DRAFT SCOPING 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

Prepared for: Metsimatala CSP Solar Energy (Pty) Ltd

Prepared by: Enviroworks

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Part of the SHE GROUP

Prepared by

enviro works

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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

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1. EXECUTIVE SUMMARY

Introduction

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.

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, a Small, Medium and Micro-sized Enterprise (SMME) company, was established in November 2002. Although the formal establishment of the company took place in 2002, it is backed by over 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.

Project Location

The proposed project facility and associated infrastructure will be established on the Farm Groenwater No 453 which is approximately 11 894.77 ha in total size and 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 also 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 fall inside 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 the Farm Groenwater No 453.

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

(See Appendix F for the title deeds)

Project Alternatives Considered

Due to this proposed project being a revision of an initial project for which Environmental Authorisation was already received, it was not deemed necessary to provide location alternatives again as this currently proposed project location has already been approved in the initial project Authorisation.

The following technology alternatives for the establishment and operation of a solar power plant were however considered:

Concentrating Solar Power technology (CSP) was determined to be the most favourable technology option due to it having significant storage capability enabling it to continuously generate electricity during the night or times of lower solar radiation levels.

Alternatives within the Concentrating Solar Power technology (CSP) were considered and compared in order to determine the preferred option. Central Tower Systems was the second viable

CSP technology alternative that was considered but the Parabolic Trough System was chosen as 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
	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.
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 such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area.	Construction and operation of a CSP Facility with associated infrastructure 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	Construction and operation of a CSP Facility with associated infrastructure on an area with indigenous vegetation covering a

Regulation	Activity	Description of trigger activity in proposed project
	required for - (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	footprint area of 500 ha.
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:	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.
	Activity 12 The clearance of an area of 300 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:	Construction and operation of a CSP Facility with associated infrastructure on an area with indigenous vegetation covering a footprint area of 500 ha.
	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:	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

Regulation	Activity	Description of trigger activity in proposed project
		trenches to existing watercourses.

Potential Environmental Impacts Identified

The Scoping phase has identified potential impacts which are discussed in detail in this report. They will need further investigation during the EIA phase to conclude on their significance.

At this preliminary stage, no “red flag” significant potential impacts on the environment have been identified of which the severity might suggest that the EIA phase and proposed project should not continue.

Public Participation Process

A continual and comprehensive Public Participation Process (PPP) will be undertaken throughout the entire Scoping & EIA process with all stakeholders and Interested and Affected Parties (I & AP’s), including the relevant Organs of State and Competent Authority (DEA) as identified during the Scoping Phase.

The PPP will be 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.

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.

Conclusion

In conclusion, although there are no environmental fatal flaws identified during the Scoping Phase, there are a number of potentially significant environmental impacts that require the attention of specialists in their specific fields. A detailed Environmental Impact Assessment is therefore required

to further investigate and assess these potential impacts and to recommend appropriate mitigation measures, where required.

2. LIST OF FIGURES

3. LIST OF TABLES

4. ABBREVIATIONS

BA	Basic Assessment
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
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
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
MSA	Middle Stone Age
MVA	Megavolt ampere

MW	Megawatt
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act (Act 25 of 1999)
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
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

5. 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 and 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 (i.e. solar thermal) while the latter does not (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 the potential to 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. This is rapidly being realised on an international scale with critical focus on reducing global atmospheric greenhouse gas emissions, to address global temperature rise 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 technologies for the generation of electricity. Such identified forms 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, 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 ideal for Solar power as it is located on the Earth’s sun belt, where there is frequent light and high level of radiation receiving 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 activities and relevant infrastructure; the identification of significant environmental impacts associated to the proposed project; identification of appropriate

alternatives and mitigation measures for reduction of undesired impacts; and communication of results in a clear and concise manner to the competent authorities and other relevant parties.

5.1 PROJECT HISTORY AND OVERVIEW

The original project scope of work was for the development and management of a 50 MW CSP Facility (Parabolic Trough System) and Enviroworks was requested by Metsimatala CSP Solar Energy (Pty) Ltd to act as the EAP and facilitate the entire Environmental Authorisation application process. A full Scoping & EIA process was therefore conducted on behalf of the client as per the EIA Regulations, 2010 requirements and the Final EIR was subsequently submitted to the competent authority (Department of Environmental Affairs). Environmental Authorization was received from the DEA on 10 October 2012 for the originally proposed project to continue. An amendment request regarding the Environmental Authorisation was however submitted to the Competent Authority on 1 August 2013 which was subsequently approved on 28 October 2013.

The magnitude of the project scope of work was however increased in the meantime to 150 MW and a new Environmental Authorisation application process therefore had to commence for the revised project scope of work. The new application process will however be based on 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 Metsimatala CSP Solar Energy (Pty) Ltd to act as the EAP and facilitate this second application process. The revised application process is however divided into two sections namely:

- A Basic Assessment needs to be conducted for the construction and operational phases of a new 132 kV powerline which will originate at the substation of the newly proposed facility and will connect into Eskom's national power grid at the relevant substation. An application for the connection of the Project to the Eskom network was submitted on 1 July 2015 by the lead developer Metsimatala CSP Solar Energy (Pty) Ltd. The Eskom Cost Estimate Letter ("CEL") was received on 17 September 2015 (Eskom Ref. 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 consists of both Eskom built and self-built components.
    - The proposed diversion of the existing 132 kV Blingklip powerline traversing the proposed facility footprint will also be included.
- A full Scoping & EIA process needs to be conducted for the construction and operational phases of the rest of the Solar Power facility and associated infrastructure.

5.2 PROJECT ALTERNATIVES CONSIDERED

Due to this proposed project being a revision of an initial project for which Environmental Authorisation was already received, it was not deemed necessary to provide location alternatives again as this currently proposed project location has already been approved in the initial project Authorisation.

The following technology alternatives for the establishment and operation of a solar power plant were however considered:
Concentrating Solar Power technology (CSP) was determined to be the most favourable technology option due to it having significant storage capability enabling it to continuously generate electricity during the night or times of lower solar radiation levels.

Alternatives within the Concentrating Solar Power technology (CSP) were considered and compared in order to determine the preferred option. Central Tower Systems was the second viable CSP technology alternative that was considered but the Parabolic Trough System was chosen as the preferred technology alternative.

5.3 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

6. ENVIRONMENTAL ASSESSMENT PRACTITIONER

6.1 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, a Small, Medium and Micro-sized Enterprise (SMME) company, was established in November 2002. Although the formal establishment of the company took place in 2002, it is backed by over 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. 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 our years of experience and industry presence assures the seamless execution and roll out of tasks to achieve projected results on time. The company continuously engages existing and emerging legislation, guidelines and practices, to ensure the execution of qualitative and appropriate studies. Our past experience on renewable energy projects further benefits our understanding of technology-related processes and the impacts thereof.

Table 4: Details of the EAP

Company/entity name:	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

6.2 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 projects.

Relevant Project Experience

2016

- Management of the Environmental Authorisation and EIA processes of the proposed Meerkat Hydropower Facility Project in the Northern Cape Province.
- Management of the Environmental Authorisation and Basic Assessment processes of the proposed Wegdraai Cultivation of Virgin Soils Project in the Northern Cape Province.
- Completion of a specialist vegetation study and report for the proposed Olifantshoek Bulk Water Supply Project in the Northern Cape Province.

See Appendix A for Curriculum Vitae.

6.3 PUBLIC PARTICIPATION OFFICER

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

See Appendix A for Curriculum Vitae.

6.4 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-FS). 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”) and NEMA EIA Regulations.

In 2002 Elbi established Enviroworks. As the Director of the company, Elbi gained extensive experience in the conducting of Environmental Impact Assessments, Risk Analysis, Auditing and Monitoring and Compiling of Environmental Management Plans for numerous projects. A familiarity with departmental mechanisms and functioning aided towards the success of these projects.

Designation: Company Director
Contact number: 082 562 4134
Email address: elbi@enviroworks.co.za

See Appendix A for Curriculum Vitae.

7. RELEVANT ENVIRONMENTAL LEGISLATION AND GUIDELINES

7.1 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."

The following sections provide an overview of the relevant environmental legislation and guideline documents applicable to the proposed project.

7.2 OTHER RELEVANT ENVIRONMENTAL LEGISLATION

Aside from NEMA, other key environmental legislation, policies, plans and guidelines will also be triggered by the proposed project, whilst others shall provide strategic goals and priorities for different resources and sectors.

The environmental legislation relevant to the proposed project and which has been taken into account in the preparation of the Draft Scoping Report is summarised below:

7.2.1 National

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

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 and provides for the sustainable usage of the country's indigenous biological resources.

NEMBA and its Regulations was therefore utilised for determining the ecological/biodiversity significance, value and subsequently 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).

National Forests Act (Act 84 of 1998)

The aim of the National Forests Act 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 protection of specific forests and tree species which duly require formal protection in order to ensure their prolonged existence.

The National Forests Act 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 provincial authority, which in this case is the Department of Environment and nature Conservation in the Northern Cape Province.

Conservation of Agricultural Resources Act (Act 43 of 1983)

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.

National Water Act (Act 36 of 1998)

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 and there seems to be no relevant water use types which are triggered during the construction and operational phases of the proposed project:

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.

National Heritage Resources Act (Act 25 of 1999)

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 bequeathed for future generations.

Section 38 lists categorised development processes which require the South African Heritage Resources Agency (SAHRA) to be notified and furnished with an archaeological study 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 000m2 in extent; or

(ii) involving three or more existing erven or subdivisions thereof; or

(d) the re-zoning of a site exceeding 10 000m2 in extent; or

The South African Heritage Resources Agency (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.

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

After consultation with the National Department of Environmental Affairs (Ms. Z. Mbili) it was determined that the Metsimatala 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.

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).

Integrated Resource Plan for Electricity, 2010-2013

In accordance with the Energy Act 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 least cost supply option and provide information on the opportunities for new investment. The plans 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.

Electricity Regulation Act 2006 (Act No. 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 (IPPs). 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.

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 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 positive contribution towards this milestone.

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)*.

7.2.2 Provincial

Northern Cape Nature Conservation Act (Act 9 of 2009)

In addition to NEMBA, the Northern Cape Nature Conservation Act 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 NEMBA to determine the ecological/biodiversity significance, value and subsequent management of the proposed project area.

It is overseen by The Department of Environment and Nature Conservation in the Northern Cape Province.

Northern Cape Provincial Spatial Development Framework

The Northern Cape Provincial Spatial Development Framework (NCPSDF) was formulated in 2011 to meet the requirements of the Northern Cape Planning and Development Act, 1998 (Act 7 of 1998) and the Municipal Systems Act, 2000 (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 'island' 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.

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.

7.2.3 District and Local

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.

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 (Tsantsabane *Local Municipality Integrated Development Plan Review 2014-2015)*.

7.3 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 5: 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).

7.4 NEMA LISTED ACTIVITIES TRIGGERED BY THE PROPOSED PROJECT

The National Environmental Management Act (Act 107 of 1998) is the principle/framework legislation governing Environmental Impact Assessment and subsequent Environmental Authorisation 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 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 Environmental Authorisation being obtained for a desired project.

Considering the nature and scale of the development activities triggered by the proposed project, it was deemed necessary 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 Environmental Authorisation applied for.

