIA3: Later Iron Age/Contemporary Cemetery

GPS coordinates: S28°16'45.3"; E23°18'26.0"

This site was first identified and described by Van Ryneveld (2012) and comprises a Later Iron Age/contemporary cemetery situated at the northern extremity of Metsimatala informal settlement and adjacent to the proposed 500 ha footprint of the Metsimatala CSP facility study site. Graves at the site are stylistically divided, with primarily traditional style stone cairn graves characterising the northern part of the cemetery and modern style graves mixed with traditional stone cairn graves characterising the southern part thereof. The older, more traditional part of the cemetery is associated with burial relating to Old Metsimatala Village (Site MVIA2). After reoccupation of Groenwater by the community in the 1990s it was decided to continue use of the cemetery rather than to establish a new cemetery. The cemetery contains 150+ graves and is an operational cemetery, serving the Metsimatala community. The cemetery is fenced on 3 sides; east, south and west, but without a fence to its northern side.

Site MVIA3 is ascribed a SAHRA High-Medium significance rating and a Generally Protected IV-A field rating. The site will not be impacted by development, but based on immediate proximity to the Metsimatala proposed project site it is recommended that the developer ensures formal conservation of the site prior to any impact. This will entail formal fencing of the site (including upgrading of the existing fence where necessary) on all sides with an access gate allowing vehicular access thereto.

Conclusion

The Metsimatala CSP facility can be described as a 'safe' development proposal with reference to archaeological and cultural heritage resources, as defined and protected by the NHRA 1999. Development will impact on a low density Stone Age occurrence, with artefact densities too low to ascribe an artefact ratio (artefacts: m^2); accordingly a heritage site significance rating cannot be assigned thereto. The MVIA3 site will not be impacted upon by the proposed development, but additional conservation measures, ensuring the formal conservation of the site are recommended. All other previously recorded heritage sites and features situated on Groenwater 453 will be conserved.

The proposed Metsimatala CSP facility will have little to no impact on the recorded cultural landscape:

- The most significant Stone Age site recorded to date, Site PVSA 4 (S28°15'48.2"; E23°18'48.2"), a MSA and LSA site (fairly extensive artefact lense or member) characterised by a high density of lithic artefacts with mitigatory or further excavation and research potential is situated approximately 1.3km north, north-east of the northern extremity of the Metsimatala study site and will not be impacted.
- The cultural landscape of Old Metsimalata Village, Site MVIA2 (S28°16'37.6"; E23°18'56.2"), and PVIA1-PVIA18 which are largely remains of farming small holdings on the outskirts of the former village will not be impacted.

In accordance with the above described development impact (or rather lack thereof) on the cultural landscape of Groenwater 453, it can reasonably be concluded that little to no negative cumulative impact will result from the proposed Metsimatala CSP facility development on recorded archaeological and cultural heritage resources, as defined and protected by the NHRA 1999. The proposed development will in fact be contributory to living heritage, ensuring the sustainability of the Thlaping people on their tribal by virtue of their recorded history on the property, but with the prospect of a green, economically sustainable future.

7.1.7.2 Palaeontology

The bedrock geology underlying the proposed CSP Facility is made up of carbonate, iron-rich and volcanic rocks of the Ghaap and Postmasburg Groups of the Transvaal Supergroup (Beukes 1980, 1983; Harding 2004; Erikson et al. 2006). The carbonate rocks of the ~2.5 Ga old Cambell Rand Subgroup (Vgl) underlie the western part of the development footprint, while outcrops of the ~2.4 Ga old, iron-rich Asbestos Hills Subgroup (Kuruman, Vak and Griquatown Formations, Vad), intrude along the central part of the footprint. The CSP facility footprint appears to be underlain by sedimentary bedrock (glacial diamictites, Vm) lavas, dolomites and ironstones of the basal

Postmasburg Group (Makganyene Vm and Ongeluk Vo Formations). Superficial deposits within the proposed impact area include reddish-brown wind-blown sands (Qs) and alluvium.

Potentially fossiliferous and paleontologically significant rocks in the Postmasburg area are represented by carbonate meta-sediments of the Cambellrand Subgroup and the iron rich Kuruman and Griquatown formations of the Asbestos Hills Subgroup. The basal Makganyene Formation (Postmasburg Group) represents an important record of climatic change during the early Proterozoic, while the overlying Ongeluk Formation within the overlying Postmasburg Group is not considered to be paleontologically sensitive.

To conclude, the CSP facility footprint is largely underlain by Postmasburg Group strata (subordinate siliclastic sediments, lava and tillites, Vm, Vo) that are unlikely to be directly impacted by the proposed development since they are mantled by geologically recent superficial deposits (wind-blown sand) considered to be of low palaeontological sensitivity. Direct impact on potential fossil heritage within the CSP facility footprint is considered to be low. There are no major palaeontological grounds to halt this development and it is exempted from further palaeontological investigation but it is advised that sites marked for construction of associated infrastructure, which will require excavation into fresh bedrock sediments of the Campbellrand and Asbestos Hills Subgroup, be mapped and recorded prior to the construction phase of the development. If any significant heritage artefacts are uncovered during the excavation processes, work must be stopped immediately and SAHRA and a heritage specialist must be notified. The CSP facility footprint is assigned a site rating of Generally Protected C (GP.C).

Feedback from the South African Heritage Resources Agency (SAHRA) is available in Appendix E along with the specialist reports.

7.1.8 Visual Impact Assessment

A Visual Impact Assessment was conducted for the proposed project area in order to identify and evaluate the potential impacts that the proposed project will have on the sense of place of the area. This information was then used to determine possible mitigation measures which could be implemented in order to reduce the significance of the associated impacts. An overview of the visual aspects surrounding the proposed project is provided in the section below:

Visual exposure/visibility

The visibility analyses were undertaken at three different heights above ground level, in order to simulate the preferred technology and to indicate the prominence of the structures within the landscape.

- 5 m agl.
- 100 m agl.

The initial viewshed analyses were undertaken from a number of vantage points within the proposed development area at the offsets indicated above.

0 – 1 km (short distance)

Features from where the facility will be visible within a 1 km radius of the proposed site will mainly include the Groenwater farm itself, a section of the R 385 main road, the Groenwater farm residence and the Metsimatala informal settlement. It is expected that the proposed project infrastructure would be highly visible and prominent within this zone.

1 – 3 km (short to medium distance)

The area of potential visual exposure becomes interrupted within this zone due to the hills surrounding the CSP site. The core area of visual exposure for the parabolic trough technology is largely contained within a 3 km radius of the site but individual 50 m components will still be visible. This area is generally devoid of sensitive visual receptors, except for sections of the R 385 main road and the secondary road. The Groenwater settlement, located beyond a hill to the east of the site, is not expected to be exposed to the proposed CSP facility.

3 – 6 km (medium to long distance)

The intensity of visual exposure is expected to diminish beyond a 3 km radius from the proposed development site. It is mainly the individual 50 m components of the trough system and solar tower structures that may be visible from farmsteads and roads within this zone.

Greater than 6 km (long distance)

Visibility beyond 6km from the proposed development site is expected to be negligible and highly unlikely due to the distance between the object (development) and the observer.

Conclusion

The proposed Metsimatala CSP will be introducing a new type of land use into a rural environment where the sense of place can be described as quiet with tranquil views of open landscapes and

distant ridges. However, the fact that some components of the proposed facility may be visible does not automatically imply a high visual impact.

It is envisaged that the structures, where visible from shorter distances (e.g. less than 3 km), may constitute a high visual prominence, potentially resulting in a high visual impact.

The general absence of sensitive visual receptors mitigates the potential visual impact to a large degree. It is also further expected that the short distance observers, residents of Metsimatala settlement and the Groenwater farmstead, are generally in favour of the development. This will further mitigate, or even negate the potential visual impact.

Observers travelling along the R 385 main road may experience short term (i.e. transitionary) visual exposure where this road traverses within close proximity to the proposed CSP facility, potentially resulting in a high visual impact.

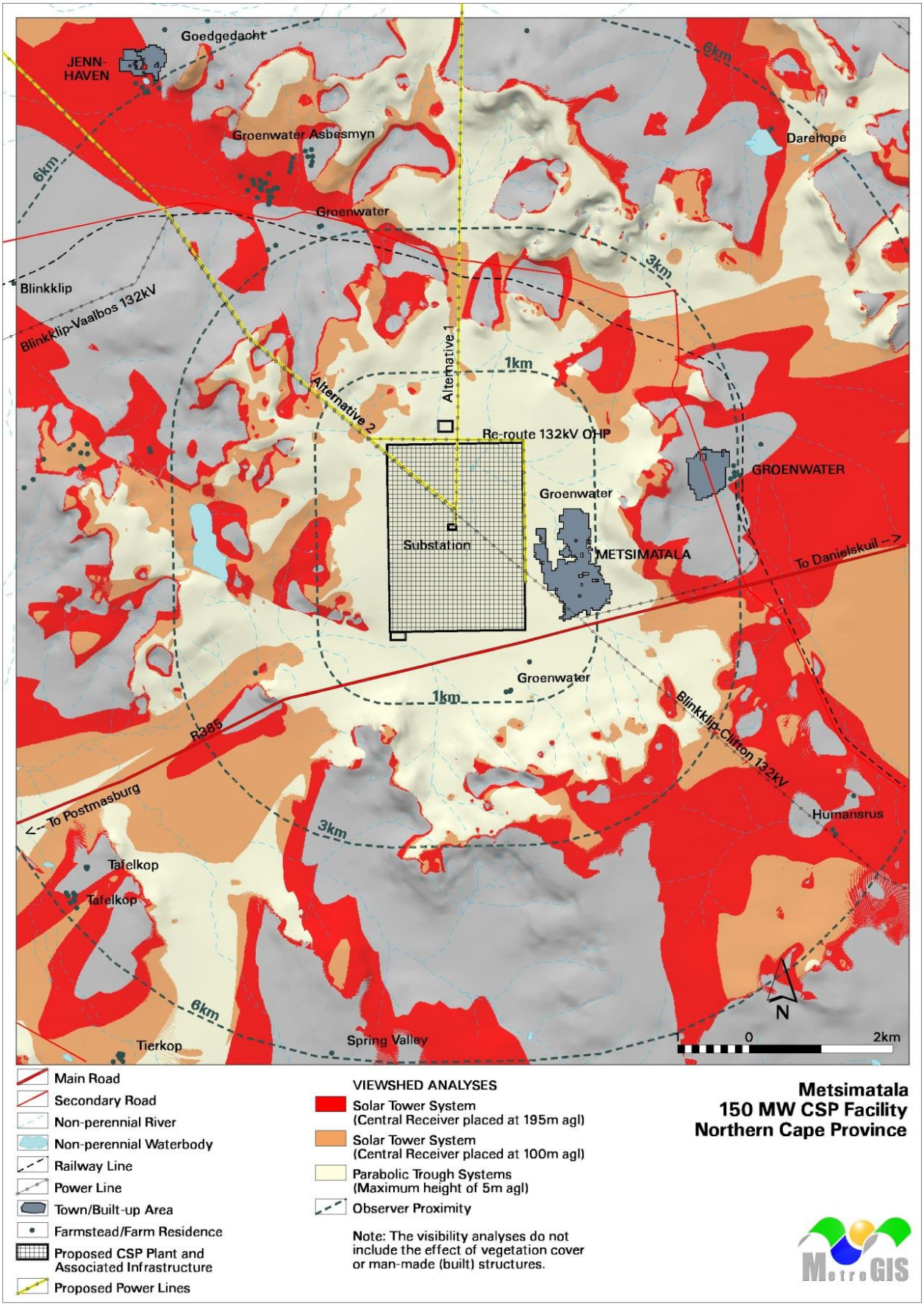

Figure 10: Map indicating the potential (preliminary) visual exposure of the proposed facility.