Only once Environmental Authorisation is approved and required supporting permits have been issued, may the applicant lawfully commence with the proposed project, thus rendering the Scoping & EIA processes a critical component in the feasibility and planning stage of any 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 6: 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.

Regulation	Activity	Description of trigger activity in proposed project
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 such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area.	Construction and operation of a CSP Facility with associated infrastructure 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 Facility with associated infrastructure on an area with indigenous vegetation covering a footprint area of 500 ha.
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:	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.
	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:	associated infrastructure on an area with indigenous vegetation covering a footprint area of 500 ha.
	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:	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.

7.5 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 Scoping Report as per Appendix 2 of the Regulations as well as providing cross-references to where the relevant information is located in this document and/or its appendices.

Table 7: Information required in the Scoping Report as per Appendix 2 of GN R. 982 of the EIA Regulations, 2014

EIA Regulations, 2014 - Appendix 2 – Content of Scoping Report	Location in this document
(a) details of-	
(i) the EAP who prepared the report; and	Section 6.1
(ii) the expertise of the EAP, including a curriculum vitae;	Section 6.2

(b) the location of the activity, including-	
(i) the 21 digit Surveyor General code of each cadastral land parcel;	Section 8.1
(ii) where available, the physical address and farm name;	Section 8.1
(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Section 8.1
(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is-	Section 8.1
(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	NA
(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	NA
(d) a description of the scope of the proposed activity, including-	
(i) all listed and specified activities triggered;	Section 7.4
(ii) a description of the activities to be undertaken, including structures and infrastructure;	Section 8.2
(e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;	Section 7
(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 9
(h) a full description of the process followed to reach the proposed preferred activity, site and location within the site, including -	
(i) details of all the alternatives considered	Section 10
(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 12
(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Section 12
(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 11

(v) the impacts and risks identified for each alternative, 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 13
(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	Section 13.1
(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 13
(viii) the possible mitigation measures that could be applied and level of residual risk;	Section 13
(ix) the outcome of the site selection matrix;	NA
(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and	NA
(x) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	Section 13.5
(i) a plan of study for undertaking the environmental impact assessment process to be undertaken, including -	Section 8
(i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;	Section 11
(ii) a description of the aspects to be assessed as part of the environmental impact assessment process;	Section 14.2
(iii) aspects to be assessed by specialists;	Section 8.2
(iv) a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;	Section 14.1
(v) a description of the proposed method of assessing duration and significance;	Section 14.1
(vi) an indication of the stages at which the competent authority will be consulted;	Section 13.1
(vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; and	Section 13
(viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process;	Section 8.1

(ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.	Section 14.2
(j) an undertaking under oath or affirmation by the EAP in relation to-	Appendix D
(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	Section 13.2
(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;	Section 13.2
(k) an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment;	Appendix D
(l) where applicable, any specific information that may be required by the competent authority and	NA
(m) any other matter required in terms of section 24(4)(a) and (b) of the Act.	NA

8. PLAN OF STUDY FOR THE EIA PROCESS

During the Environmental Impact Assessment phase, the full results of the specialist studies conducted will be integrated into the Final Environmental Impact Report and potential Environmental Impacts will be thoroughly assessed and rated in order to determine their significance to the environment and recommend mitigation measures.

8.1 TASKS TO BE UNDERTAKEN DURING THE EIA PROCESS

On commencement of the Impact Assessment Phase, the key tasks to be undertaken will be as follow:

- Provide a detailed description of the proposed activity and affected bio-physical and socio-economic environment;
- Specialists will conduct and complete studies to address all significant issues identified during the Scoping Phase. A summary of the findings and recommendations will be provided and copies of the specialist reports will be included in the appendices of the Final Environmental Impact Report;
- Provide a description of the needs and desirability of the proposed project and the possible alternatives, including the advantages and disadvantages that the project may have on the bio-physical and socio-economic environment;
- Investigate and conduct a comparative assessment of the identified possible alternatives which may include:
    - Site alternatives, which represent different properties or locations where the development could be constructed.
    - Design or layout alternatives, such as varying blueprint or orientation options.
    - Routing alternatives for transmission lines and roads, which would determine the path by which electricity is transferred to the substation and site access is gained.
    - Technology alternatives as opposed to using the CSP technology.
    - The ‘no-go’ alternative, which would mean that the facility is not constructed and the status quo would prevail.
- The potential Environmental Impacts will be fully assessed and evaluated through the use of the impact rating methodologies.
- A detailed description of the Public Participation Process followed.
- An assessment of cumulative impacts will be completed.
- Account for all assumptions, uncertainties and gaps in knowledge.
- The provision of an Environmental Impact Statement.

- The assignment of mitigation and management measures for incorporation during the construction and operational phases through the preparation of a draft Environmental Management Programme (EMPr).

8.2 SPECIALIST STUDIES REQUIRED

During the EIA phase, the specialists may be required to undertake further specific investigations on potential key issues identified during the Scoping phase. The final results of the specialist studies will then be incorporated into the Final EIR and used to complete the Impact Ratings process. The required specialist studies are indicated in the table below:

Table 8: Description of Specialist studies to be undertaken

Specialist Study	Description of ToR for Study
Soil and Land Capability Assessment	• A detailed Soil analysis. • Current Land Use on the site. • Surrounding Land Use. • Current status of land, erosion, vegetation cover, water availability etc. • Description and Motivation of change or no change of land use from agriculture. • Potential Alternative Land uses. • To obtain written comments on your report from the Department of Agriculture and Forestry contact person.
Ecological and Wetland Assessment	**Terrestrial** • Baseline survey and describe the impacted environment within the project footprint (including any alternatives and all associated infrastructure) from a biodiversity perspective. • Take into consideration the provincial biodiversity conservation plan. • Assess the current ecological status and the conservation priority within the project footprint and adjacent area (as deemed necessary). • Provide a concise description of the importance of the affected area to biodiversity in terms of pattern and process, ecosystem goods and services, as appropriate. • Undertake sensitivity study to identify protected species, threatened species, alien species and medicinal species. • Prepare a biodiversity sensitivity map with the use of

	a Geographical Information System (GIS), based on the findings of the study. • Identify potential fatal flaws associated with the project and its alternatives from a biodiversity perspective. • Assess all potential impacts and assign significance to the impacts. • Prepare a report including mitigation measures for minimising negative impacts. • Prepare a Biodiversity and Ecological Sensitivity map, with the use of a Geographical Information System (GIS), based on the findings of the study, which must accompany the report. **Wetland** • Desktop Study • Walk-through Survey • Broad area Survey (use of aerial photographs and GIS Databases) • WETLAND-IHI (only applied to major wetlands) • Wetland delineation completed (indicated on map) • Compilation of Final Report by Specialist (incorporation of comments received) • A Wetland Sensitivity map, with the use of a Geographical Information System (GIS), based on the findings of the study, must accompany the report.
Avifaunal Assessment	• Description of the receiving environment (habitat) from an avifaunal perspective. • Identification of high risk species, particularly Red Data Listed and other priority species that might be impacted by the proposed project. • Description and assessment of potential impacts on priority avifauna. • Provision of mitigation measures to reduce the anticipated impacts. • An Avifaunal Sensitivity map, with the use of a Geographical Information System (GIS), based on the findings of the study, must accompany the report.
Heritage Impact Assessment	**Archaeology** • A Phase 1 Archaeological Impact Assessment in accordance with the South African Heritage

	Resources Act (Act 25 of 1999). • Walk-through Survey • Review of literature • Compilation of Final Report by Specialist (incorporation of comments received) • An Archaeological Sensitivity map, with the use of a Geographical Information System (GIS), based on the findings of the study, must accompany the report. **Palaeontology** • Desktop study is required and based on the outcome of the desktop study, a field assessment is likely • Investigate available resources (geological maps, scientific literature, previous impact assessment reports, institutional fossil collections, satellite images, etc) to inform an assessment of fossil heritage and/or exposure of potentially fossiliferous rocks within the study • A Palaeontological Sensitivity map, with the use of a Geographical Information System (GIS), based on the findings of the study, must accompany the report.
Socio-Economic Impact Assessment	• Review of existing project information, including project and planning documents. • Identification of the components associated with the proposed operation, including total capital expenditure, number of employment opportunities created, breakdown of the employment opportunities in terms of skill levels (unskilled, semiskilled and skilled) breakdown of wages per skill level, assessment procurement policies etc. • Collection and review of reports and baseline socio-economic data on the area (IDPs, Spatial Development Frameworks etc.). • Site visit and interviews with selected key affected parties, including adjacent landowners and local authorities, representatives from the local famer's union etc. • Identification and assessment of key social and socio-economic issues. • Consideration of existing land uses including tourism related activities.

	• Assessment of potential impacts (negative and positive) associated with the construction and operational phase. • Identification of potential mitigation and enhancement measures.
Visual Impact Assessment	• Desktop analysis of aerial photography and existing mapping information, including GIS and topographic maps, to identify representative publicly accessible viewpoints, potentially affected receptors and potential local landscape character and visual context areas for site assessment purposes. • A site evaluation to verify the results of the desktop study and provide more detailed information about the site and likely impacts to arise. Publicly accessible and representative viewpoints are to be confirmed, recorded and photographed. • A qualitative assessment of landscapes and visual impacts of the proposed facility is then undertaken. • A chronological order of steps taken in the VIA can be described as follow: o Describe the site context, location and environmental characteristics. o Describe and categorise the proposed development in terms of accepted guidelines. o Identify main view corridors and prepare a photographic record. o Undertake a view-shed analysis to identify and pick observation points for the VIA. o Assess the potential visual impact of the proposed development from selected observation points as per normative measures and guidelines.

9. 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.

9.1 PROJECT LOCATION

The proposed project facility and associated infrastructure will be established on the Farm Groenwater No 453 which is approximately 11 894.77 ha in total size and 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 also 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 fall inside 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 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 image of the proposed project area is illustrated in Figure 1 while the location of the proposed project area in relation to the nearby town, access roads and adjacent farms is illustrated on the locality map in Figure 2 below:

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

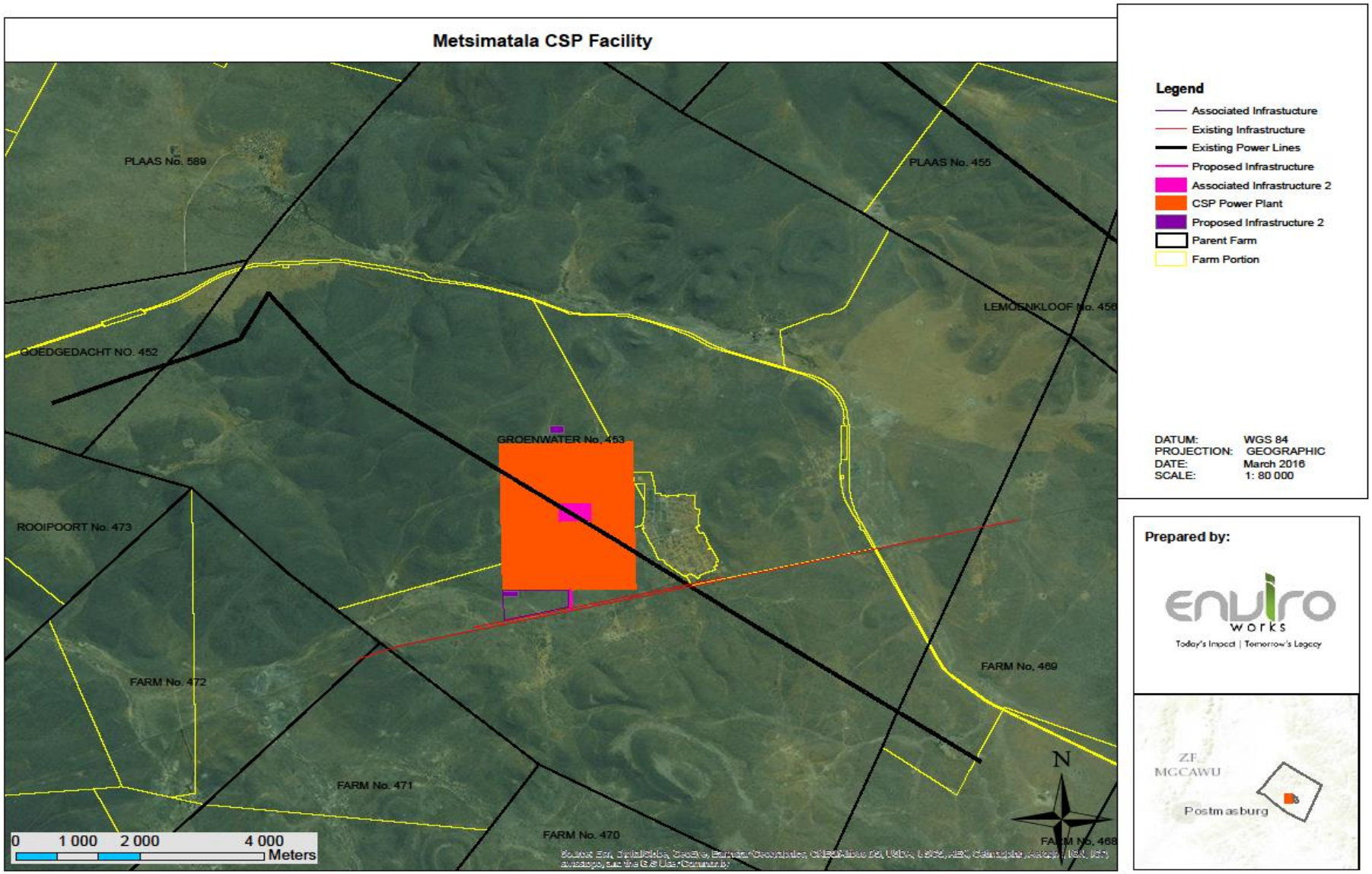

Figure 2: Locality map of the proposed project layout

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

9.2 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 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. 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 on the outside boundary of the proposed project area. This will be included in the separate Basic Assessment to be conducted for the transmission lines.

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.

9.2.1 CSP Facility and Associated Infrastructure

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 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 oil captures this heat as the oil circulates through receiver tubes, reaching temperatures of up to 400°C. The hot oil 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 not sufficient 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 7.5 hour molten salt storage. The total footprint of the parabolic trough plant will be approximately 500 hectares (including associated infrastructure).

The plant layout consists of a solar field and a power block in which are placed all the equipment necessary to the production of electricity. Most of the plant layout 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 must be designed in order to have all the areas necessary to fully enable the Operation and Maintenance activities.

The main infrastructure components of the proposed project are listed below:

Table 10: Description of proposed project infrastructure

Main Infrastructure	Description
Solar field	The solar field comprises 650 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). The solar field will cover the majority of the proposed project footprint.
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. The HTF system comprises 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 North-South orientation has been 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.

Thermal Energy Storage system	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 7.5 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: One Hot Salt Tank; One Cold Salt Tank; One Drain Tank, Cold salt pumps including one standby pump per tank (4 + 1); Hot salt pumps including one standby pump per tank (4 + 1); Trains of HTF-Salt heat exchangers (HE); Interconnecting piping; Six electrical heaters per tank; Heat Trace System; Filters, and Nitrogen System. The system proposed for the Project has been demonstrated commercially.
Power block and auxiliary systems	Solstice's power block is based around unitized 50 MWe reheat turbine islands each with dedicated cooling and feed-heating plant. The footprint of the power block will be near the centre of the footprint area and is approximately 4 000m² or 0.4 ha in size.
Associated Infrastructure	**Description**
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.
Substation	The distribution substation will be approximately 173 m X 173.5 m and will ideally be located in close proximity to the existing power lines. 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 traverse the site. A new access road, which is approximately 370 m 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. 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 health and 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.
Temporary work areas	A lay down area of approximately 38.8 ha adjacent to the site or access route 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. 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 purposes of the proposed Metsimatala parabolic trough 150 MW facility it is intended to make use of the Vaal Gamagara pipeline. The water abstracted from this pipeline will be utilised for the cleaning of the mirrors and human consumption in the offices. The applicant has approached the Sedibeng Water Authority for approval of this water

	source.
Power block building	This will contain all the component and facilities required for the electricity generation and transmission processes including the turbines.
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. This facility will fall inside the 500 ha footprint.
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.
Sewage treatment facilities	During construction phase, Sanitech will be responsible for the sewage handling. The following applies to operational phase handling of sewage: Three sewage reticulation systems were considered: • 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; and 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. 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, the following was concluded: 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 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. The Tsantsabane Local Municipality has indicated that it shall be able to accommodate general waste at its landfill site. The Waste Act will not

	be triggered as general waste quantities will fall below the threshold.
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 m3 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 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 of 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 (NALCO 73360) 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.

All infrastructure will be located within the borders of the 500 ha proposed project area. For further elaboration and clarification of the technical and layout aspects regarding the proposed facility please refer to the Process Description report in Appendix E.

10. 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.

11. 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).

Alternatives considered for the proposed CSP Facility include two technology alternatives and a no-go option. The following section describes those alternatives that have been considered (i.e. identified and investigated) and indicate which alternatives are deemed to be "feasible" and "reasonable" and therefore preferred. It also indicates and compares the advantages and disadvantages of these alternatives.

11.1 LOCATION ALTERNATIVES

Due to this proposed project being a revision of an initial project for which Environmental Authorisation was already received, it was not deemed necessary to provide location alternatives again as this currently proposed project location has already been approved in the initial project Authorisation.

The details of the initially approved project are as follows:
FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED COMPACT LINEAR FRESNEL REFLECTOR FACILITY ON PORTION 4, 5 AND REMAINDER OF THE FARM GROENWATER 453 AND FARM 455 , NORTHERN CAPE PROVINCE,
SOUTH AFRICA (DEA Reference 12/12/20/2252/2)

The establishment of a CSP facility is also very dependent and sensitive of the topography and slope of an area. A virtually flat area is required in order to optimise the operational processes after installation. This proposed project area which was also approved in the initial project application has very favourable topography with virtually no slope making it the preferred location in the area.

11.2 TECHNOLOGY ALTERNATIVES

Solar power technologies can be loosely classified as Photovoltaic (PV) and Concentrated Solar Power (CSP). At this stage of the project only the CSP technology is being considered.
CSP systems use lenses or mirrors and tracking systems to concentrate a large area of sunlight, or solar thermal energy, onto a small area. 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. The advantage of CSP technology compared to silicon and thin film PV is higher conversion efficiencies and therefore lower generation costs. Concentrating technologies exist in four common forms namely: parabolic trough, concentrating linear fresnel reflector, solar power tower and dish Stirling generators.

Concentrating Solar Power technology (CSP) was determined to be the most favourable technology option due to it having significant storage capability enabling it to continuously generate electricity during the night or times of lower solar radiation levels.

Alternatives within the Concentrating Solar Power technology (CSP) were considered and compared in order to determine the preferred option. Central Tower Systems was the second viable CSP technology alternative that was considered but the Parabolic Trough System was chosen as the preferred technology alternative.

Alternative 1 (Preferred): 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. Many 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 heat of the sun is reflected off the mirrors and due to the curved shape of the mirrors; most of the heat is concentrated to a specific focal line position in front of the mirrors.
- A receiver tube is placed in this concentrated focal solar line and 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 fluid mixture which is able to contain the heat energy of the sun well. Originally a special type of oil, called therminol, was used as the transfer fluid. Today, new designs are using a molten salt compound as the transfer fluid. The molten salt is a mixture of 60 % sodium nitrate and 40 % potassium nitrate, commonly called saltpeter. The molten salt can achieve a higher temperature and hold heat longer than the therminol. However, 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 degrees 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 six hours when stored in specially designed storage tanks. This means that power is still available for up to six hours after the sun goes low on the horizon - enough to cover the period of peak electrical demand. The heated fluid can then continue producing electricity during the night even when the sun is not providing heat energy to the system.
- 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.
- See figures below illustrating the functionality of the system.

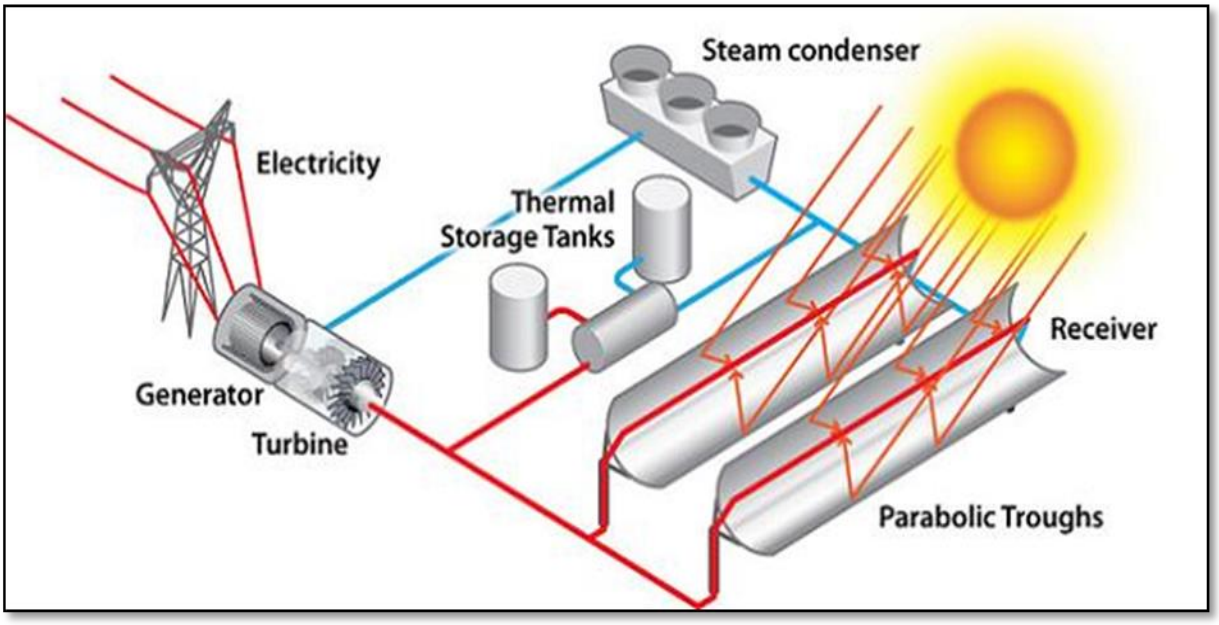

Figure 3: Illustration of the functionality of a Parabolic Trough System

Figure 4: An example of the layout of a Parabolic Trough System

Advantages

- The technology is more proven than others and has been successfully implemented elsewhere in the country as well.

- The technology requires approximately half the size of land compared to the technology of alternative 2 for the same generation output. It is therefore significantly less expensive and complex to operate and will have a smaller environmental footprint and subsequent negative impact.
- The technology utilises significantly less water than the technology of alternative 2. Water usage efficiency is therefore much better.
- Parabolic trough systems have a significantly smaller visual impact compared to the solar tower system due to the height of the solar field of the trough system which will only be approximately 15 m as opposed to the central receiver of alternative 2 which could even be up to 200 m in height.

Alternative 2: Solar Tower System

Should the Central Tower CSP technology be chosen it will be a molten salt central receiver solar generating plant with a nominal capacity of 150MW and 9 hours of storage.

Generation of electricity from a molten-salt power tower facility can be broken down into the following steps:

Sunlight is concentrated and directed from a large field of heliostats (mirrors) to a central receiver/tower; central receiver which is located at the top of a 200m

Molten salt from the cold salt tank is then pumped through the receiver where it is heated to 566°C via solar energy directed by heliostats onto the central receiver. The Molten salt in the Cold tank is stored at a temperature of 288°C.

The heated molten salt is pumped into the hot-salt storage tank, where it can be stored for a period of 3-15 hours. Heated molten salt is pumped from the hot-salt storage tank to the steam generator, where superheated steam is produced. The steam then drives the steam turbine.

The turbine spins the electric generator, creating electricity, which is stepped up to a higher voltage through a transformer and placed into the grid.

A 360 degree heliostat field consisting of mirrors reflects the sunlight onto the central receiver which is located at the top of a 200m tall tower. In the closed loop system, molten salt as the heat transfer fluid (HTF) is pumped from the cold tank at the base of the tower to the receiver where it is heated by the reflected radiation from the heliostats. The hot transfer fluid is then transferred to the hot tank. Electricity can then be generated at any time of day by pumping the hot transfer fluid through a steam generator to generate standard high pressure and high temperature steam which is then passed through a steam turbine to generate electricity. The power plant will be dry cooled and thus more environmentally friendly due to the lower water usage. The power plant will be designed to have a plant life of about 30 years and to cover a maximum of approximately 700 hectares.

In summary the plant will consist of:

- Solar thermal power generation facility or power block with a 150MW steam turbine and steam generator (heat exchanger);
- Solar field reflective surface area comprising of heliostats (mirrors)
- Reinforced concrete square tower - 200m high with molten salt receiver
- Hot and Cold molten slat storage tanks
- Dry cooling technology to dump the low grade waste heat from the power generator
- Associated infrastructure for utilities, i.e. water pipeline, power (132kV), telecommunications, access road, etc.

Heliostats

The solar field located around the base of the tower will have heliostats (mirrors) that will reflect sunlight onto the central receiver located at the top of an approximate 200 m tall tower.

Tracking system

A single axis tracking system aligned in North-South orientation has been 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.

Thermal Energy Storage System

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 9 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:

- One Hot Salt Tank;
- One Cold Salt Tank;
- One Drain Tank,
- Cold salt pumps including one standby pump per tank (4 + 1);
- Hot salt pumps including one standby pump per tank (4 + 1);
- Trains of HTF-Salt heat exchangers (HE);
- Interconnecting piping;
- Six electrical heaters per tank;

- Heat Trace System;
- Filters, and
- Nitrogen System.

The Solar Tower System functions as follows:

- Multiple large slightly curved mirrors called heliostats (made of glass and steel) are arranged adjacent to each other in rows facing the sun and aligned on a north-south axis. Many parallel rows of 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.
- A receiver tower is constructed at a pre-determined position in front of the sea of mirrors and the heat of the sun is reflected off the mirrors and concentrated to a specific focussed receiver point position on the receiver tower.
- A receiver is made up of steel panels which consist of an array of pipes filled with water. The receiver is heated to extremely high temperatures by the focussed solar heat which makes the water in the pipes evaporate and turn to steam.
- The steam is then sent to a steam turbine where the steam spins the turbine which in turn spins a generator which generates electricity.
- The steam is then cooled until it condenses back to water and can be recycled for re-use in the process.
- See figures below illustrating the functionality of the system.

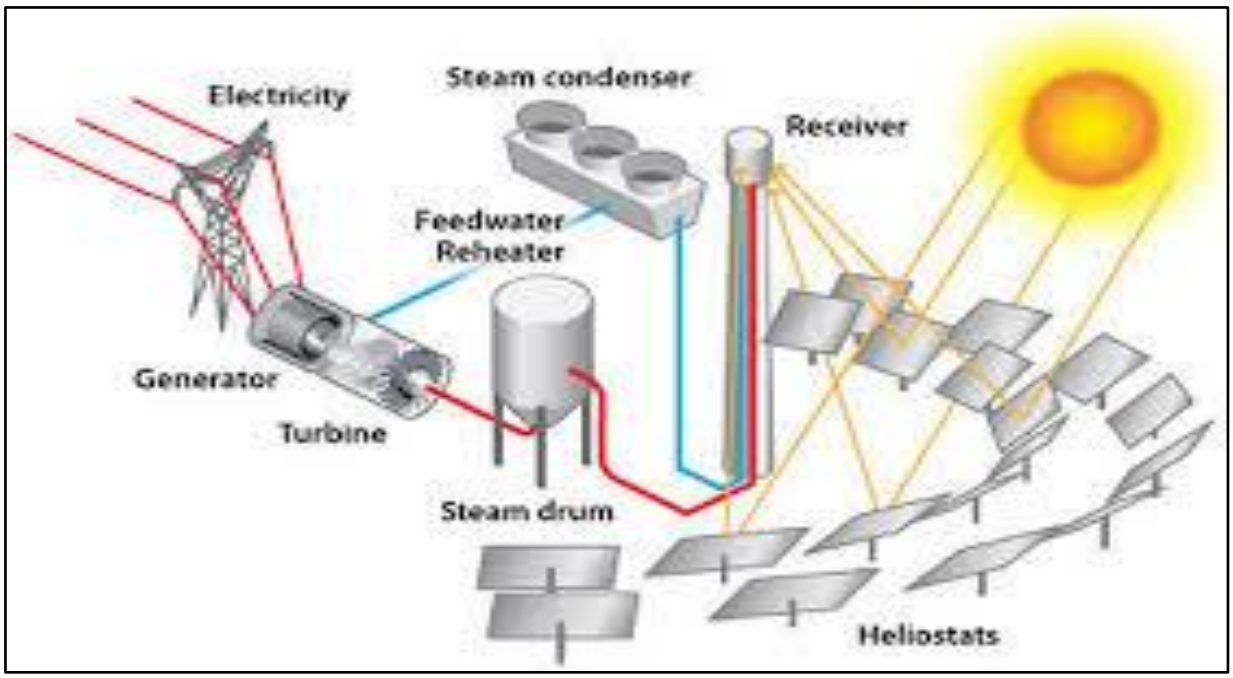

Figure 5: Illustration of the functionality of a Solar Tower System

Figure 6: An example of the layout of a Solar Tower System

Disadvantages

- The technology is less proven than the parabolic trough systems.
- The technology requires approximately twice the size of land compared to the Parabolic Trough technology for the same generation output. It is therefore significantly more expensive and complex to operate and will have a larger environmental footprint and subsequent negative impact.
- The technology utilises significantly more water than a Parabolic Trough technology due to the size of the heliostats. Water usage efficiency is therefore not as good.
- Central tower has a significantly higher visual impact due to the height of the central receiver which could even be up to 200 m – 250 m in height versus the height of the solar field of the trough system which will only be approximately 15 m.
- The significant impact of the central tower system on avifauna is also discussed in more detail in Section 12.1.5.

11.3 "NO-GO" OPTION

Advantages

The negative environmental impacts associated with the proposed project and its alternatives as identified under Section 13 will be avoided if the proposed project is not implemented.

Disadvantages

If the proposed project however does not go ahead, the local communities 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.

12. 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 11: 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

12.1 BIO-PHYSICAL DESCRIPTION

12.1.1 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.

12.1.2 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.

12.1.3 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.

12.1.4 Ecology

An Ecological and Wetland 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:

12.1.4.1 **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 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). They are both categorised as least threatened by Mucina & Rutherford, 2006.

Vegetation and land cover of the study area

The vegetation on site is mostly comprised of natural savanna with some significant disturbance due to overgrazing, vehicle tracks & fire breaks.

Alien trees & weeds

The largest concentration of alien species is found in trampled areas and camps where domestic animals are concentrated The most commonly found alien/invasive trees on the proposed project site are Prosopis (*Prosopis glandulosa*) (listed as a Category 3 invasive in the Northern Cape Province) and Pepper Trees (*Schinus molle*).

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*.

Cultivation

There is no area of current or previous cultivation at or near the proposed project site. The only cultivated areas are small areas close to the dwellings.

Savanna vegetation

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 previous statement regarding degradation 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.

Red Data Listed and Protected species

The aim of this section is to list those plant species for which there is conservation concern which may be affected by the proposed project development. This includes threatened, rare, declining and protected plant species.

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

The only 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.

Northern Cape Nature Conservation Act (Act 9 of 2009)

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). Provincial permits will be required if any of these species are to be removed or damaged during the construction phase.

See specialist report in Appendix E for a list of these species.

Conclusion

Although the proposed project site will completely transform the site, the site is situated on a flat, degraded plain with little ecological value/significance. The site is not situated in any sensitive ecosystem or plant community and 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 provincially protected species namely *Olea europaea* subsp. *africana* (Schedule 2 of the Northern Cape Nature Conservation Act (Act 9 of 2009)) occurs on the rocky outcrops.

Recommendations

The following is recommended:

- An Environmental Control Officer (ECO) must be appointed to oversee and ensure that the aspects stipulated in the Environmental Permit are carried out adequately.
- 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

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 on the sensitivity map in Figure 7 below:

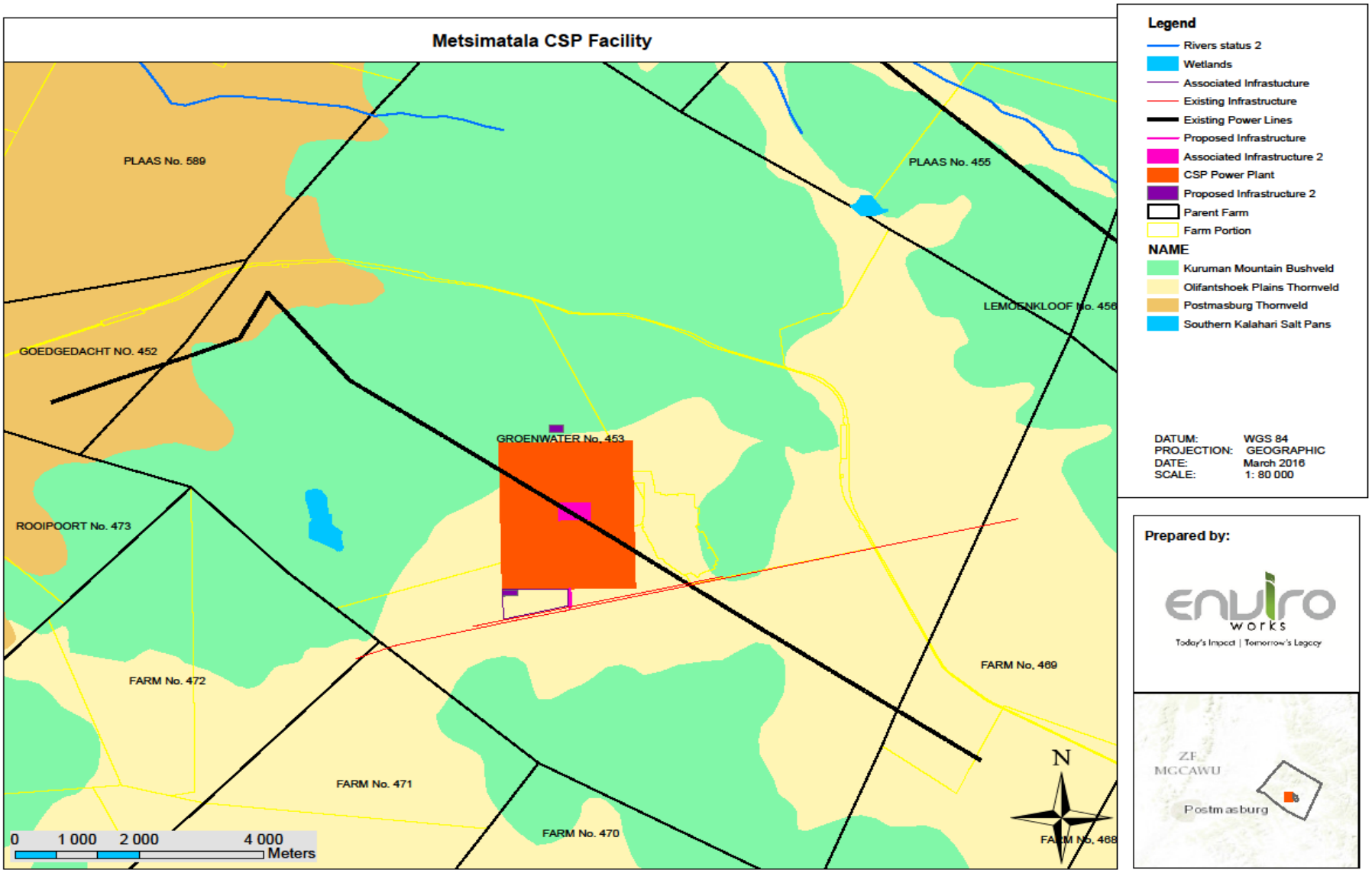

Figure 7: Ecological sensitivity map of the proposed project layout

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

12.1.4.2 **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.

12.1.5 Avifauna

Southern African Bird Atlas Project 1 (Harrison *et al*. 1997)

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. **Error! Reference source not found.** 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 168species.

Table 12: Raptors and Priority Species recorded by SABAP1 in the Quarter Degree Square (QDS) covering the proposed project site

Species	**Regional Red Data Status (Taylor *et al.* 2015)**	**Report rate (%) ** QDS 2823AD**
Total species		*168*
Number of cards submitted		*77*
Barn Owl		4
Black-chested Snake-Eagle*		1
Black Harrier*	*Endangered*	1
Black Korhaan (Northern)*		34
Black Stork*	*Vulnerable*	5
Black-shouldered Kite*		69
Blue Crane*	*Near-threatened*	6
Common Buzzard*		1
Gabar Goshawk		6

Species	Regional Red Data Status (Taylor *et al.* 2015)	Report rate (%) ** QDS 2823AD
Greater Flamingo*	*Near-threatened*	5
Greater Kestrel*		12
Kori Bustard*	*Near-threatened*	1
Lesser Kestrel*		13
Pale Chanting Goshawk*		39
Rock Kestrel		79
Secretarybird*	*Vulnerable*	9
Spotted Eagle Owl*		1
Tawny Eagle*	*Endangered*	1
Verreaux's Eagle*	*Vulnerable*	55
White-backed Vulture*	*Critically Endangered*	17
Booted Eagle*		4
Martial Eagle*	*Endangered*	6

* 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.

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 SABAP1. 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 (i.e. on the CSP site and the Grid Connection 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 13: Raptors and Priority Species recorded in the SABAP2 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 14: 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
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

Species	Regional Red Data Status (Taylor *et al.* 2015)	Report rate (%) ** QDS 2823AD
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 an IBA 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

Two five day avifaunal surveys have been conducted by Arcus to date, one in November 2015 and one in February 2016.

Avifaunal monitoring comprised flight activity surveys from two vantage points (VPs), as well as walked transects, driven transects, and focal site surveys. Large terrestrial species and raptors were recorded incidentally in the course of travelling the length of the *site en route* to survey locations.

The following definitions were applied:
Priority species: all species occurring on the BirdLife South Africa (BLSA) and EWT Avian Sensitivity Map priority species list.
Target species: those particular bird species that were recorded by a specific survey method.

Target species per survey method:

- Walked transects (WT): all birds;
- Driven transects (DT): all raptors; all large (non-passerine) priority species; corvids (crows and ravens) and korhaans.
- Vantage point (VP) surveys: all raptors; all large (non-passerine) priority species; doves; corvids (crows and ravens); sandgrouse; korhaans; egrets; geese; ibises and lapwings.
- Incidental observations: all Red Data species (Taylor, 2015); all raptors; and all large (non-passerine) priority species; and
- Focal sites (FS): all species associated, utilising or interacting at/with the focal site.

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.

Therefore a total of number of 113 species, including three Red Data species (White-backed Vulture, Martial Eagle and Lanner Falcon) have been recorded during the monitoring surveys to date.

Conclusion

Based on a desk based study and the two site surveys conducted to date, it can be concluded that the proposed project site appears moderately sensitive in terms of avifauna. While up to 13 Red Data listed species may at some time utilise or traverse over the CSP site, only three have been recorded to date by monitoring on and around the CSP site. Of these, the species of most concern at this stage is the *Critically Endangered* White-backed Vulture, and the *Endangered* Martial Eagle. It was noted though that these species were rarely recorded in the surveys conducted and in fact, the abundance and flight activity levels of all raptors and priority species recorded to date is relatively low.

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. Impacts of associated infrastructure (e.g. the grid connection power lines) are however well understood.

Potential impacts have been identified and given a preliminary rating. The most significant potential impacts to date are associated with the CSP facility Technology Alternative 2 (i.e. central receiver tower) which includes burning and collision with reflective structures and/or CSP infrastructure which were rated (after the application of mitigation) as High and Medium-High respectively. The cumulative impact significance of the residual impacts of burning and collision (if Technology Alternative 2 is constructed) may be High.

Generally, all the impacts at this stage are not viewed as being of an extent or significance so as to preclude development, and the project may proceed.

All the identified impacts and cumulative impacts will be examined and re-assessed in more detail during the EIA phase of the study and following the completion of the bird monitoring programme.

12.1.6 Agricultural

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:

12.1.6.1 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 Ae214 and IB237. A brief summary of the geology, topography and soils of the relevant Land Type will follow.

Ae214

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.

Ib237

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.

12.1.6.2 **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. If a constant water source could be found, there is a possibility for some irrigation, but the chances are slim. A number of non-perennial streams are present, but the dominant source of water for agricultural purposes is groundwater.

12.1.6.3 **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 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 8: Image indicating the degraded status of vegetation

12.1.6.4 **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 Plans must be implemented as mitigation in order to manage and reduce unnecessary traffic movement in the area and subsequently decrease undesired dust emissions.

12.1.6.5 **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 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 control measures and mitigation strategies be put in place in order to ensure that the proposed project and current agricultural practices in the area continue in a sustainable manner.

12.1.7 Heritage

A Heritage 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:

12.1.7.1 **Archaeology**

The proposed approximate 500ha Metsimatala CSP 150MW Solar Energy Facility study site overlaps the former proposed 50MW CSP study site (210ha). Only a single archaeological and cultural heritage site, as defined and protected by the NHRA 1999 and previously identified pertains (van Ryneveld 2012); Site MVIA3, a Later Iron Age (LIA) / contemporary cemetery is situated adjacent to the proposed study site at the northern perimeter of Metsimatala Village. The site will however not be impacted by development.

Results of the 500ha study site field assessment are similar to that previously recorded for the area. The general terrain is characterized 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: m²) 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 indicate 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 500ha Metsimatala CSP 150MW Solar Energy Facility study site 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: S28°16'45.3"; E23°18'26.0"

Site MVIA3 was first identified and described by Van Ryneveld (2012) and comprises a Later Iron Age / contemporary cemetery situated at the northern extremity of Metsimatala Village and adjacent to the proposed Metsimatala CSP 150MW Solar Energy 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 (Pers. Comm. Obemang Kgoronyane – CPA member, 2012): 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 Significance & Recommendations

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

Conclusion

The Metsimatala CSP 150MW Solar Energy 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. One archaeological and cultural heritage resource, as defined and protected by the NHRA 1999, Site MVIA3, a LIA / contemporary cemetery, is situated adjacent to the study site towards the northern extremity of Metsimatala Village. The site will not be impacted by 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 150MW Solar Energy 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 within the dolerite hill outcrop band characterising the area north of the proposed study site; by virtue of location shielded by terrain and landscape gradient from visual impact from the development.
- The cultural landscape of Old Metsimalata Village, Site MVIA2 (S28°16'37.6"; E23°18'56.2"), and PVIA1-PVIA18, largely remains of farming small holdings on the outskirts of the former village, with Site MVIA2 being the most significant recorded LIA site to date, not only pertaining to heritage resources recorded on Groenwater 453, but within the approximate 25km radius from the Metsimatala study site, will be conserved; again by virtue of location, being situated at the foot of a large dolerite hill approximately 1km east of the Metsimatala study site. Contemporary Metsimatala village, located basically between the proposed Metsimatala CSP 150MW Solar Energy Facility and Old Metsimatala Village forms an interesting transition between the past, the very origins, heritage and 'sense of place' of the Thlaping of Old Metsimatala Village, with Site MVIA3 concrete testimony thereto, and the future green, economic sustainability of the people thereof, represented by the proposed Metsimatala CSP 150MW Solar Energy Facility itself. [No LIA / contemporary cemeteries will be directly impacted, despite proximity of the MVIA3 cemetery to the Metsimatala study site.]

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 150MW Solar Energy 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 on their land; tribal, by virtue of their recorded history on the property, but with the prospect of a green, economically sustainable future.

12.1.7.2 **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 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. The CSP Facility footprint is assigned a site rating of Generally Protected C (GP.C).

12.1.8 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 result of the preliminary viewshed analyses for the proposed facility is shown in the figure below.

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

- Parabolic trough system – 5 - 42 m agl.
- Solar tower system – 100 m agl.
- Solar tower system – 195 m agl.

Note: In the absence of more detailed design information, two different heights above ground level were used for the tower system. The height of the tower and the placement of the receiver are dependent on the scale of the facility.

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

It must be noted that the Digital Terrain Model (DTM) utilised for the viewshed analyses do not include the effect of vegetation cover and built structures. These features may influence the visual exposure of the CSP facility to some degree.

The viewshed analyses will be further refined once a preliminary and/or final layout of the CSP facility is completed and will be regenerated for the actual position of the infrastructure on the site, and per structure position (and actual proposed technology) during the EIA phase of the project.

The figure below also indicates proximity radii from the proposed site boundaries for the proposed facility in order to show the viewing distance (scale of observation) of the facility in relation to its surrounds.