7.2 SOCIO-ECONOMIC DESCRIPTION

Summary of Social Impacts Associated with the Various Project Phases

The impacts described in this section were assessed and are described in relation to the following phases of the development:

- Design and Feasibility Phase
- Construction Phase
- Operational Phase
- Decommissioning Phase

Design and Feasibility Phase

The design and feasibility phase is the period before construction during which the initial consultation and participation with affected communities takes place. The following are the main potential social impacts to consider during this period:

- Effect of unrealised expectations: The Metsimatala community is extremely marginalised with high levels of poverty and unemployment. Understandably such communities are usually particularly prone to raised expectations. Although the risks to the development such as the EIA authorisation process and more importantly the preferred bidder tender process have been explained, rising expectations are unavoidable at this stage in the process. However, a raised level of expectation is not an impact by itself. The impact only occurs once the expectations are either met or remain unfulfilled. It is recommended that continual communication between the local community leadership and the developer be sustained throughout the EIA and tendering processes to ensure that the risks are fully explained and the affected communities are kept up to date with progress. In this regard it is noted that the developer has been engaging with the Metsimatala local community in a seemingly responsible manner since 2011, specifically to manage expectations.
- Capacity building, awareness and information sharing: The EIA process has to some extent already provided an opportunity for capacity building, awareness and information sharing around the project and renewable energy in general. The minutes of meetings and the content of the presentation sessions with the community suggest an honest and clear channel of communication between the applicant/developer and the Groenwater CPA.

Construction Phase

The following key social impacts are identified:

- Job creation, empowerment and skills development: A total of approximately 1 200 construction related employment opportunities are envisaged for the construction phase. A local employment policy will be applied as far as possible in the appointment of low-skilled and

semi-skilled construction workers. Preference will be given to skilled workers within the Northern Cape Province. In view of the very high unemployment rates in the local municipality area (64%) these employment figures will make a significant positive contribution.

- Influx of job seekers and presence of construction workers: It is expected that the influx of construction workers will have a relatively minor impact on the Metsimatala community. This is because most of the low-skilled and semi-skilled workers will be employed from the existing community. Moreover, the lack of basic services and relative distances to local towns will also to some extent deter the influx of outsiders. However, this aspect should be monitored throughout the construction phase.
- Risk of theft and damage to infrastructure. Because of the location of the development near a low income community, theft and damage to infrastructure is a concern. In this regard the developer indicated that the development will be fenced off and a designated security company will be appointed to ensure the safety of the facilities.
- Nuisance related to construction activities: It is evident that the construction phase will last many months and therefore a sound construction management plan will be required to mitigate the nuisance as well as health and safety related impacts.

Operational Phase

The operational phase of the project will last approximately 20-25 years - with the option to extend the lifetime by upgrading the facility infrastructure. The positive impacts during the operational phase have been identified as highly significant while the potential negative impacts were assessed to be medium to low significance. The key impacts to consider are the following:

- Job creation: The unemployment rate for the municipal area in general stands at 64%, which is probably even lower in the Metsimatala community specifically. It is estimated that the proposed development will provide a total of 120 permanent jobs. Taking an average of five dependents per employed individual the potential total effect is estimated at 500 individuals to benefit indirectly from employment generated by the development which is significant within the local context.
- Income generation from the development: In additioan ot job creation, the development will provide two income streams. The first is a monthly lease amount for the land portions utilised for the solar energy facilities and the second will be from dividends declared by the project company. The Metsimatala community will obtain a share in the development company.
- Conflict over income: These types of developments, which include a strong community development focus, pose a particular challenge in terms of the management and application of the income generated by the development. To address this challenge the developer

envisages setting up the Groenwater CPA Trust to administer the income in a responsible manner.

- Influx of job seekers: The extent of influx of job seekers to the area is very difficult to predict and/or quantify. However, since the development will be located on CPA property and limited housing and related services exist in close proximity, the influx of outsiders could potentially be strictly managed. Experience with other similar projects internationally suggests that due to the isolation of these facilities the influx of outsiders will not be significant.

Decommissioning Phase

Although the developer indicated that the ideal would be for the facility to be upgraded, retrofitted and re-assembled for another 20-25 years, the possibility of decommissioning needs to be considered. There are two main social impacts related to this phase:

- Loss of income and employment: The closure of the facility could present a major social impact to the workers employed at the facilities, and to the community at large. To mitigate the potential impact the provision of a viable pension and savings plan over a period of 20 - 25 years is recommended. The fact that most of the labourers will be local workers with limited employment mobility suggests a high retention rate – which would support long term savings initiatives. Moreover, during the lifespan of the project the employees should be able to provide for the education of their children leading to increased employment mobility–mitigating the severity of the decommissioning impacts.
- Nuisance related to construction activities: The decommissioning phase poses very similar impacts to the construction phase. However the timeframe for the decommissioning is much shorter (less than a year).

Conclusion and Recommendations

The majority of the impacts can be reduced to ratings of low negative after adequate implementation of mitigation measures while a number of impacts are regarded as being of high positive significance to the local community. The main positive impacts are:

- Job creation during construction and operational phases.
- Income generation during the operational phase.
- Empowerment and skills development during the construction phase.

Two potentially significant negative impacts are the possible conflict over income and leadership within the local communities as well as the loss of income and employment after decommissioning. Mitigation options are available for both impacts in the form of a third party to advise and administer

income and a retirement fund option during operations to buffer the social impacts after decommissioning.

Overall the proposed project does not hold any overriding negative social impacts to suggest a no development option. The investment, employment and income generation potential linked to the project could significantly contribute to the socio-economic development and improvement objectives described in the local IDP's.

8. PUBLIC PARTICIPATION PROCESS

A continual and comprehensive Public Participation Process (PPP) has been undertaken up to date during the Scoping phase with all stakeholders and Interested and Affected Parties (I & AP's), including the relevant Organs of State and competent authority being adequately consulted and provide with sufficient time for comment.

The PPP is being conducted in accordance with the requirements of Regulation 41 of the EIA Regulations, 2014 and the designated Public Participation Officer will ensure that the PPP is facilitated in a manner which ensures reasonable opportunity for all stakeholders and registered I & AP's to comment and provide input on the proposed project.

8.1 SCOPING PHASE

The PPP for the Scoping Report commenced on 1 April 2016 and was concluded on 6 May 2016. The following means were used to notify the public of the commencement of the process:

- Email notifications were sent to all identified stakeholders, relevant Organs of State and Competent Authority (DEA) on 31 March 2016.
- Advertisements were placed in two free local newspapers on 31 March 2016 (Ghaap newspaper and the Kalahari bulletin).
- Written notices were placed at two separate entrances of the Postmasburg municipal building as well as at the entrance of the Postmasburg public library on 31 March 2016.
- Site notices were placed at the entrance of the Remaining Extent of Farm Groenwater 453; the entrance to the informal settlement of Metsimatala and the entrance to the local primary school in the informal settlement of Metsimatala on 31 March 2016.
- Hardcopies of the Draft Scoping Report were made available at the Postmasburg municipal building and the Postmasburg public library for public viewing on 31 March 2016.
- A hardcopy was also couriered to the competent authority and received on 4 April 2016.

All stakeholders and I & AP's were adequately notified of the Public Participation Processes taking place as well as the availability of the relevant documents for comment as per Regulation 41 of the EIA Regulations, 2014.

An I & AP's register containing the names and contact details of all relevant stakeholders and I & AP's has been established and was submitted to the competent authority along with the Final Scoping Report as per Regulation 42 of the EIA Regulations, 2014 (see Appendix C).

All proof of notifications, I & AP registrations as well as comments received and responses provided during the Scoping phase PPP were incorporated into a Public Participation Report which was submitted to the competent authority along with the Final Scoping Report as per Regulation 42 of the EIA Regulations, 2014 (see Appendix C).

PPP completed

- Upon completion of the Draft Scoping Report, the stakeholders and I & AP's were notified and the document was made available for comments for a period of 30 days. The competent authority (DEA) was also consulted to comment on the Draft Scoping Report. After the completion of the PPP the comments received and responses provided were incorporated into a Final Scoping Report and submitted to the competent authority.

PPP still to take place

- The competent authority, stakeholders and registered I & AP's will be notified of the commencement of the second PPP on the draft Environmental Impact Report and EMPr. The documents will be made available for a commenting period of 30 days. The competent authority will be consulted to comment on the draft Environmental Impact Report. After the completion of the PPP the comments received and responses provided will be incorporated into a Final PPP Report to be submitted with the Final Environmental Impact Report and EMPr to the competent authority for final decision making on environmental authorisation.
- The competent authority will then approve or reject the Environmental Authorisation application within a period of 107 days after receipt of the submitted document and provide feedback to the applicant on their decision.

8.1.1 Comments and Responses Received during the Scoping phase

All comments received from the stakeholders and I & AP's during the Scoping phase together with the subsequent responses provided were incorporated into the Public Participation Report which was submitted to the competent authority along with the Final Scoping Report.
See table below providing the summary of all comments and responses during the Scoping phase:

Table 16: Summary of all comments and responses received during the Scoping Report PPP

Commenting party	Comment received	Response provided
1. Northern Cape Occupational Health - Tidu van der Merwe	Requested a copy of Appendix G (The I & AP registration form) as well as access to the Draft coping Report (see proof of email correspondence under heading 2.5.1 below).	A copy of Appendix G was forwarded to the commenting party as well as a website link to the Draft coping Report (see proof of email correspondence under heading 2.5.1 below). The Appendix G form was

		completed and submitted by the commenting party (see completed form under heading 2.5.2 below).
2. Andre January	Would like to arrange a meeting between EAP and community to discuss the application for prospecting rights which the community has submitted for the relevant project farms. Diamonds, tiger-eye, manganese, iron ore has been applied for. Amos Davids from Breeze Court Investments is managing the prospecting rights application on behalf of the community – 082 707 3239. Dan Mafusa is the community headman – 078 504 5764	Amos Davids was contacted telephonically on 19 April 2016 in order to obtain information regarding the application for prospecting rights. He then requested that a formal email be sent to him regarding the matter. The email request was sent on 19 April 2016 after which his feedback was received on 22 April 2016 containing the relevant documentation (see proof of email correspondence and documents received under heading 2.5.1 below). An email was sent to the DMR on 29 April 2016 requesting advice and clarification on the situation (see proof of email correspondence under heading 2.5.1 below). The telephonic feedback and recommendation from the DMR on 13 May 2016 was to firstly engage directly with the applicant representative of the prospecting permit. The applicant for this current project has therefore decided to engage directly with Amos Davids via email on 17 May 2016. Further feedback will be provided on the communications/negotiations during the next project phase.
3. Rete Property Development and Roads – Tebogo Maake	Confirmed that the project will positively reduce unemployment and benefit the local community in terms of job and skills creation.	Acknowledgement email was sent to the commenting party to confirm that the comments will be included in the PPP report (see proof of email correspondence under heading 2.5.1 below).
4. Community member - Benjamin Kolberg	Contacted me telephonically on 25 April 2016 and informed me that a community meeting was held with the Counsellor of Ward 3 who has requested a community meeting with us to	The member was telephonically contacted again on 29 April 2016 in order to obtain his email address which he had stated during the initial phone call on 25 April 2016 he would