General

It is evident from the preliminary viewshed analyses that the proposed solar tower technology (100 m to 195 m) would have a much larger area of visual exposure compared to the much reduced vertical dimensions of the parabolic trough technology. The solar tower is expected to be visible from a large portion of the study area, even if the maximum height is contained at 100 m above ground level. It is expected that the heliostats, generally much larger than the parabolic troughs, would further contribute to the increased area of exposure.

0 – 1 km (short distance)

Theoretical visibility within a 1 km radius of the proposed site mainly includes the Groenwater farm itself, a section of the R 385 main road, the Groenwater farm residence and the Metsimatala settlement. It is expected that the proposed project infrastructure, regardless of the chosen solar technology, 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 42 m components will still be visible. The solar tower is expected to still be highly visible within this zone. 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 3km radius from the proposed development site. It is mainly the individual 42 m components of the trough system and solar tower structures that may be visible from farmsteads and roads within this zone.

Greater than 6km (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.

Summary

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 visual exposure and general visual impact is expected to be higher for the much taller solar tower and heliostats, than for the much more constrained parabolic trough system.

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 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.

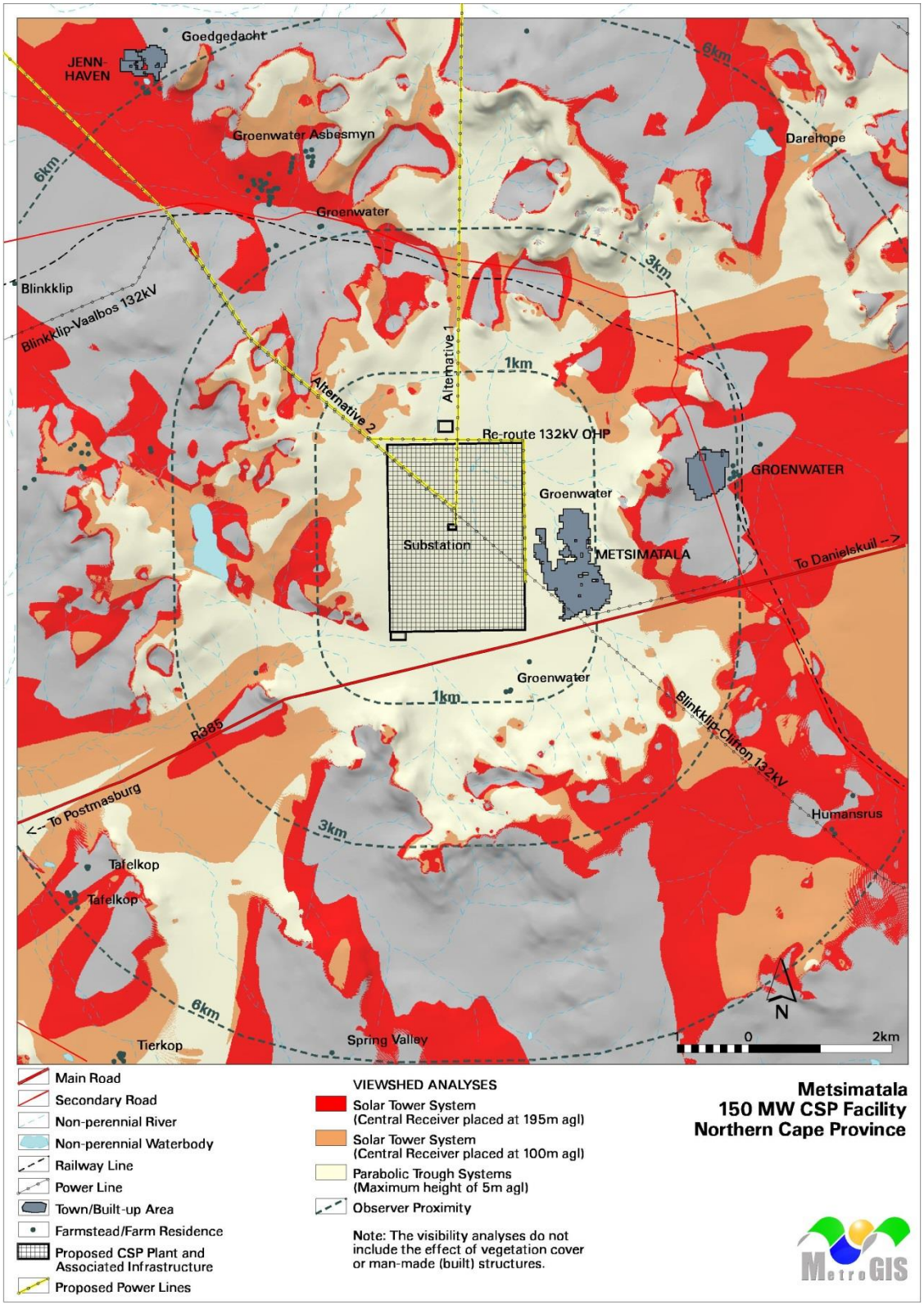

Figure 9: Map indicating the potential (preliminary) visual exposure of the proposed facility.

Conclusions/recommendations

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. The solar tower technology is expected to be more intrusive than the parabolic trough system. The latter technology option is therefore preferred from a visual impact perspective.

However, the fact that some components of the proposed facility may be visible does not automatically imply a high visual impact. Sensitive visual receptors within (but not restricted to) a 3 km buffer zone from the facility need to be identified and the severity of the visual impact assessed within the EIA phase of the project.

It is recommended that additional spatial analyses be undertaken in order to create a visual impact index that will further aid in determining potential areas of visual impact and potential sensitive visual receptors. This exercise should be undertaken for the core facility as well as for the ancillary infrastructure, as these structures (e.g. the substation and power line) are envisaged to have varying levels of visual impact at a more localized scale. The site-specific issues (as mentioned earlier) and potential sensitive visual receptors should be measured against this visual impact index and be addressed individually in terms of nature, extent, duration, probability, severity and significance of visual impact.
The recommended Plan of Study for the EIA phase of the project is described in the specialist report.

12.2 SOCIO-ECONOMIC DESCRIPTION

Summary of Social Impacts Associated with the Various Project Phases

The impacts described in this section were assessed according to the methodology described in section 2 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 we note 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 developer and the 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 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. 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 much lower than for 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*: 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 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 employers 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).

Key Findings 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 objectives described in the local IDP's.

13. PUBLIC PARTICIPATION PROCESS

A continual and comprehensive Public Participation Process (PPP) will be undertaken throughout the entire Scoping & EIA process with all stakeholders and Interested and Affected Parties (I & AP's), including the relevant Organs of State and Competent Authority (DEA) as identified during the Scoping Phase.

The PPP will be 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.

13.1 REGISTRATION AND NOTIFICATION

An I & AP's register containing the names, contact details and addresses of all relevant stakeholders and I & AP's will be established and submitted to the Competent Authority (DEA) as per Regulation 42 of the EIA Regulations, 2014.

All stakeholders and I & AP's will be 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.

The sequence of events regarding the two Public Participation Processes, which will take place, is as follows:

- Upon completion of the Draft Scoping Report, the stakeholders and I & AP's will be notified and the document will be made available for comments for a period of 30 days. The Competent Authority (DEA) will also be consulted to comment on the Draft Scoping Report. After the completion of the PPP the comments received will be incorporated into a Final Scoping Report and submitted to the Competent Authority (DEA) for decision making.
- The Competent Authority (DEA) will accept or reject the Final Scoping Report within a period of 43 days after receipt of the submitted document and provide feedback to the applicant on their decision.
- Upon completion of the subsequent Draft Environmental Impact Report and EMPr, the I & AP's will again be notified and the document will be made available for a second commenting period of 30 days. The Competent Authority (DEA) will also be consulted to comment on the Draft Environmental Impact Report. After the completion of the PPP the comments received will be incorporated into a Final Environmental Impact Report and EMPr and submitted to the Competent Authority (DEA) for final decision making on Environmental Authorisation.

- The Competent Authority (DEA) 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.

13.2 COMMENTS AND RESPONSES

All comments received from the I & AP's together with the subsequent responses provided to the I & AP's will be incorporated into a Public Participation Process: Comments and Responses Report which will be submitted to the Competent Authority together with the relevant documents.

See Appendix C for the Public Participation Process: Comments and Responses Report.

14. 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.

14.1 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 15: 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 16: 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.

14.2 DESCRIPTION OF POTENTIAL IMPACTS AND THEIR RECOMMENDED MITIGATION MEASURES

The following section provides descriptions of the potential environmental impacts which the proposed project will have as well as the recommended mitigation measures to be implemented for each impact as identified during the Scoping phase.

14.2.1 Construction Phase

Removal, destruction and transformation of natural vegetation and faunal habitats

Although the proposed project site will completely transform the site, the site is situated on a flat, degraded plain with little ecological value/significance. The site is not situated in any sensitive ecosystem or plant/animal community and 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. 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.

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.

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 arrays, operation offices, and access roads.

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.

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.

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.

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.

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.

Mitigation measures to reduce potential impacts:

- Dust Management as well as Traffic Management Plans 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 archaeological and cultural heritage site, as defined and protected by the NHRA 1999 and previously identified pertains (van Ryneveld 2012); Site MVIA3. Site MVIA3 was first identified and described by Van Ryneveld (2012) and comprises a Later Iron Age / contemporary cemetery situated at the northern extremity of Metsimatala Village and adjacent to the proposed Metsimatala CSP 150MW Solar Energy Facility study site. The site will however not be directly impacted by development.

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 low.

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 in the case of the parabolic trough system be mainly restricted to within 3 km of the proposed project area after which the visibility will diminish although the solar tower technology option will have a visual impact stretching over a longer distance due to the significant difference in height of the central tower compared to the parabolic troughs.

Mitigation measures to reduce potential impacts:

- The parabolic trough system should be considered as the preferred technology alternative to reduce visual impacts of the proposed project.

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 construction workers and job seekers 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.

Mitigation measures to reduce potential impacts:

- A designated security company will be appointed to ensure the safety of the facilities.

14.2.2 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.

Mitigation measures to reduce potential impacts:

- Ensure no unnecessary expansion of the project footprint occurs.

Avifaunal burning

The reflective surfaces (of either heliostats or parabolic troughs) focus beams of sunlight into a small area resulting in concentrated solar flux which may burn birds. In Technology Alternative 2, large heliostat arrays focus solar flux on a central “power tower”, exposing passing birds to the risk of being singed or burnt in the flux beams, particularly as they aggregate close to the receiver. Birds may also be burnt in the stand-by focal points of the heliostats.

Mitigation measures to reduce potential impacts:

- For Technology Alternative 2, the occurrence and intensity of standby focal points should be kept to a minimum by careful focusing of heliostats when not in use.
- Attractants to birds, such as foraging and perching opportunities should be limited in the immediate vicinity of the facility.
- 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 (e.g. heliostats or parabolic troughs which may be mistaken for large water bodies and can cause disorientation of flying birds, resulting in injury and/or death. For Technology Alternative 2, birds may also collide with the central receiver tower. Furthermore, if Technology Alternative 2 utilises evaporative cooling ponds, these bodies of water may provide artificial habitat to birds and their prey (e.g. insects), thus attracting more birds to the site which may result in a greater risk of collision with project structures.

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 (Ledec et al., 2010).
- 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.

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 eosin is present and must be monitored.

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 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.

Mitigation measures to reduce potential impacts:

- Continued Dust Management as well as Traffic Management Plans 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.

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.

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 in the case of the parabolic trough system be mainly restricted to within 3 km of the proposed project area after which the visibility will diminish although the solar

tower technology option will have a visual impact stretching over a longer distance due to the significant difference in height of the central tower compared to the parabolic troughs.

Mitigation measures to reduce potential impacts:

- The parabolic trough system should be considered as the preferred technology alternative to reduce visual impacts of the proposed project.

Job creation and income generation

The unemployment rate for the municipal area in general stands at 64%, which is probably much lower than for 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.

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.

Mitigation measures to reduce potential impacts:

A local employment policy will be applied as far as possible in the appointment of permanent workers.

14.3 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.

14.3.1 Construction Phase

Table 17: Environmental Risk and Significance Ratings for the Construction Phase

Bio-Physical Aspects			
	Technology Alternative 1	**Technology Alternative 2**	**No-Go Alternative**
Identified Environmental Impacts	**Removal, destruction and transformation of natural vegetation and faunal habitats**	**Removal, destruction and transformation of natural vegetation and faunal habitats**	**The proposed development will not take place and as such this impact will not occur**
Magnitude of Impact	Low (4)	Low (4)	-
Duration of impact:	Long term (4)	Long term (4)	-
Extent of the impact	Local (2)	Local (2)	-
Degree to which local resources are irreplaceable	Low (2)	Low (2)	-
Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	-
Probability of occurrence:	High Probability (4)	High Probability (4)	-
Cumulative impact prior to mitigation:	Medium	Medium	
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	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.		-
Cumulative impact post mitigation:	Medium	Medium	-
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (56)	Medium (56)	-
	Technology Alternative 1	**Technology Alternative 2**	**No-Go Alternative**
Identified Environmental Impacts	**Avifaunal habitat destruction**	**Avifaunal habitat destruction**	**The proposed development will not take place and as such this impact will not occur**
Magnitude of Impact	Low (4)	Medium (6)	-
Duration of impact:	Long term (4)	Long term (4)	-
Extent of the impact	Local (2)	Local (2)	-
Degree to which local resources are irreplaceable	Low (2)	Low (2)	-
Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	-

Probability of occurrence:	Definite (5)	Definite (5)	-
Cumulative impact prior to mitigation:	Medium	Medium	
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium-High (75)	Medium-High (85)	-
Proposed mitigation:	• 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	-
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (65)	Medium (70)	-

	Technology Alternative 1	Technology Alternative 2	No-Go Alternative
Identified Environmental Impacts	**Avifaunal disturbance and displacement**	**Avifaunal disturbance and displacement**	**The proposed development will not take place and as such this impact will not occur**
Magnitude of Impact	Medium (6)	Medium (6)	
Duration of impact:	Short-term (2)	Short-term (2)	
Extent of the impact	Regional (3)	Regional (3)	
Degree to which local resources are irreplaceable	Moderate (3)	Moderate (3)	
Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	
Probability of occurrence:	High (4)	High (4)	
Cumulative impact prior to mitigation:	Medium	Medium	
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (68)	Medium (68)	
Proposed mitigation:	• A site specific Construction Environmental Management Plan (CEMP) must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the CEMP and should apply good environmental practice during construction. • Environmental Control Officers to oversee activities and ensure that the site specific construction environmental management plan (CEMP) is implemented and enforced;		

	• 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 road and power line routes as well as the CSP layout, 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	
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (34)	Low (34)	
	Technology Alternative 1	**Technology Alternative 2**	**No-Go Alternative**
Identified Environmental Impacts	**Reduction of agricultural potential of land**	**Reduction of agricultural potential of land**	**The proposed development will not take place and as such this impact will not occur**
Magnitude of Impact	Low (4)	Low (4)	-
Duration of impact:	Long term (4)	Long term (4)	-

Extent of the impact	Local (2)	Local (2)	-
Degree to which local resources are irreplaceable	Low (2)	Low (2)	-
Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	-
Probability of occurrence:	High Probability (4)	High Probability (4)	-
Cumulative impact prior to mitigation:	Medium	Medium	
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	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:	Medium	Medium	-
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (56)	Medium (56)	-

	Technology Alternative 1	Technology Alternative 2	No-Go Alternative
Identified Environmental Impacts	**Dust generation and emissions**	**Dust generation and emissions**	**The proposed development will not take place and as such this impact will not occur**
Magnitude of Impact	Very low (2)	Very low (2)	-
Duration of impact:	Medium term (3)	Medium term (3)	-
Extent of the impact	Local (2)	Local (2)	-
Degree to which local resources are irreplaceable	Low (2)	Low (2)	-
Degree to which the impact can be reversed:	High (2)	High (2)	-
Probability of occurrence:	Medium probability (3)	Medium probability (3)	-
Cumulative impact prior to mitigation:	Low	Low	
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (33)	Low (33)	-
Proposed mitigation:	• Dust Management as well as Traffic Management Plans 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	-
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (16)	Low (16)	-
	Technology Alternative 1	**Technology Alternative 2**	**No-Go Alternative**
Identified Environmental Impacts	**Destruction of important heritage conservational cemetery sites (MVIA3 site)**	**Destruction of important heritage conservational cemetery sites (MVIA3 site)**	**The proposed development will not take place and as such this impact will not occur**
Magnitude of Impact	Low (4)	Low (4)	-
Duration of impact:	Short term (2)	Short term (2)	-
Extent of the impact	Site specific (1)	Site specific (1)	-
Degree to which local resources are irreplaceable	Moderate (3)	Moderate (3)	-
Degree to which the impact can be reversed:	Low (4)	Low (4)	-
Probability of occurrence:	Medium probability (3)	Medium probability (3)	-
Cumulative impact prior to	Medium	Medium	

mitigation:			
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	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:	Low	Low	-
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Positive (+8)	Positive (+8)	-
	Technology Alternative 1	**Technology Alternative 2**	**No-Go Alternative**
Identified Environmental Impacts	**Transformation of early Proterozoic palaeontological heritage**	**Transformation of early Proterozoic palaeontological heritage**	**The proposed development will not take place and as such this impact will not occur**
Magnitude of Impact	Low (4)	Low (4)	-
Duration of impact:	Long term (4)	Long term (4)	-
Extent of the impact	Local (2)	Local (2)	-
Degree to which local resources are	Moderate (3)	Moderate (3)	-

irreplaceable			
Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	-
Probability of occurrence:	High Probability (4)	High Probability (4)	-
Cumulative impact prior to mitigation:	Medium	Medium	
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	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	-
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (45)	Medium (45)	-
	Technology Alternative 1	**Technology Alternative 2**	**No-Go Alternative**
Identified Environmental	**Visual disturbance of natural landscape and sense of place**	**Visual disturbance of natural landscape and sense of place**	**The proposed development will not take place and as such this impact**

Impacts			**will not occur**
Magnitude of Impact	Low (4)	Medium (6)	-
Duration of impact:	Short term (2)	Short term (2)	-
Extent of the impact	Local (2)	Local (2)	-
Degree to which local resources are irreplaceable	Low (2)	Low (2)	-
Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	-
Probability of occurrence:	Medium probability (3)	Medium probability (3)	-
Cumulative impact prior to mitigation:	Low	Low	
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (39)	Medium (45)	-
Proposed mitigation:	• The parabolic trough system should be considered as the preferred technology alternative to reduce visual impacts of the proposed project.		
Cumulative impact post mitigation:	Low	Low	-
Significance rating of impact after mitigation (Low, Medium, Medium-	Low (39)	Medium (45)	-

High, High, or Very-High)			
	Technology Alternative 1	**Technology Alternative 2**	**No-Go Alternative**
Identified Environmental Impacts	**Job creation, empowerment and skills development**	**Job creation, empowerment and skills development**	**The proposed development will not take place and as such this impact will not occur**
Magnitude of Impact	High (8)	High (8)	-
Duration of impact:	Short term (2)	Short term (2)	-
Extent of the impact	Regional (3)	Regional (3)	-
Degree to which local resources are irreplaceable	None (0)	None (0)	-
Degree to which the impact can be reversed:	0	0	-
Probability of occurrence:	High probability (4)	High probability (4)	-
Cumulative impact prior to mitigation:	Positive	Positive	-
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Positive (+52)	Positive (+52)	-

Proposed mitigation:	None		-
Cumulative impact post mitigation:	Positive	Positive	-
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Positive (+52)	Positive (+52)	-
	Technology Alternative 1	**Technology Alternative 2**	**No-Go Alternative**
Identified Environmental Impacts	**Influx of construction workers and job seekers and damage to property**	**Influx of construction workers and job seekers and damage to property**	**The proposed development will not take place and as such this impact will not occur**
Magnitude of Impact	Low (4)	Low (4)	-
Duration of impact:	Short term (2)	Short term (2)	-
Extent of the impact	Regional (3)	Regional (3)	-
Degree to which local resources are irreplaceable	None (0)	None (0)	-
Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	-
Probability of occurrence:	High probability (4)	High probability (4)	-

Cumulative impact prior to mitigation:	Low	Low	-
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (48)	Medium (48)	-
Proposed mitigation:	• A designated security company will be appointed to ensure the safety of the facilities.		-
Cumulative impact post mitigation:	Low	Low	-
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (24)	Low (24)	-

14.3.2 Operational Phase

Table 18: Environmental Risk and Significance Ratings for the Operational Phase

Bio-Physical Aspects			
	Technology Alternative 1	**Technology Alternative 2**	**No-Go Alternative**
Identified Environmental Impacts	**Continued destruction and transformation of natural vegetation and faunal habitats due to initial construction phase**	**Continued destruction and transformation of natural vegetation and faunal habitats due to initial construction phase**	**The proposed development will not take place and as such this impact will not occur**
Magnitude of Impact	Low (4)	Low (4)	-
Duration of impact:	Long term (4)	Long term (4)	-
Extent of the impact	Local (2)	Local (2)	-
Degree to which local resources are irreplaceable	Low (2)	Low (2)	-
Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	-
Probability of occurrence:	High Probability (4)	High Probability (4)	-
Cumulative impact prior to mitigation:	Medium	Medium	
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (60)	Medium (60)	-

Proposed mitigation:	• Ensure no unnecessary expansion of the project footprint occurs.		-
Cumulative impact post mitigation:	Medium	Medium	-
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (56)	Medium (56)	-
	Technology Alternative 1	**Technology Alternative 2**	**No-Go Alternative**
Identified Environmental Impacts	**Avifaunal burning**	**Avifaunal burning**	**The proposed development will not take place and as such this impact will not occur**
Magnitude of Impact	Very High (10)	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)	High (4)	-

Cumulative impact prior to mitigation:	Low	High	
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (25)	High (100)	-
Proposed mitigation:	• For Technology Alternative 2, the occurrence and intensity of standby focal points should be kept to a minimum by careful focusing of heliostats when not in use. • Attractants to birds, such as foraging and perching opportunities should be limited in the immediate vicinity of the facility. • 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: o Assess the suitability of using deterrent devices to reduce burning risk. o Various approaches to standby aiming of heliostats, which could significantly reduce flux levels.		
Cumulative impact post mitigation:	Low	High	-
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (25)	High (100)	-
	Technology Alternative 1	**Technology Alternative 2**	**No-Go Alternative**
Identified Environmental	**Avifaunal collision with infrastructure**	**Avifaunal collision with infrastructure**	**The proposed development will not**