	discuss future opportunities and job creation of the project.	provide by sending an email to the listed email address (rikus@enviroworks.co.za). During the follow up conversation on 29 April 2016 he indicated that he would send an email during the course of the day. An email was received on 29 April 2016 (see proof of email correspondence under heading 2.5.1 below). An email reply was sent to the member on 29 April 2016 recommending that a community meeting rather be held during the full EIA phase once the Scoping phase has been accepted and more comprehensive information is available on the project (see proof of email correspondence under heading 2.5.1 below). The member sent an email reply on 29 April 2016 indicating that this recommendation is accepted (see proof of email correspondence under heading 2.5.1 below). The member however then sent an email on 3 May 2016 indicting that they are not satisfied with the response and would like a community meeting arranged or they would object to the EIA process (see proof of email correspondence under heading 2.5.1 below). After a telephonic discussion with the member by the project applicant representative on 3 May 2016, it was concluded that the objection from the member could be disregarded. An email confirmation of this was sent to the member on 3 May 2016 upon which he also responded positively with an email (see proof of email correspondence under heading 2.5.1 below).
5. Competent authority (Department of Environmental Affairs) – Salome Mambane	Late feedback was received via email on 10 May 2016 after the PPP had concluded but is still	An email reminder was sent to the member on 3 May 2016 to reiterate the closure of the

	included in this document (see proof of email correspondence and feedback letter under heading 2.5.1 below).	commenting period on 6 May 2016 (see proof of email correspondence under heading 2.5.1 below). The various comments as received in the feedback letter have been addressed (see proof of feedback letter under heading 2.5.1 below and comments addressed under heading 3).
6. South African Astronomical Observatory	The notice of Public Participation Process was sent to enquiries@saao.co.za for comment on the Draft Scoping Report on 31 March 2016. Feedback was only received on 10 May 2016 confirming that the project would not have any impact on SALT (see proof of email correspondence under heading 2.5.1 below).	A follow up email was sent on 3 May 2016 in order to request comments on the relevance of the project to the Astronomy Geographic Advantage Act (No 21 of 2007) as well as the South African Large Telescope (see proof of email correspondence under heading 2.5.1 below). A follow up phone call was made on 5 May 2016. The email request was re-sent again on 6 March 2016 after which feedback was received on 10 May 2016 confirming that the project would not have any impact on SALT (see proof of email correspondence under heading 2.5.1 below). An email reply was then sent back to the member on 10 May 2016 to confirm receipt of information (see proof of email correspondence under heading 2.5.1 below).
7. South African Civil Aviation Authority	The notice of Public Participation Process was sent to robertsh@caa.co.za for comment on the Draft Scoping Report on 31 March 2016.	An email reminder was sent to the member on 4 May 2016 to reiterate the closure of the commenting period (see proof of email correspondence under heading 2.5.1 below).
8. South African Heritage Resources Agency (SAHRA)	A case was submitted on the SAHRA website for the proposed project on 13 April 2016. Comments were received on 5 May 2016 (see Appendix E of the Final Scoping Report for the SAHRA interim feedback document). Feedback was received from the specialist on the SAHRA	The SAHRA interim feedback document was forwarded to the specialist on 5 May 2016 in order to attend to the comments and recommendations received in the document. Feedback was received from the specialist on the SAHRA comments on 9 May 2016 (see Appendix E of the Final

	comments on 9 May 2016 (see Appendix E of the Final Scoping Report for the specialist interim feedback document).	Scoping Report for the specialist interim feedback document).
9. Birdlife South Africa	Late feedback was received via email on 9 May 2016 after the PPP had concluded but is still included in this document (see proof of email correspondence and feedback letter under heading 2.5.1 below).	An email reply was sent to the stakeholder on 10 May 2016 to confirm that their feedback letter would be included in the PPP report. The feedback letter was also sent to the avifaunal specialist for comment. The feedback letter received is included under heading 2.5.1 (see proof of email correspondence and feedback letter under heading 2.5.1 below)
10. Northern Cape Department of Environment and Nature Conservation	The notice of Public Participation Process was sent to tmakaudi@ncpg.gov.za for comment on the Draft Scoping Report on 31 March 2016.	A follow up email was sent on 5 May 2016 to request the Department to confirm whether the proposed project would potentially trigger any listed activities in Listing Notice 3 of the EIA Regulations 2014. No confirmation feedback was received (see proof of email correspondence under heading 2.5.1 below). Another follow up email was sent on 11 May 2016 (see proof of email correspondence under heading 2.5.1 below). No feedback yet been received but the EAP will continue to engage with the provincial authority.
11. DEA: Biodiversity and Conservation Directorate	A request for comments was sent to the Directorate via email.	The feedback/comments letter was received from the Directorate on 18 May 2016 (see proof of feedback letter under heading 2.5.1 below)

See Appendix C for the Public Participation Report.

8.2 ENVIRONMENTAL IMPACT ASSESSMENT PHASE

The PPP on the draft EIR will commence on 2 August 2016 and conclude on 5 September 2016. A 30 day period will therefore be afforded for comment on this document.

- The competent authority, identified stakeholders and registered I & AP's will be notified of the commencement of the second PPP on the draft Environmental Impact Report and EMPr via email.
- Site notices will be placed at two separate entrances of the Postmasburg municipal building as well as at the entrance of the Postmasburg public library on 2 August 2016.
- A hardcopy will also be couriered to the comment authority for comment.

After the completion of the PPP the comments received and responses provided will be incorporated into a Final PPP Report to be submitted with the Final Environmental Impact Report and EMPr to the competent authority for final decision making on environmental authorisation

9. ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

The processes of investigation which have led to the production of this report, harbours several **assumptions**, which include the following:

- All information provided by the applicant and engineer to the environmental team was correct and valid at the time that it was provided;
- Strategic level investigations undertaken by engineer prior to the commencement of the EIA process, determined that the development site represents a potentially suitable and technically acceptable location;
- The public received a fair and reoccurring opportunity to participate in the EIA process, through the provision of adequate public participation timeframes stipulated in the Regulations;
- The need and desirability was based on strategic national, provincial and local plans and policies which reflect the interests of both statutory and public viewpoints;
- The information provided by specialists is accurate and unbiased;
- The EIA process is a project-level framework and is limited to assessing the anticipated environmental impacts associated with the construction and operation phases of the proposed facility
- Strategic level decision making is conducted through cooperative governance principles with the consideration of sustainable and responsible development principles underpinning all decision making.

Given that an EIA involves prediction, **uncertainty** forms an integral part of the process. Two types of uncertainty are associated with the EIA process, namely process-related and prediction-related.

- Uncertainty of prediction is critical at the data collection phase as final certainty will only be resolved upon implementation of the proposed development. Adequate research may minimise this uncertainty;
- Uncertainty of values depicts the approach assumed during the EIA process, while final certainty will be determined at the time of decision making. Enhanced communication and widespread/comprehensive coordination can lower uncertainty;
- Uncertainty of related decision relates to the interpretation and decision making aspect of the EIA process, which shall be appeased once monitoring of the project phases is undertaken.

The significance/importance of widespread/comprehensive consultation towards minimising the risk of omitting significant impacts is further stressed. The use of quantitative impact significance rating formulas (as utilised in this document) can further limit the occurrence and scale of uncertainty.

Gaps in knowledge can be attributed to:

The EIA process is being undertaken prior to the availing of certain information which would be derived from the project design and feasibility studies. As such, technical aspects included herein are derived from a range of sources including pre-feasibility engineering and through personal communication with the design team.

With regards to impacts on avifauna, commercial scale solar farms, and particularly CSP developments, are relatively new in South Africa and little information therefore exists on the potential impacts of these technologies on South African avifauna. Some information is available internationally which shows that the main potential impacts may include: burning; collision; electrocution; disturbance and displacement; habitat destruction; water pollution; and excessive use of water.

The principle of human nature provides for uncertainties with regards to the identified socio-economic impacts of the proposed development. The dynamics of this aspect were therefore investigated by a specialist in order to obtain relevant and educated predictions regarding the impact and outcomes (see Appendix E for specialist report).

Enviroworks is an independent environmental consulting firm and as such, all processes and attributes of the EIA are addressed in a fair and unbiased/objective manner. It is believed that through the running of a transparent and participatory process, risks associated with assumptions, uncertainties and gaps in knowledge can be and have been acceptably reduced.

10. ENVIRONMENTAL IMPACT ASSESSMENT

The following section identifies the potential environmental impacts (both positive and negative) which the construction as well as operational phases of the proposed project will have on the surrounding environment.

Once the potential environmental impacts are identified, they are assessed by rating their Environmental Risk after which the final Environmental Significance is calculated and rated for each identified environmental impact.

The same Environmental Risk rating process is then followed for each environmental impact to determine the Environmental Significance if the recommended mitigation measures were to be implemented.

The objective of this section is therefore firstly to identify all the potential environmental impacts of the proposed project and secondly to determine the significance of the impacts and how effective the recommended mitigation measures will be able to reduce their significance. The potential environmental impacts which are still rated as highly significant, even after implementation of mitigations, can then be identified in order to specifically focus on implement of effective management strategies for them.

10.1 METHODOLOGY FOR IMPACT ASSESSMENT AND RISK RATING

The tables below indicate and explain the methodology and criteria used for the evaluation of the Environmental Risk Ratings as well as the calculation of the final Environmental Significance Ratings of the identified potential environmental impacts.

Each potential environmental impact is scored for each of the Evaluation Components as per Table 4 below.

Table 17: Scale utilised for the evaluation of the Environmental Risk Ratings

Evaluation Component	Rating Scale and Description/criteria
MAGNITUDE of NEGATIVE IMPACT (at the indicated spatial scale)	**10 - Very high**: Bio-physical and/or social functions and/or processes might be *severely* altered. **8 - High**: Bio-physical and/or social functions and/or processes might be *considerably* altered. **6 - Medium**: Bio-physical and/or social functions and/or processes might be *notably* altered. **4 - Low** : Bio-physical and/or social functions and/or processes might be *slightly* altered. **2 - Very Low**: Bio-physical and/or social functions and/or processes might be *negligibly* altered. **0 - Zero**: Bio-physical and/or social functions and/or processes will remain *unaltered.*

MAGNITUDE of POSITIVE IMPACT (at the indicated spatial scale)	**10 - Very high (positive)**: Bio-physical and/or social functions and/or processes might be *substantially* enhanced. **8 - High (positive)**: Bio-physical and/or social functions and/or processes might be *considerably* enhanced. **6 - Medium (positive)**: Bio-physical and/or social functions and/or processes might be *notably* enhanced. **4 - Low (positive)**: Bio-physical and/or social functions and/or processes might be *slightly* enhanced. **2 - Very Low (positive)**: Bio-physical and/or social functions and/or processes might be *negligibly* enhanced. **0 - Zero (positive)**: Bio-physical and/or social functions and/or processes will remain *unaltered.*
DURATION	**5 - Permanent** **4 - Long term**: Impact ceases after operational phase/life of the activity > 60 years. **3 - Medium term**: Impact might occur during the operational phase/life of the activity – 60 years. **2 - Short term**: Impact might occur during the construction phase - < 3 years. **1 - Immediate**
EXTENT (or spatial scale/influence of impact)	**5 - International**: Beyond National boundaries. **4 - National**: Beyond Provincial boundaries and within National boundaries. **3 - Regional**: Beyond 5 km of the proposed development and within Provincial boundaries. **2 - Local**: Within 5 km of the proposed development. **1 - Site-specific**: On site or within 100 m of the site boundary. **0 -** None
IRREPLACEABLE loss of resources	**5 – Definite** loss of irreplaceable resources. **4 – High** potential for loss of irreplaceable resources. **3 – Moderate** potential for loss of irreplaceable resources. **2 – Low** potential for loss of irreplaceable resources. **1 – Very low** potential for loss of irreplaceable resources. **0 - None**
REVERSIBILITY of impact	**5 –** Impact **cannot** be reversed. **4 – Low** potential that impact might be reversed. **3 – Moderate** potential that impact might be reversed. **2 – High** potential that impact might be reversed. **1 –** Impact **will be** reversible. **0 –** No impact.
PROBABILITY (of occurrence)	**5 - Definite**: >95% chance of the potential impact occurring. **4 - High probability**: 75% - 95% chance of the potential impact occurring. **3 - Medium probability**: 25% - 75% chance of the potential impact occurring **2 - Low probability**: 5% - 25% chance of the potential impact occurring. **1 - Improbable**: <5% chance of the potential impact occurring.
Evaluation Component	**Rating Scale and Description/criteria**

CUMULATIVE impacts	**High**: The activity is one of several similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern. **Medium**: The activity is one of a few similar past, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern. **Low**: The activity is localised and might have a negligible cumulative impact. **None**: No cumulative impact on the environment.