Impacts			**take place and as such this impact will not occur**
Magnitude of Impact	Very High (10)	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:	Medium (3)	High (4)	
Cumulative impact prior to mitigation:	Medium	High	
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium-High (75)	High (100)	
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 (Ledec et al., 2010). • 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	
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (50)	Medium-High (75)	
	Technology Alternative 1	**Technology Alternative 2**	**No-Go Alternative**
Identified Environmental Impacts	**Soil erosion**	**Soil erosion**	**The proposed development will not take place and as such this impact will not occur**
Magnitude of Impact	Low (4)	Low (4)	-
Duration of impact:	Medium term (3)	Medium term (3)	-
Extent of the impact	Site specific (1)	Site specific (1)	-
Degree to which local resources are irreplaceable	Low (2)	Low (2)	-

Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	-
Probability of occurrence:	Medium probability (3)	Medium probability (3)	-
Cumulative impact prior to mitigation:	Low	Low	
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	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	-
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (33)	Low (33)	-
	Technology Alternative 1	**Technology Alternative 2**	**No-Go Alternative**
Identified Environmental Impacts	**Continued dust generation and emissions**	**Continued dust generation and emissions**	**The proposed development will not take place and as such this impact will not occur**
Magnitude of Impact	Very low (2)	Very low (2)	-

Duration of impact:	Medium term (3)	Medium term (3)	-
Extent of the impact	Local (2)	Local (2)	-
Degree to which local resources are irreplaceable	Low (2)	Low (2)	-
Degree to which the impact can be reversed:	High (2)	High (2)	-
Probability of occurrence:	Medium probability (3)	Medium probability (3)	-
Cumulative impact prior to mitigation:	Low	Low	
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (33)	Low (33)	-
Proposed mitigation:	• Continued Dust Management as well as Traffic Management Plans 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	-
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (16)	Low (16)	-

	Technology Alternative 1	Technology Alternative 2	No-Go Alternative
Identified Environmental Impacts	**Continued deterioration of important heritage conservational cemetery sites (MVIA3 site)**	**Continued deterioration of important heritage conservational cemetery sites (MVIA3 site)**	**The proposed development will not take place and as such this impact will not occur**
Magnitude of Impact	Very low (2)	Very low (2)	-
Duration of impact:	Medium term (3)	Medium term (3)	-
Extent of the impact	Site specific (1)	Site specific (1)	-
Degree to which local resources are irreplaceable	Moderate (3)	Moderate (3)	-
Degree to which the impact can be reversed:	High (2)	High (2)	-
Probability of occurrence:	Medium probability (3)	Medium probability (3)	-
Cumulative impact prior to mitigation:	Low	Low	
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	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:	Low	Low	-
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Positive (6)	Positive (6)	-
	Technology Alternative 1	**Technology Alternative 2**	**No-Go Alternative**
Identified Environmental Impacts	**Continued transformation of early Proterozoic palaeontological**	**Continued transformation of early Proterozoic palaeontological**	**The proposed development will not take place and as such this impact will not occur**
Magnitude of Impact	Low (4)	Low (4)	-
Duration of impact:	Long term (4)	Long term (4)	-
Extent of the impact	Local (2)	Local (2)	-
Degree to which local resources are irreplaceable	Moderate (3)	Moderate (3)	-
Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	-
Probability of occurrence:	High Probability (4)	High Probability (4)	-
Cumulative impact prior to mitigation:	Medium	Medium	

Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (64)	Medium (64)	-
Proposed mitigation:	• Ensure no unnecessary expansion of the project footprint occurs.		-
Cumulative impact post mitigation:	Medium	Medium	-
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (45)	Medium (45)	-
	Technology Alternative 1	**Technology Alternative 2**	**No-Go Alternative**
Identified Environmental Impacts	**Continued visual disturbance of natural landscape and sense of place**	**Continued visual disturbance of natural landscape and sense of place**	**The proposed development will not take place and as such this impact will not occur**
Magnitude of Impact	Low (4)	Medium (6)	-
Duration of impact:	Short term (2)	Short term (2)	-
Extent of the impact	Local (2)	Local (2)	-
Degree to which local resources are irreplaceable	Low (2)	Low (2)	-

Degree to which the impact can be reversed:	Moderate (3)	Moderate (3)	-
Probability of occurrence:	Medium probability (3)	Medium probability (3)	-
Cumulative impact prior to mitigation:	Low	Low	-
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (39)	Medium (45)	-
Proposed mitigation:	• The parabolic trough system should be considered as the preferred technology alternative to reduce visual impacts of the proposed project.		-
Cumulative impact post mitigation:	Low	Low	-
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (39)	Medium (45)	-
	Technology Alternative 1	**Technology Alternative 2**	**No-Go Alternative**
Identified Environmental Impacts	**Job creation and income generation**	**Job creation and income generation**	**The proposed development will not take place and as such this impact will not occur**
Magnitude of Impact	High (8)	High (8)	-

Duration of impact:	Medium term (3)	Medium term (3)	-
Extent of the impact	Regional (3)	Regional (3)	-
Degree to which local resources are irreplaceable	None (0)	None (0)	-
Degree to which the impact can be reversed:	0	0	-
Probability of occurrence:	High probability (4)	High probability (4)	-
Cumulative impact prior to mitigation:	Positive	Positive	-
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Positive (+ 56)	Positive (+ 56)	-
Proposed mitigation:	None		-
Cumulative impact post mitigation:	Positive	Positive	-
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Positive (+ 56)	Positive (+ 56)	-

	Technology Alternative 1	Technology Alternative 2	No-Go Alternative
Identified Environmental Impacts	**Influx of job seekers**	**Influx of job seekers**	**The proposed development will not take place and as such this impact will not occur**
Magnitude of Impact	Low (2)	Low (2)	-
Duration of impact:	Medium term (3)	Medium term (3)	-
Extent of the impact	Regional (3)	Regional (3)	-
Degree to which local resources are irreplaceable	Low (2)	Low (2)	-
Degree to which the impact can be reversed:	High (2)	High (2)	-
Probability of occurrence:	Medium probability (3)	Medium probability (3)	-
Cumulative impact prior to mitigation:	Low	Low	-
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (36)	Low (36)	-
Proposed mitigation:	• A local employment policy will be applied as far as possible in the appointment of permanent workers.		-
Cumulative impact post	Low	Low	-

mitigation:			
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (24)	Low (24)	-

14.4 CUMULATIVE IMPACTS

Although various 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 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 potential cumulative impacts of this proposed solar power project will however be evaluated in more detail during the EIA phase.

14.5 PREFERRED ALTERNATIVE CONCLUDING STATEMENT

In identifying, evaluating and comparing impacts associated with the proposed CSP facility earlier in Section as well as the alternatives discussion in Section 11, it has been concluded that **Technology Alternative 1: Parabolic Trough System** is the preferred and recommended alternative for the proposed project.

15. ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

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

- All information provided by the applicant and engineer to the environmental team/role players was correct and valid at the time that it was provided;
- Strategic level investigations undertaken by engineer prior to the commencement of the Scoping & EIA process, determined that the development site represents a potentially suitable and technically acceptable location;
- The public will receive a fair and reoccurring opportunity to participate in the Scoping & EIA process, through the provision of 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 Scoping & EIA process is a project-level framework and is limited to assessing the environmental impacts associated with the construction and operation phases of the proposed CSP facility
- Strategic level decision making is achieved through cooperative governance with sustainable development principles underpinning all decision-making.

Given that a Scoping & EIA involves prediction, **uncertainty** forms an integral part of the process. Two types of uncertainty are associated with the Scoping & 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 on implementation of the proposed development. Adequate research may minimise this uncertainty;
- Uncertainty of values depicts the approach assumed during the Scoping & EIA process, while final certainty will be determined at the time decisions are made. Enhanced communications and widespread coordination can lower uncertainty;
- Uncertainty of related decision relates to the decision-making aspect of the EIA process, which shall be appeased once monitoring of the project phases is undertaken.

The significance of widespread consultation towards minimising the risk of omitting significant impacts is further stressed. The use of quantitative impact significance rating formulas can further limit the occurrence and scale of uncertainty.

Gaps in knowledge can be attributed to:

The Scoping & 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 derive from a range of sources including pre-feasibility engineering and through personal communication with the design team.

Enviroworks is an independent environmental consulting firm and as such, all processes and attributes of the Scoping & EIA are addressed in a fair and unbiased fashion. It is believed that through the running of a transparent and participatory process, risks associated with assumptions, uncertainties and gaps in knowledge will be significantly minimised.

16. PROFESSIONAL OPINION OF THE EAP AND ENVIRONMENTAL IMPACT STATEMENT

16.1 PRELIMINARY PROFESSIONAL OPINION OF THE EAP

After careful consideration of the findings and outcomes during the Scoping phase, Enviroworks is of the opinion that the full Environmental Impact Assessment (EIA) phase of this proposed project should be allowed to continue in order to comprehensively evaluate the potential impact vs benefit associated with this proposed project and conclude on the project's final viability. Based on all information that was captured in this report, the proposed development will not lead to unacceptable impacts or fatal flaws and should be considered plausible in the framework of NEMA. Thus far, it is indicated that the majority of the anticipated impacts can be addressed through the various mitigation measures to an acceptable level.

Enviroworks also recommend that the preferred Technology Alternative 1: Parabolic trough system be considered due to its lesser impacts.

16.2 PRELIMINARY ENVIRONMENTAL IMPACT STATEMENT

The key findings of the Scoping phase can be summarised as follows:

The Receiving Environment

The surrounding area is mainly characterised by farming activities and natural veld and the area is regarded as being of little ecological, agricultural or heritage significance/value according to the various specialist reports. Technology Alternative 1 will have a significantly smaller visual impact on the surrounding area in comparison with Technology Alternative 2 and should therefore be considered as the preferred alternative. The proposed project also poses significant potential socio-economic benefits which far outweigh the potential negative social impacts.

Public Participation

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

Comments will be responded to during various stages of the public participation process in the Scoping & EIA phases and will be formally addressed in project reports. It is considered that through the public participation conducted by the EAP, all relevant parties will have adequate

opportunity to partake in this process and express opinions and concerns. All relevant concerns will be adequately addressed to ensure that all parties are in agreement with the proposed project.

17. CONCLUSION

In conclusion, although there are no environmental fatal flaws identified during the Scoping Phase, there are a number of potentially significant environmental impacts that require the attention of specialists in their specific fields. A detailed Environmental Impact Assessment is therefore required to further investigate and assess these potential impacts and to recommend appropriate mitigation measures, where required.

A period of 30 days will be made available for public comment on the Draft Scoping Report. The availability of the Draft Scoping Report will be announced through the placing of site notices at the relevant farm; the publication of advertisements in two free local newspapers and the distribution of written notifications to all identified stakeholders as well as registered I & AP's. In addition, a site notice and hardcopy of the report will be made available at the reception of the Tsantsabane Local Municipal office as well as public library in the town of Postmasburg.

A downloadable version will be available on the Enviroworks website: http://www.enviroworks.co.za/projectdownloads.php.

18. REFERENCES

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National Heritage Resources Act (Act 25 of 1999)

National Water Act (Act 36 of 1998)

Northern Cape Nature Conservation Act (Act 9 of 2009)

19. APPENDICES