Once the Environmental Risk Ratings have been evaluated for each potential environmental impact, the Significance Score of each potential environmental impact is calculated by using the following formula:

- **SS (Significance Score) = (magnitude + duration + extent + irreplaceable + reversibility) x probability.**

The maximum Significance Score value is 150.

The Significance Score is then used to rate the Environmental Significance of each potential environmental impact as per Table 5 below. The Environmental Significance rating process is completed for all identified potential environmental impacts both before and after implementation of the recommended mitigation measures.

Table 18: Scale used for the evaluation of the Environmental Significance Ratings

Significance Score	Environmental Significance	Description/criteria
125 – 150	**Very high (VH)**	An impact of very high significance will mean that the project cannot proceed, and that impacts are irreversible, regardless of available mitigation options.
100 – 124	**High (H)**	An impact of high significance which could influence a decision about whether or not to proceed with the proposed project, regardless of available mitigation options.
75 – 99	**Medium-high (MH)**	If left unmanaged, an impact of medium-high significance could influence a decision about whether or not to proceed with a proposed project. Mitigation options should be relooked.
40 – 74	**Medium (M)**	If left unmanaged, an impact of moderate significance could influence a decision about whether or not to proceed with a proposed project.
<40	**Low (L)**	An impact of low is likely to contribute to positive decisions about whether or not to proceed with the project. It will have little real effect and is unlikely to have an influence on project design or alternative motivation.
+	**Positive impact (+)**	A positive impact is likely to result in a positive consequence/effect, and is likely to contribute to positive decisions about whether or not to proceed with the project.

10.2 DESCRIPTION OF POTENTIAL IMPACTS AND THEIR RECOMMENDED MITIGATION MEASURES

During the Scoping phase the CSP (Parabolic Trough) system was chosen/recommended as the preferred technology alternative due to its significantly lower environmental impact as well as its more efficient surface area: energy generation ratio. The following section provides descriptions of the potential environmental impacts which the proposed project and preferred technology alternative will have as well as the recommended mitigation measures to be implemented for each impact.

10.2.1 Construction Phase

Removal, destruction and transformation of natural vegetation and faunal habitats

Although the proposed project will completely transform the ecology of the site, the area is situated on a flat, degraded plain devoid of water courses and with little ecological value/significance. The site is not situated in any sensitive ecosystem or plant community and the general area is only classified as other natural areas in accordance with the Provincial Spatial Biodiversity Plan (see sensitivity map below). The species richness of the vegetation of the study area is relatively low with a total of only 33 species. No Red Data listed species were found to occur on the site although a small number of provincially protected species occur. The impact of the proposed project on the ecological resources is therefore considered to be low due to the already low current status of the area. This project will also not result in any significant cumulative impact (low - medium) as the vegetation type is classified as least concerned and disturbance of vegetation will be mostly confined to the footprint of the proposed facility. Although approximately 8 large solar energy projects in various stages of the EIA application process fall within this a 50 km radius of the project site, the area and vegetation type is vast. The cumulative sizes of these proposed facilities should not pose a significant cumulative effect on the integrity of the vegetation type as a whole.

Mitigation measures to reduce potential impacts:

- Strictly limit CSP facility and associated infrastructure construction and development to the proposed project footprint.
- Use existing roads as far as possible and limit the number of additional roads constructed.
- Ensure adequate erosion control measures are implemented to reduce the risk of soil erosion during the construction phase.
- Adhere to the guidelines provided in the Open space Management Plan in order to preserve surrounding natural areas.

Destruction/damage to nationally or provincially protected species individuals

In accordance with the National Forests Act (Act 84 of 1998), no person may cut, disturb, damage or destroy an individual of a nationally protected tree except if a permit is obtained for the desired process. No person may also without a permit pick (which includes the definition damage or

destroy), import, export, transport, possess, cultivate or trade in a specimen of a provincially protected plant in accordance with the Northern Cape Nature Conservation Act (Act 9 of 2009). Partaking in any such processes will constitute a transgression of the law which is criminally prosecutable.

A small number of nationally and provincially protected plant species are present on the proposed project site and the development of the facility will either destroy or significantly damage such individuals. This project will also not result in any significant cumulative impact (low - medium) as activities revolving around protected species in the province are well and strictly managed and documented through permitting systems.

Mitigation measures to reduce potential impacts:

- A permit application must be submitted to the national and provincial departments for removal/destruction of the individuals prior to the execution of any restricted activities to these individuals.
- Strictly limit CSP facility and associated infrastructure construction and development to the proposed project footprint.
- Adhere to the guidelines provided in the Open space Management Plan in order to preserve surrounding natural areas.

Avifaunal habitat destruction

Clearing activities during the construction phase will remove vegetation and therefore habitat that birds may require for breeding, foraging and roosting. While some of the impact may be temporary in the case of construction offices or laydown areas mitigation through rehabilitation of such areas is possible, however there will also be direct long-term loss of vegetation associated with the footprint of the solar field, operation offices, and access roads. The avifaunal cumulative impacts associated with the construction phase will not be highly significant and will range between low – medium. The wider area and vegetation type is very homogenous and provides the same habitat opportunities. The mobility of avifaunal species enables them to simply utilise other similar areas in the vast vegetation type in the event that numerous facilities are constructed in the area.

Mitigation measures to reduce potential impacts:

- Strictly limit transmission line and associated infrastructure construction and development to the proposed project footprint.
- Use existing roads as far as possible and limit the number of additional roads constructed.
- A site specific Construction Environmental Management Plan (CEMP) must be implemented, which gives appropriate and detailed description of how construction activities must be

conducted to reduce unnecessary destruction of habitat. All contractors are to adhere to the CEMP and should apply good environmental practice during construction

- High traffic areas and buildings such as offices, batching plants, storage areas etc. should, where possible be situated in areas that are already disturbed;
- Existing roads and farm tracks should be used where possible;
- The minimum footprint areas of infrastructure should be used wherever possible, including road widths and lengths;
- No off-road driving;
- Environmental Control Officers to oversee activities and ensure that the site specific construction environmental management plan (CEMP) is implemented and enforced; Following construction, rehabilitation of all areas disturbed (e.g. temporary access tracks and laydown areas) must be undertaken and to this end a habitat restoration plan is to be developed by a specialist and included within the Construction Environmental Management Plan (CEMP).

Avifaunal disturbance and displacement

Resident bird species (particularly sensitive and breeding species) may be disturbed by construction and activities associated with the CSP plant, which may lead to temporary or permanent displacement and/or a reduction in breeding success. It is noted though that due to the uniformity of the broader area, birds may quite easily move off and find similar habitat nearby. The avifaunal cumulative impacts associated with the construction phase will therefore not be highly significant and will range between low - medium due to vast available homogenous habitat even in the event of numerous facilities being constructed.

Mitigation measures to reduce potential impacts:

- Strictly limit transmission line and associated infrastructure construction and development to the proposed project footprint.
- Use existing roads as far as possible and limit the number of additional roads constructed.
- The appointed Environmental Control Officer (ECO) must be trained by an avifaunal specialist to identify the potential Red Data species as well as the signs that indicate possible breeding by these species. The ECO must then, during audits/site visits, make a concerted effort to look out for such breeding activities of Red Data species, and such efforts may include the training of construction staff (e.g. in Toolbox talks) to identify Red Data species, followed by regular questioning of staff as to the regular whereabouts on site of these species. If any of the Red Data species are confirmed to be breeding (e.g. if a nest site is found), construction activities within 500 m of the breeding site must cease, and an avifaunal specialist is to be

contacted immediately for further assessment of the situation and instruction on how to proceed.

- Prior to construction, an avifaunal specialist should conduct a site walkthrough, covering the final power line route, to identify any nests/breeding/roosting activity of sensitive species, as well as any additional sensitive habitats. The results of which may inform the final construction schedule in close proximity to that specific area, including abbreviating construction time, scheduling activities around avian breeding and/or movement schedules, and lowering levels of associated noise.

Reduction of agricultural potential of land

Although 500 ha of natural soil and vegetation will be transformed, the arid climate of the study area, coupled with shallow soils, limits the agricultural potential to low intensity grazing. The impact of the proposed project on the agricultural resources is therefore considered to be low due to the already low current status of the area. The cumulative impact of this development is also expected to be low - medium due to the low potential of the land in the area.

Mitigation measures to reduce potential impacts:

- Strictly limit CSP Facility and associated infrastructure construction and development to the proposed project footprint.
- Use existing roads as far as possible and limit the number of additional roads constructed.
- Ensure adequate erosion control measures are implemented to reduce the risk of soil erosion during the construction phase.

Dust generation and emissions

Increased vehicle and machine activity will result in a significant increase in dust emissions into the surrounding environment. This could have a negative impact on adjacent sheep farmers as excessive dust fallout could result in the value of wool decreasing or potential health implications. If managed correctly the cumulative impact of vehicles on dust generation can be limited to low.

Mitigation measures to reduce potential impacts:

- Dust Management as well as Traffic Management measures must be implemented in order to manage and reduce unnecessary traffic movement in the area and subsequently decrease undesired dust emissions.

Destruction of important heritage conservational cemetery sites (MVIA3 site)

Only a single significant archaeological and cultural heritage site, as defined and protected by the NHRA 1999 and previously identified pertains. Site MVIA3, a Later Iron Age / contemporary cemetery is situated at the northern extremity of Metsimatala Village and adjacent to the proposed

Metsimatala CSP facility study site. The site will however not be directly impacted by development. Little to no negative cumulative impact will result from the proposed Metsimatala CSP facility development on recorded archaeological and cultural heritage resources, as defined and protected by the NHRA (Act 25 of 1999). The proposed development and mitigation measures will in fact improve the condition of the single cultural heritage site identified.

Mitigation measures to reduce potential impacts:

- Upgrading of the cemetery boundary fence and gates in order to implement access control to the cemetery is recommended.

Transformation of early Proterozoic palaeontological heritage

Although the footprint of the proposed facility will transform the surface area which is largely underlain by Postmasburg Group strata (subordinate siliclastic sediments, lava and tillites, Vm, Vo), it is unlikely that the underlying material would be directly impacted by the proposed development since they are mantled by geologically recent superficial deposits (wind-blown sand) considered to be of low palaeontological sensitivity. Direct impact on potential fossil heritage within the CSP facility footprint is considered to be medium - low. The project could hold a low - medium potential cumulative impact due to the combined sizes of various proposed similar facilities in the area.

Mitigation measures to reduce potential impacts:

- It is advised that sites marked for erection of pylons or construction of associated infrastructure, which will require excavation into fresh bedrock sediments of the Campbellrand and Asbestos Hills Subgroup, be mapped and recorded prior to the construction phase of the development.
- Ensure development is restricted to the project footprint.

Visual disturbance of natural landscape and sense of place

The construction of the proposed facility within the landscape, of which the majority is currently viewed as natural areas, will cause a direct visual impact on the tranquillity and sense of place of the area to the local community as well as users of the R 385 road. The visual impact will however be mainly restricted to within 3 km of the proposed project area after which the visibility will diminish. Although another similar facility is situated in the nearby vicinity of the proposed project and numerous other projects are proposed within a 50 km radius, the sloping landscape decreases the visibility distance and subsequent impact of the proposed facility and other similar potential facilities. This proposed facility will therefore not significantly contribute to any cumulative visual disturbances along with other facilities.

Mitigation measures to reduce potential impacts:

- Strictly construction and development to the proposed project footprint.

- Use existing roads as far as possible and limit the number of additional roads constructed.
- Adequate planning and management of laydown areas.

Job creation, empowerment and skills development

A total of approximately 1 200 construction related employment opportunities are envisaged for the construction phase. A local employment policy will be applied as far as possible in the appointment of low-skilled and semi-skilled construction workers. Preference will be given to skilled workers within the Northern Cape Province. In view of the very high unemployment rates in the local municipality area (64%), these employment figures will make a significant positive contribution. The proposed project will, along with other similar renewable energy projects, cumulatively contribute to reduction in poverty and unemployment figures in the Northern Cape Province.

Influx of construction workers and job seekers and risk of theft and damage to property

It is expected that the influx of construction workers will have a relatively minor impact on the Metsimatala community. This is because most of the low-skilled and semi-skilled workers will be employed from the existing community. Moreover, the lack of basic services and relative distances to local towns will also to some extent deter the influx of outsiders. However, this aspect should be monitored throughout the construction phase. Because of the location of the development near a low income community, theft and damage to infrastructure is a concern. There will be no cumulative impact of the facility on the local informal settlement.

Mitigation measures to reduce potential impacts:

- A designated security company will be appointed to ensure the safety of the facilities.
- Adequately monitor and manage the process throughout the construction phase.

10.2.2 Operational Phase

Continued destruction and transformation of natural vegetation and faunal habitats due to initial construction phase

The initial impact as per the construction phase will continue. This project will not result in any significant cumulative impact (low - medium) as the vegetation type is classified as least concerned and disturbance of vegetation will be mostly confined to the footprint of the proposed facility. Although approximately 8 large solar energy projects in various stages of the EIA application process fall within this a 50 km radius of the project site, the area and vegetation type is vast. The cumulative sizes of these proposed facilities should not pose a significant cumulative effect on the integrity of the vegetation type as a whole.

Mitigation measures to reduce potential impacts:

- Ensure no unnecessary expansion of the project footprint occurs.

Continued destruction/damage to nationally or provincially protected tree species individuals

Activities during the operational phase could still cause harm to individuals of identified protected species if their protection is not manged.

Mitigation measures to reduce potential impacts:

- If any protected individuals are preserved on site through buffering, it is important that the buffer be sufficiently maintained on a continual basis to ensure its integrity and functionality.
- Complete a training and awareness intervention with the employees and any new/additional employees in order to inform them of the protected tree individuals as well as the reasoning behind the protection.

Avifaunal electrocution

Birds may be electrocuted either by the onsite substation or overhead power lines inside the facility footprint. Of particular concern are large raptors (e.g. Martial Eagle, Black-chested Snake Eagle and White-backed Vulture) and storks, which due to their size and nature are prone to electrocution impacts. Approximately 8 large solar energy projects in various stages of the EIA application process fall within this 50 km radius of the project site. Should some or all of these projects be constructed the cumulative impact significance of bird electrocution may increase.

Mitigation measures to reduce potential impacts:

- All on site power cables and power lines to be buried underground as far as possible.
- Within the on-site substation, electrical components are to be properly insulated in line with Eskom standard guidelines. Where possible, clearances between live components should be greater than 2 m.

Avifaunal burning

Birds may fly between the troughs and the receiver unit. The reflective surfaces focus beams of sunlight into a small area resulting in concentrated solar flux which may burn the bird. Approximately 8 large solar energy projects in various stages of the EIA application process fall within this 50 km radius of the project site. Should some or all of these projects be constructed the cumulative impact significance of the residual impacts of burning may increase.

Mitigation measures to reduce potential impacts:

- Attractants to birds, such as open water, foraging and perching opportunities should be limited in the immediate vicinity of the facility.

- A maintenance plan must be developed for all water associated infrastructure, so that any leakages etc. are identified and fixed as soon as possible so that birds in this arid environment are not attracted to a temporary artificial water source.
- Develop and implement an operational monitoring programme for birds in line with applicable guidelines, which must include searching for mortalities.
- Frequent and regular review of operational phase monitoring data and results by an avifaunal specialist.
- The above reviews should strive to identify sensitive locations at the development including that may require additional mitigation. If unacceptable impacts are observed (in the opinion of the bird specialist and independent review), the specialist should conduct a literature review specific to the impact and provide updated and relevant mitigation options to be implemented. As a starting point for the review of possible mitigations, the following may need to be considered:
    - Assess the suitability of using deterrent devices to reduce burning risk.
    - Various approaches to standby aiming of heliostats, which could significantly reduce flux levels.

Avifaunal collision with infrastructure

Birds may be attracted to, and collide with, the reflective surfaces (parabolic troughs) which may be mistaken for large water bodies and can cause disorientation of flying birds, resulting in injury and/or death. Approximately 8 large solar energy projects in various stages of the EIA application process fall within this 50 km radius of the project site. Should some or all of these projects be constructed the cumulative impact significance of collision may increase.

Mitigation measures to reduce potential impacts:

- Where possible, infrastructure should be located away from known bird flight paths or features which are attractive to birds, e.g. natural or man-made open water areas or agricultural fields.
- To limit bird traffic across the site, perch able structures should be avoided where possible.
- Lighting should be kept to a minimum to avoid attracting insects and birds and light sensors/switches should be utilised to keep lights off when not required.
- Lighting fixtures should be hooded and directed downward, to minimize the skyward and horizontal illumination which could attract night-flying birds.
- Where possible, lighting should be intermittent or flashing-beam lights.
- Careful selection of and modifications to solar facility equipment should be made where possible. For instance, white borders could be applied to trough panels to reduce the resemblance that arrays have of waterbodies.

- Develop and implement an operational monitoring programme for birds in line with applicable guidelines, which must include searching for mortalities.
- Frequent and regular review of operational phase monitoring data and results by an avifaunal specialist.
- The above reviews should strive to identify sensitive locations at the development including that may require additional mitigation. If unacceptable impacts are observed (in the opinion of the bird specialist and independent review), the specialist should conduct a literature review specific to the impact and provide updated and relevant mitigation options to be implemented. As a starting point for the review of possible mitigations, the following may need to be considered:
    - Assess the suitability of using deterrent devices to reduce collision risk.

Pollution of water resources

Pollution of water resources used by birds can result from various operational activities such as production of wastewater (brine), which can be difficult to manage and treat. Artificial evaporation ponds attract water birds, the water of which could be chemically altered. This will have a damaging effect on avifauna utilising the sources and could even lead to death. The cumulative impact is expected to be low as it is anticipated that similar facilities developed will also implement adequate monitoring and management measures to prevent such impacts.

Mitigation measures to reduce potential impacts:

- Ensure that birds do not come into contact with evaporation ponds i.e. ponds should be covered with wire mesh or netting to reduce the possibilities of, attracting, drowning, or poisoning birds.
- All cleaning products used on the site should be environmentally friendly and biodegradable.
- Site specific measures for the effective management and treatment of waste water need to be implemented.

Soil erosion

Due to the removal of natural vegetation and alteration of the landscape during the construction phase the potential for loss of soil due to erosion is present and must be monitored. The cumulative impact of this development is expected to be low due to the low potential of the land in the area and the isolated effect that erosion could have on site.

Mitigation measures to reduce potential impacts:

- Ensure adequate erosion control measures are implemented to reduce the risk of soil erosion during the operational phase.

Continued dust generation and emissions

Continued vehicle activity during the operational phase will result in continued dust emissions occurring into the surrounding environment. It will be much less significant than during the construction phase but could have a negative impact on adjacent sheep farmers as excessive dust fallout could still result in the value of wool decreasing or potential health implications. If managed correctly the cumulative impact of vehicles on dust generation will be limited to low/virtually none.

Mitigation measures to reduce potential impacts:

- Continued Dust Management as well as Traffic Management measures must be kept in place in order to manage traffic movement in the area during the entire operational phase and subsequently decrease undesired dust emissions.

Continued deterioration of important heritage conservational cemetery sites (MVIA3 site)

Continued operational activities of the proposed project might potentially lead to deterioration or decrease in integrity of the MVIA3 Later Iron Age/contemporary cemetery site if continued maintenance is not implemented. Little to no negative cumulative impact will result from the proposed Metsimatala CSP facility development on recorded archaeological and cultural heritage resources, as defined and protected by the NHRA (Act 25 of 1999). The proposed development and mitigation measures will in fact improve the condition of the single cultural heritage site identified.

Mitigation measures to reduce potential impacts:

- Continued maintenance and management to be conducted once the upgrading of the cemetery boundary fence and gates have been completed.

Continued transformation of early Proterozoic palaeontological heritage

The initial impact as per the construction phase will continue. The project could hold a low - medium cumulative impact due to the sizes of various proposed similar facilities in the area.

Mitigation measures to reduce potential impacts:

- Ensure no unnecessary expansion of the project footprint occurs.

Continued visual disturbance of natural landscape and sense of place

The operation of the proposed facility within the landscape will result in continued visual impact on the tranquillity and sense of place of the area to the local community as well as users of the R 385 road. The visual impact will however be mainly restricted to within 3 km of the proposed project area after which the visibility will diminish. Although another similar facility is situated in the nearby vicinity of the proposed project and numerous other projects are proposed within a 50 km radius, the sloping landscape decreases the visibility distance and subsequent impact of the proposed

facility and other similar potential facilities. This proposed facility will therefore not significantly contribute to any cumulative visual disturbances along with other facilities.

Mitigation measures to reduce potential impacts:

- Strictly construction and development to the proposed project footprint.
- Use existing roads as far as possible and limit the number of additional roads constructed.
- Adequate planning and management of laydown areas.

Job creation and income generation

The unemployment rate for the municipal area in general stands at 64%, which is probably even lower in the Metsimatala community specifically. It is estimated that the proposed development will provide a total of 120 permanent jobs. Taking an average of five dependents per employed individual the potential total effect is estimated at 500 individuals to benefit indirectly from employment generated by the development which is significant within the local context. The development will provide two income streams. The first is a monthly lease amount for the land portions utilised for the solar energy facilities and the second will be from dividends declared by the project company. The Metsimatala community will obtain a share in the development company. The proposed project will, along with other similar renewable energy projects, cumulatively contribute to reduction in poverty and unemployment figures in the Northern Cape Province.

Influx of job seekers and risk of theft and damage to property

The extent of influx of job seekers to the area is very difficult to predict and/or quantify. However, since the development will be located on CPA property and limited housing and related services exist in close proximity, the influx of outsiders could potentially be strictly managed. Experience with other similar projects internationally suggests that due to the isolation of these facilities the influx of outsiders will not be significant.

Mitigation measures to reduce potential impacts:

- A local employment policy will be applied as far as possible in the appointment of permanent workers.
- A designated security company will be appointed to ensure the safety of the facilities.
- Adequately monitor and manage the process throughout the construction phase.

10.2.3 Cumulative Impacts

Approximately 8 large solar energy projects in various stages of the EIA application process fall within this a 50 km radius of the project site. Although various of these solar power generating facilities have been established or are in the process of being established in the Northern Cape Province due to the favourability of the solar belt in the province for this kind of renewable electricity

generation, they are wide apart and rarely in close proximity to each other. The impacts associated with such facilities also seem to be mostly localised and mainly restricted to the footprint areas and immediate vicinities. This renders them unlikely to be significantly contributing to combined cumulative/bio-magnifying impacts along with other similar facilities. The cumulative impacts have been rated by the specialists and included in the descriptions and risk rating tables.

Terrestrial and Wetland Ecology

This project will not result in any significant cumulative impact (low - medium) as the vegetation type is classified as least concerned and disturbance of vegetation will be mostly confined to the footprint of the proposed facility. The area and vegetation type is vast and the cumulative sizes of these proposed facilities should not pose a significant cumulative effect on the integrity of the vegetation type as a whole.

The project will also not result in any significant cumulative impact (low - medium) on the subsistence of protected species as activities revolving around protected species in the province are well and strictly managed and documented through permitting systems.

Avifauna

The avifaunal cumulative impacts associated with the construction phase will not be highly significant and will range between low – medium. The wider area and vegetation type is very homogenous and provides the same habitat opportunities. The mobility of avifaunal species enables them to simply utilise other similar areas in the vast vegetation type in the event that numerous facilities are constructed in the area.

Operational phase impacts of the proposed project may be intensified to some degree due to the potential cumulative impacts of a number of proposed commercial scale solar energy projects within 50 km of the project site. Should some or all of these projects be constructed the cumulative impact significance of electrocution, burning and collision may be high if adequately proposed mitigation measures are not implemented.

Agriculture

The cumulative impact of this development is expected to be low due to the low potential of the land in the entire area. The construction of a number of similar facilities within the area will not result in significant agricultural potential losses as these facilities only consume restricted footprints within a vast natural area zoned for stock farming but which has a low agricultural potential specifically so for irrigation and crop production purposes.

Archaeology

Little to no negative cumulative impact will result from the proposed Metsimatala CSP facility development on recorded palaeontological, archaeological and cultural heritage resources, as defined and protected by the NHRA (Act 25 of 1999). The proposed development and mitigation measures will in fact improve the condition of the single cultural heritage site identified and will also be contributory to living heritage, ensuring the sustainability of the Thlaping people on their tribal by virtue of their recorded history on the property, but with the prospect of a green, economically sustainable future.

Palaeontology

Although no significant palaeontological items have been identified on site, the nature of surface and potential subsurface transformation during the construction of such facilities results in the project having a low - medium potential cumulative impact due to the combined sizes of various proposed similar facilities in the area.

Visual Impact Assessment

Although another similar facility is situated in the nearby vicinity of the proposed project and numerous other projects are proposed within a 50 km radius, the sloping landscape decreases the visibility distance and subsequent impact of the proposed facility and other similar potential facilities. This proposed facility will therefore not significantly contribute to any cumulative visual disturbances along with other facilities.

Socio-Economic description

The proposed project will, along with other similar renewable energy projects in the vicinity, cumulatively contribute to reduction in poverty and unemployment in the Northern Cape Province. It will cumulatively contribute job creation and sustainable capacity building and skills development and transfer.

There will be no negative cumulative impact of the facility on the local informal settlement due to potential influx of construction workers and job seekers and risk of theft and damage to property.

Conclusion

The potential cumulative impacts of this proposed project have been adequately assessed and no fatal flaws or unacceptable environmental impacts have been identified due to the cumulative effects in combination with other similar developments in the region which cannot be acceptably mitigated.

10.3 RISK RATINGS OF POTENTIAL IMPACTS

The following section provides the Environmental Risk as well as the Environmental Significance Ratings for the potential environmental impacts for the proposed project both before and after implementation of the recommended mitigation measures.

10.3.1 Construction Phase

Table 19: Environmental Risk and Significance Ratings for the Construction Phase

	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Removal, destruction and transformation of natural vegetation and faunal habitats**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Very low (2)	Low (4)	Low (4)
Duration of impact:	Long term (4)	Long term (4)	Long term (4)
Extent of the impact	Local (2)	Local (2)	Local (2)
Degree to which local resources are irreplaceable	Low (2)	Low (2)	Low (2)
Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	Moderate (3)
Probability of occurrence:	High Probability (4)	High Probability (4)	High Probability (4)
Cumulative impact prior to mitigation:	Medium	Medium	Medium
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (52)	Medium (60)	Medium (60)
Proposed mitigation:	• Strictly limit CSP facility and associated infrastructure construction and development to the proposed		

	project footprint. • Use existing roads as far as possible and limit the number of additional roads constructed. • Ensure adequate erosion control measures are implemented to reduce the risk of soil erosion during the construction phase. • Adhere to the guidelines provided in the Open space Management Plan in order to preserve surrounding natural areas.		
Cumulative impact post mitigation:	Medium	Medium	Medium
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (52)	Medium (56)	Medium (56)
	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Destruction/damage to nationally or provincially protected species individuals**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Low (4)	Medium (6)	Medium (6)
Duration of impact:	Permanent (5)	Permanent (5)	Permanent (5)
Extent of the impact	Site specific (1)	Site specific (1)	Site specific (1)
Degree to which local resources are irreplaceable	Low (2)	Low (2)	Low (2)

Degree to which the impact can be reversed:	Low (4)	Low (4)	Low (4)
Probability of occurrence:	High probability (4)	High probability (4)	High probability (4)
Cumulative impact prior to mitigation:	Low	Medium	Medium
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (64)	Medium (72)	Medium (72)
Proposed mitigation:	• A permit application must be submitted to the national and provincial departments for removal/destruction of the individuals prior to the execution of any restricted activities to these individuals. • Strictly limit CSP facility and associated infrastructure construction and development to the proposed project footprint. • Adhere to the guidelines provided in the Open space Management Plan in order to preserve surrounding natural areas.		
Cumulative impact post mitigation:	Low	Medium	Medium
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (56)	Medium (64)	Medium (64)

	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Avifaunal habitat destruction**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Very low (2)	Low (4)	Low (4)
Duration of impact:	Long term (4)	Long term (4)	Long term (4)
Extent of the impact	Local (2)	Local (2)	Local (2)
Degree to which local resources are irreplaceable	Low (2)	Low (2)	Low (2)
Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	Moderate (3)
Probability of occurrence:	Definite (5)	Definite (5)	Definite (5)
Cumulative impact prior to mitigation:	Medium	Medium	Medium
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (65)	Medium-High (75)	Medium-High (75)
Proposed mitigation:	• Strictly limit transmission line and associated infrastructure construction and development to the proposed project footprint. • Use existing roads as far as possible and limit the number of additional roads constructed. • A site specific Construction Environmental Management Plan (CEMP) must be implemented, which		

	gives appropriate and detailed description of how construction activities must be conducted to reduce unnecessary destruction of habitat. All contractors are to adhere to the CEMP and should apply good environmental practice during construction • High traffic areas and buildings such as offices, batching plants, storage areas etc. should, where possible be situated in areas that are already disturbed; • Existing roads and farm tracks should be used where possible; • The minimum footprint areas of infrastructure should be used wherever possible, including road widths and lengths; • No off-road driving; • Environmental Control Officers to oversee activities and ensure that the site specific construction environmental management plan (CEMP) is implemented and enforced; Following construction, rehabilitation of all areas disturbed (e.g. temporary access tracks and laydown areas) must be undertaken and to this end a habitat restoration plan is to be developed by a specialist and included within the Construction Environmental Management Plan (CEMP).		
Cumulative impact post mitigation:	Medium	Medium	Medium
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (65)	Medium (65)	Medium (65)

	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Avifaunal disturbance and displacement**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Medium (4)	Medium (6)	Medium (6)
Duration of impact:	Short-term (2)	Short-term (2)	Short-term (2)
Extent of the impact	Regional (3)	Regional (3)	Regional (3)
Degree to which local resources are irreplaceable	Moderate (3)	Moderate (3)	Moderate (3)
Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	Moderate (3)
Probability of occurrence:	High (4)	High (4)	High (4)
Cumulative impact prior to mitigation:	Medium	Medium	Medium
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (60)	Medium (68)	Medium (68)
Proposed mitigation:	• Strictly limit transmission line and associated infrastructure construction and development to the proposed project footprint. • Use existing roads as far as possible and limit the number of additional roads constructed. • The appointed Environmental Control Officer (ECO) must be trained by an avifaunal specialist to		

	identify the potential Red Data species as well as the signs that indicate possible breeding by these species. The ECO must then, during audits/site visits, make a concerted effort to look out for such breeding activities of Red Data species, and such efforts may include the training of construction staff (e.g. in Toolbox talks) to identify Red Data species, followed by regular questioning of staff as to the regular whereabouts on site of these species. If any of the Red Data species are confirmed to be breeding (e.g. if a nest site is found), construction activities within 500 m of the breeding site must cease, and an avifaunal specialist is to be contacted immediately for further assessment of the situation and instruction on how to proceed. • Prior to construction, an avifaunal specialist should conduct a site walkthrough, covering the final power line route, to identify any nests/breeding/roosting activity of sensitive species, as well as any additional sensitive habitats. The results of which may inform the final construction schedule in close proximity to that specific area, including abbreviating construction time, scheduling activities around avian breeding and/or movement schedules, and lowering levels of associated noise.		
Cumulative impact post mitigation:	Low	Low	Low
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (30)	Low (34)	Low (34)

	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Reduction of agricultural potential of land**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Very low (2)	Low (4)	Low (4)

Duration of impact:	Long term (4)	Long term (4)	Long term (4)
Extent of the impact	Local (2)	Local (2)	Local (2)
Degree to which local resources are irreplaceable	Low (2)	Low (2)	Low (2)
Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	Moderate (3)
Probability of occurrence:	High Probability (4)	High Probability (4)	High Probability (4)
Cumulative impact prior to mitigation:	Low	Medium	Medium
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (52)	Medium (60)	Medium (60)
Proposed mitigation:	• Strictly limit CSP Facility and associated infrastructure construction and development to the proposed project footprint. • Use existing roads as far as possible and limit the number of additional roads constructed. • Ensure adequate erosion control measures are implemented to reduce the risk of soil erosion during the construction phase.		
Cumulative impact post mitigation:	Low	Medium	Medium
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (52)	Medium (56)	Medium (56)

	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Dust generation and emissions**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Very low (2)	Very low (2)	Very low (2)
Duration of impact:	Medium term (3)	Medium term (3)	Medium term (3)
Extent of the impact	Local (2)	Local (2)	Local (2)
Degree to which local resources are irreplaceable	Low (2)	Low (2)	Low (2)
Degree to which the impact can be reversed:	High (2)	High (2)	High (2)
Probability of occurrence:	Medium probability (3)	Medium probability (3)	Medium probability (3)
Cumulative impact prior to mitigation:	Low	Low	Low
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (33)	Low (33)	Low (33)
Proposed mitigation:	• Dust Management as well as Traffic Management measures must be implemented in order to manage and reduce unnecessary traffic movement in the area and subsequently decrease undesired dust		

	emissions.		
Cumulative impact post mitigation:	Low	Low	Low
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (16)	Low (16)	Low (16)

	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Destruction of important heritage conservational cemetery sites (MVIA3 site)**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Very low (2)	Low (4)	Low (4)
Duration of impact:	Short term (2)	Short term (2)	Short term (2)
Extent of the impact	Site specific (1)	Site specific (1)	Site specific (1)
Degree to which local resources are irreplaceable	Moderate (3)	Moderate (3)	Moderate (3)
Degree to which the impact can be reversed:	Low (4)	Low (4)	Low (4)
Probability of occurrence:	Medium probability (3)	Medium probability (3)	Medium probability (3)

Cumulative impact prior to mitigation:	Low	Low	Low
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (36)	Medium (42)	Medium (42)
Proposed mitigation:	• Upgrading of the cemetery boundary fence and gates in order to implement access control to the cemetery is recommended.		
Cumulative impact post mitigation:	Positive	Positive	Positive
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Positive (+8)	Positive (+8)	Positive (+8)
	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Transformation of early Proterozoic palaeontological heritage**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Very low (2)	Low (4)	Low (4)
Duration of impact:	Long term (4)	Long term (4)	Long term (4)
Extent of the impact	Site specific (1)	Site specific (1)	Site specific (1)

Degree to which local resources are irreplaceable	Moderate (3)	Moderate (3)	Moderate (3)
Degree to which the impact can be reversed:	Low (4)	Low (4)	Low (4)
Probability of occurrence:	High Probability (4)	High Probability (4)	High Probability (4)
Cumulative impact prior to mitigation:	Medium	Medium	Medium
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (56)	Medium (64)	Medium (64)
Proposed mitigation:	• It is advised that sites marked for erection of pylons or construction of associated infrastructure, which will require excavation into fresh bedrock sediments of the Campbellrand and Asbestos Hills Subgroup, be mapped and recorded prior to the construction phase of the development. • Ensure development is restricted to the project footprint.		
Cumulative impact post mitigation:	Medium	Medium	Medium
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (38)	Medium (45)	Medium (45)

Socio-Economic Aspects			
	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Visual disturbance of natural landscape and sense of place**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Very low (2)	Low (4)	Low (4)
Duration of impact:	Short term (2)	Short term (2)	Short term (2)
Extent of the impact	Local (2)	Local (2)	Local (2)
Degree to which local resources are irreplaceable	Low (2)	Low (2)	Low (2)
Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	Moderate (3)
Probability of occurrence:	Medium probability (3)	Medium probability (3)	Medium probability (3)
Cumulative impact prior to mitigation:	Low	Low	Low
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (33)	Low (39)	Low (39)
Proposed mitigation:	• Strictly limit construction and development to the proposed project footprint. • Use existing roads as far as possible and limit the number of additional roads constructed.		

	• Adequate planning and management of laydown areas.		
Cumulative impact post mitigation:	Low	Low	Low
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (27)	Low (39)	Low (39)

	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Job creation, empowerment and skills development**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	High (8)	High (8)	High (8)
Duration of impact:	Short term (2)	Short term (2)	Short term (2)
Extent of the impact	Regional (3)	Regional (3)	Regional (3)
Degree to which local resources are irreplaceable	None (0)	None (0)	None (0)
Degree to which the impact can be reversed:	0	0	0
Probability of occurrence:	High probability (4)	High probability (4)	High probability (4)

Cumulative impact prior to mitigation:	Positive	Positive	Positive
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Positive (+52)	Positive (+52)	Positive (+52)
Proposed mitigation:	None		
Cumulative impact post mitigation:	Positive	Positive	Positive
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Positive (+52)	Positive (+52)	Positive (+52)
	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Influx of construction workers and job seekers and risk of theft and damage to property**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Low (4)	Low (4)	Low (4)
Duration of impact:	Short term (2)	Short term (2)	Short term (2)
Extent of the impact	Regional (3)	Regional (3)	Regional (3)
Degree to which local resources are	None (0)	None (0)	None (0)

irreplaceable			
Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	Moderate (3)
Probability of occurrence:	High probability (4)	High probability (4)	High probability (4)
Cumulative impact prior to mitigation:	Low	Low	Low
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (48)	Medium (48)	Medium (48)
Proposed mitigation:	• A designated security company will be appointed to ensure the safety of the facilities. • Adequately monitor and manage the process throughout the construction phase.		
Cumulative impact post mitigation:	Low	Low	Low
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (24)	Low (24)	Low (24)

10.3.2 Operational Phase

Table 20: Environmental Risk and Significance Ratings for the Operational Phase

Bio-Physical Aspects			
	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Continued destruction and transformation of natural vegetation and faunal habitats due to initial construction phase**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Very low (2)	Low (4)	Low (4)
Duration of impact:	Long term (4)	Long term (4)	Long term (4)
Extent of the impact	Local (2)	Local (2)	Local (2)
Degree to which local resources are irreplaceable	Low (2)	Low (2)	Low (2)
Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	Moderate (3)
Probability of occurrence:	High Probability (4)	High Probability (4)	High Probability (4)
Cumulative impact prior to mitigation:	Medium	Medium	Medium
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-	Medium (52)	Medium (60)	Medium (60)

High)			
Proposed mitigation:	• Ensure no unnecessary expansion of the project footprint occurs.		
Cumulative impact post mitigation:	Medium	Medium	Medium
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (52)	Medium (56)	Medium (56)
	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Continued destruction/damage to nationally or provincially protected tree species individuals**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Low (4)	Medium (6)	Medium (6)
Duration of impact:	Permanent (5)	Permanent (5)	Permanent (5)
Extent of the impact	Site specific (1)	Site specific (1)	Site specific (1)
Degree to which local resources are irreplaceable	Low (2)	Low (2)	Low (2)
Degree to which the impact can be reversed:	Low (4)	Low (4)	Low (4)

Probability of occurrence:	High probability (4)	High probability (4)	High probability (4)
Cumulative impact prior to mitigation:	Low	Medium	Medium
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (64)	Medium (72)	Medium (72)
Proposed mitigation:	• If any protected individuals are preserved on site through buffering, it is important that the buffer be sufficiently maintained on a continual basis to ensure its integrity and functionality. • Complete a training and awareness intervention with the employees and any new/additional employees in order to inform them of the protected tree individuals as well as the reasoning behind the protection.		
Cumulative impact post mitigation:	Low	Medium	Medium
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (56)	Medium (64)	Medium (64)
	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Avifaunal electrocution**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Very High (10)	Very High (10)	Very High (10)

Duration of impact:	Long term (4)	Long term (4)	Long term (4)
Extent of the impact	Regional (3)	Regional (3)	Regional (3)
Degree to which local resources are irreplaceable	High (4)	High (4)	High (4)
Degree to which the impact can be reversed:	Cannot (5)	Cannot (5)	Cannot (5)
Probability of occurrence:	High (4)	High (4)	High (4)
Cumulative impact prior to mitigation:	High	High	High
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	High (104)	High (104)	High (104)
Proposed mitigation:	• All on site power cables and power lines to be buried underground as far as possible. • Within the on-site substation, electrical components are to be properly insulated in line with Eskom standard guidelines. Where possible, clearances between live components should be greater than 2 m.		
Cumulative impact post mitigation:	Low	Low	Low
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (26)	Low (26)	Low (26)

	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Avifaunal burning**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	No burning will take place at the substation, only at the solar field.	Very High (10)	-
Duration of impact:	-	Long-Term (4)	Long-Term (4)
Extent of the impact	-	Local (2)	Local (2)
Degree to which local resources are irreplaceable	-	High (4)	High (4)
Degree to which the impact can be reversed:	-	Cannot (5)	Cannot (5)
Probability of occurrence:	-	Improbable (1)	Improbable (1)
Cumulative impact prior to mitigation:	-	Medium	Medium
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	-	Low (25)	Low (25)
Proposed mitigation:	• Attractants to birds, such as open water, foraging and perching opportunities should be limited in the immediate vicinity of the facility. • A maintenance plan must be developed for all water associated infrastructure, so that any leakages etc.		

	are identified and fixed as soon as possible so that birds in this arid environment are not attracted to a temporary artificial water source. • Develop and implement an operational monitoring programme for birds in line with applicable guidelines, which must include searching for mortalities. • Frequent and regular review of operational phase monitoring data and results by an avifaunal specialist. • The above reviews should strive to identify sensitive locations at the development including that may require additional mitigation. If unacceptable impacts are observed (in the opinion of the bird specialist and independent review), the specialist should conduct a literature review specific to the impact and provide updated and relevant mitigation options to be implemented. As a starting point for the review of possible mitigations, the following may need to be considered: ○ Assess the suitability of using deterrent devices to reduce burning risk. ○ Various approaches to standby aiming of heliostats, which could significantly reduce flux levels.		
Cumulative impact post mitigation:	-	Low	Low
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	-	Low (25)	Low (25)
	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Avifaunal collision with infrastructure**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Medium (6)	Very High (10)	Very High (10)

Duration of impact:	Long-Term (4)	Long-Term (4)	Long-Term (4)
Extent of the impact	Local (2)	Local (2)	Local (2)
Degree to which local resources are irreplaceable	High (4)	High (4)	High (4)
Degree to which the impact can be reversed:	Cannot (5)	Cannot (5)	Cannot (5)
Probability of occurrence:	Medium (3)	Medium (3)	Medium (3)
Cumulative impact prior to mitigation:	Medium	Medium	Medium
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (63)	Medium-High (75)	Medium-High (75)
Proposed mitigation:	• Where possible, infrastructure should be located away from known bird flight paths or features which are attractive to birds, e.g. natural or man-made open water areas or agricultural fields. • To limit bird traffic across the site, perch able structures should be avoided where possible. • Lighting should be kept to a minimum to avoid attracting insects and birds and light sensors/switches should be utilised to keep lights off when not required. • Lighting fixtures should be hooded and directed downward, to minimize the skyward and horizontal illumination which could attract night-flying birds. • Where possible, lighting should be intermittent or flashing-beam lights. • Careful selection of and modifications to solar facility equipment should be made where possible. For instance, white borders could be applied to trough panels to reduce the resemblance that arrays have of waterbodies. • Develop and implement an operational monitoring programme for birds in line with applicable guidelines,		

	which must include searching for mortalities. • Frequent and regular review of operational phase monitoring data and results by an avifaunal specialist. • The above reviews should strive to identify sensitive locations at the development including that may require additional mitigation. If unacceptable impacts are observed (in the opinion of the bird specialist and independent review), the specialist should conduct a literature review specific to the impact and provide updated and relevant mitigation options to be implemented. As a starting point for the review of possible mitigations, the following may need to be considered: ○ Assess the suitability of using deterrent devices to reduce collision risk.		
Cumulative impact post mitigation:	Medium	Medium	Medium
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (45)	Medium (50)	Medium (50)
	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Pollution of water resources**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Low (4)	Medium (6)	Medium (6)
Duration of impact:	Medium term (3)	Medium term (3)	Medium term (3)
Extent of the impact	Regional (3)	Regional (3)	Regional (3)

Degree to which local resources are irreplaceable	Low (2)	Low (2)	Low (2)
Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	Moderate (3)
Probability of occurrence:	Medium probability (3)	Medium probability (3)	Medium probability (3)
Cumulative impact prior to mitigation:	Medium	Medium	Medium
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (45)	Medium (51)	Medium (51)
Proposed mitigation:	• Ensure that birds do not come into contact with evaporation ponds i.e. ponds should be covered with wire mesh or netting to reduce the possibilities of, attracting, drowning, or poisoning birds. • All cleaning products used on the site should be environmentally friendly and biodegradable. • Site specific measures for the effective management and treatment of waste water need to be implemented.		
Cumulative impact post mitigation:	Low	Low	Low
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (30)	Low (34)	Low (34)

	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Soil erosion**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Very low (2)	Low (4)	Low (4)
Duration of impact:	Medium term (3)	Medium term (3)	Medium term (3)
Extent of the impact	Site specific (1)	Site specific (1)	Site specific (1)
Degree to which local resources are irreplaceable	Low (2)	Low (2)	Low (2)
Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	Moderate (3)
Probability of occurrence:	Medium probability (3)	Medium probability (3)	Medium probability (3)
Cumulative impact prior to mitigation:	Low	Low	Low
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (33)	Low (39)	Low (39)
Proposed mitigation:	• Ensure adequate erosion control measures are implemented to reduce the risk of soil erosion during the operational phase.		
Cumulative impact post mitigation:	Low	Low	Low

Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (22)	Low (33)	Low (33)
	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Continued dust generation and emissions**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Very low (2)	Very low (2)	Very low (2)
Duration of impact:	Medium term (3)	Medium term (3)	Medium term (3)
Extent of the impact	Local (2)	Local (2)	Local (2)
Degree to which local resources are irreplaceable	Low (2)	Low (2)	Low (2)
Degree to which the impact can be reversed:	High (2)	High (2)	High (2)
Probability of occurrence:	Medium probability (3)	Medium probability (3)	Medium probability (3)
Cumulative impact prior to mitigation:	Low	Low	Low
Significance rating of impact prior to mitigation	Low (33)	Low (33)	Low (33)

(Low, Medium, Medium-High, High, or Very-High)			
Proposed mitigation:	• Continued Dust Management as well as Traffic Management measures must be kept in place in order to manage traffic movement in the area during the entire operational phase and subsequently decrease undesired dust emissions.		
Cumulative impact post mitigation:	Low	Low	Low
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (16)	Low (16)	Low (16)
	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Continued deterioration of important heritage conservational cemetery sites (MVIA3 site)**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Very low (2)	Very low (2)	Very low (2)
Duration of impact:	Medium term (3)	Medium term (3)	Medium term (3)
Extent of the impact	Site specific (1)	Site specific (1)	Site specific (1)
Degree to which local resources are irreplaceable	Moderate (3)	Moderate (3)	Moderate (3)
Degree to which the impact can be	High (2)	High (2)	High (2)

reversed:			
Probability of occurrence:	Low probability (2)	Medium probability (3)	Medium probability (3)
Cumulative impact prior to mitigation:	Low	Low	Low
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (22)	Low (33)	Low (33)
Proposed mitigation:	• Continued maintenance and management to be conducted once the upgrading of the cemetery boundary fence and gates have been completed.		
Cumulative impact post mitigation:	Positive	Positive	Positive
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Positive (+6)	Positive (+6)	Positive (+6)
	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Continued transformation of early Proterozoic palaeontological**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Very low (2)	Low (4)	Low (4)

Duration of impact:	Long term (4)	Long term (4)	Long term (4)
Extent of the impact	Site specific (1)	Site specific (1)	Site specific (1)
Degree to which local resources are irreplaceable	Moderate (3)	Moderate (3)	Moderate (3)
Degree to which the impact can be reversed:	Low (4)	Low (4)	Low (4)
Probability of occurrence:	High Probability (4)	High Probability (4)	High Probability (4)
Cumulative impact prior to mitigation:	Medium	Medium	Medium
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (56)	Medium (64)	Medium (64)
Proposed mitigation:	• Ensure no unnecessary expansion of the project footprint occurs.		
Cumulative impact post mitigation:	Medium	Medium	Medium
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (38)	Medium (45)	Medium (45)

Socio-Economic Aspects			
	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Continued visual disturbance of natural landscape and sense of place**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Very low (2)	Low (4)	Low (4)
Duration of impact:	Short term (2)	Short term (2)	Short term (2)
Extent of the impact	Local (2)	Local (2)	Local (2)
Degree to which local resources are irreplaceable	Low (2)	Low (2)	Low (2)
Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	Moderate (3)
Probability of occurrence:	Medium probability (3)	Medium probability (3)	Medium probability (3)
Cumulative impact prior to mitigation:	Low	Low	Low
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (33)	Low (39)	Low (39)
Proposed mitigation:	• Strictly construction and development to the proposed project footprint. • Use existing roads as far as possible and limit the number of additional roads constructed.		

	• Adequate planning and management of laydown areas.		
Cumulative impact post mitigation:	Low	Low	Low
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (27)	Low (39)	Low (39)
	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Job creation and income generation**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	High (8)	High (8)	High (8)
Duration of impact:	Short term (2)	Short term (2)	Short term (2)
Extent of the impact	Regional (3)	Regional (3)	Regional (3)
Degree to which local resources are irreplaceable	None (0)	None (0)	None (0)
Degree to which the impact can be reversed:	0	0	0
Probability of occurrence:	High probability (4)	High probability (4)	High probability (4)

Cumulative impact prior to mitigation:	Positive	Positive	Positive
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Positive (+52)	Positive (+52)	Positive (+52)
Proposed mitigation:	None		
Cumulative impact post mitigation:	Positive	Positive	Positive
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Positive (+52)	Positive (+52)	Positive (+52)
	CSP (Parabolic Trough) system		
Identified Environmental Impacts	**Influx of job seekers and risk of theft and damage to property**		
EIA Regulations, 2014 Listed activity	GNR 983 Activity 11	GNR 983 Activity 28; GNR 984 Activity 1 & 15; GNR 985 Activity 12	GNR 985 Activity 4 & 18
Magnitude of Impact	Low (2)	Low (2)	Low (2)
Duration of impact:	Medium term (3)	Medium term (3)	Medium term (3)
Extent of the impact	Regional (3)	Regional (3)	Regional (3)
Degree to which local resources are	Low (2)	Low (2)	Low (2)

irreplaceable			
Degree to which the impact can be reversed:	High (2)	High (2)	High (2)
Probability of occurrence:	Medium probability (3)	Medium probability (3)	Medium probability (3)
Cumulative impact prior to mitigation:	Low	Low	Low
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (36)	Low (36)	Low (36)
Proposed mitigation:	• A local employment policy will be applied as far as possible in the appointment of permanent workers. • A designated security company will be appointed to ensure the safety of the facilities. • Adequately monitor and manage the process throughout the construction phase.		
Cumulative impact post mitigation:	Low	Low	Low
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (24)	Low (24)	Low (24)

10.4 PREFERRED ALTERNATIVE CONCLUDING STATEMENT

In identifying, evaluating and comparing impacts associated with the proposed CSP facility as well as the considered alternatives during the Scoping phase, it was concluded that the **CSP (Parabolic Trough) system** is the preferred and recommended alternative for the proposed project.

11. PROFESSIONAL OPINION OF THE EAP AND ENVIRONMENTAL IMPACT STATEMENT

11.1 PROFESSIONAL OPINION OF THE EAP

After careful consideration of the findings and outcomes of the EIA process, Enviroworks is of the opinion that the construction of the proposed Metsimatala CSP (Parabolic Trough) facility can be undertaken without unacceptable or unmanageably significant negative impact or fatal flaws on the environment, should the prescribed mitigation measures be implemented. Based on all information that was captured in this report, the proposed development should be considered plausible in the framework of NEMA. The majority of the anticipated impacts have low to medium ratings while the impacts determined to have medium-high to high ratings can be suitably reduced to acceptable levels by the implementation of the mitigation measures identified and recommended by the specialists. The Parabolic Trough technology was also determined to have the lowest environmental impact with regards to the alternative technologies considered and is therefore recommended. The socio-economic benefits of the project towards the local communities and wider environment far outweigh the significance of identified environmental impacts after mitigation implementation.

An Environmental Control Officer (ECO) must be appointed by the applicant/developer to actively assist and undertake environmental compliance audits to ensure that the construction phase of the development is acceptably implemented in an environmentally responsible and sustainable manner in accordance with the recommendations of the EMPr. The ECO must also ensure compliance with the conditions of approval in the EA to be issued by the competent authority.

The results of the appointed ECO's audits should be used to inform an Environmental Close-out Audit Report, which should be submitted to the competent authority at the end of the construction phase.

11.2 ENVIRONMENTAL IMPACT STATEMENT

The key findings of the EIA process can be summarised as follows:

The Receiving Environment

The majority of the surrounding area is degraded and is mainly characterised by subsistence farming activities and natural veld. The area is regarded as being of low ecological, agricultural or heritage significance/value according to the various specialist studies conducted. The highest identified potential environmental impacts are associated with avifauna in the area but these can be suitably reduced by implementation of the recommended mitigation measures by the specialists.

The proposed project also poses significant potential socio-economic benefits which far outweigh the significance of identified environmental impacts after mitigation implementation.

Public Participation

To support public interest and inform the Scoping & EIA process, a continual and comprehensive public consultation process has taken place throughout the duration of the assessment processes. A diverse mix of authorities, stakeholders and I & AP's have been consulted during this time, representing the environment, social, cultural, economic and political sectors of local, regional, provincial and national bodies.

Comments have been responded to during various stages of the public participation process in the Scoping & EIA phases and are formally addressed in project reports. It is considered that through the public participation conducted by the EAP, all relevant parties have been afforded adequate opportunity to partake in this process and express opinions and concerns. All relevant concerns have been adequately addressed and included in a PPP Report to ensure that all parties are in agreement with the approval of the proposed project.

12. CONCLUSION

This EIA process has adequately assessed the potential impacts associated with the proposed Metsimatala CSP (Parabolic Trough) facility development and determined based on the outcomes of a multitude of contributing information that the proposed development would not result in any unacceptable impacts or fatal flaws and as such may be authorised.

The project phase within which this report falls is the draft Environmental Impact Report, which is coupled with it a 30 day PPP comment period. This Final Report will be available on the following website link: http://www.enviroworks.co.za/projectdownloads.php under the name **Metsimatala 150 MW CSP Facility.**

All comments received during the PPP will be responded to and addressed in the Final EIR.
Upon completion of the Final EIR, the report will be submitted to the competent authority for review and decision making. On receipt of the report the competent authority will review the report and its appendices and do one of the following:

- Accept the report;
- Inform the applicant that the report is being sent for specialist review;
- Request for amendments to be made to the report; or
- Reject the report, should it not materially comply with regulations.

On the issuing of the decision by the competent authority all I & AP's must be notified of the decision and be afforded the opportunity to appeal against the decision if desired. The EAP will communicate the decision and appeals process through to I & AP's within 14 days of the receipt of the decision from competent authority.

13. REFERENCES

Conservation of Agricultural Resources Act (Act 43 of 1983)

DEA. 2010. *Draft Guideline on the Need and Desirability in terms of the EIA Regulations of 2010*. Integrated Environmental Management Guideline Series 9, Government Notice 792 of 2012, Department of Environmental Affairs, Pretoria.

DEA&DP. 2013a. *Guideline on Need and Desirability, EIA Guideline and Information Document Series*. Western Cape Department of Environmental Affairs & Development Planning (DEA&DP).

DEA&DP. 2013b. *Guideline on Alternatives, EIA Guideline and Information Document Series.* Western Cape Department of Environmental Affairs & Development Planning (DEA&DP).

Electricity Regulation Act 2006 (Act 4 of 2006)

Integrated Resource Plan for Electricity, 2010 - 2013

Mucina, L. & Rutherford, M.C. (eds.) 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

National Development Plan - 2030

National Environmental Management Act (Act 107 of 1998)

National Environmental Management Act (Act 107 of 1998); Environmental Impact Assessment Regulations, 2014

National Environmental Management: Biodiversity Act (Act 10 of 2004)

National Environmental Management: Waste Act (Act 59 of 2008)

National Forests Act (Act 84 of 1998)

National Heritage Resources Act (Act 25 of 1999)

National Infrastructure Plan, 2012

National Water Act (Act 36 of 1998)

Northern Cape Nature Conservation Act (Act 9 of 2009)

Northern Cape Provincial Growth and Development Strategy (NCPGDS)

Northern Cape Provincial Spatial Development Framework

Republic of South Africa. 1996. Constitution of South Africa (No 108. of 1996). [Online]. Available at: http://www.info.gov.za/documents/constitution/1996/a108-96.pdf. [Retrieved on September 2 2013]

Tsantsabane Local Municipality Integrated Development Plan 2014-2015

White Paper on Renewable Energy Policy in South Africa (2003)

ZF Mgcawu District Municipality Integrated Development Plan 2014-2015