DRAFT BASIC ASSESSMENT REPORT

FOR

THE PROPOSED IKOMKHULU SOLAR PLANT

Prepared for

Ikomkhulu Solar (Pty) Ltd

Prepared by

Tholoana Environmental Consulting CC

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DOCUMENT CONTROL

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EXECUTIVE SUMMARY

Tholoana Environmental Consulting CC, herein referred to as Tholoana Environmental Consulting (TEC) is appointed by Ikomkhulu Solar Plant (Pty) Ltd to act as independent environmental assessment practitioners for the proposed Ikomkhulu Solar Plant at portion 5 of the Farm Van Zoelen's Laagte 58, which falls under the Frances Baard district municipality, within the Dikgatlong Local Municipality, near Windsorton town. The proposed Ikomkhulu Solar Plant includes the following:

- Construction of a 300 Ha solar plant with associated infrastructure:
    - Poly-crystalline panels mounted on single tilted axis.
    - Bulk services, including sewer and water supply, the plant will be self-sustainable in terms of electricity supply.

The other associated infrastructure includes but not limited to, an operations and maintenance centre, a transformer, an array of converters, a smart centre used for the output energy control, linked with the battery storage system. The current land for the proposed solar plant is vacant and, previously used for agricultural and mining activities. The land is zoned agricultural, thus a rezoning application is required from agricultural to Utility III for the operational suitability of the proposed development.

Summary of specialist studies

The following specialist studies were undertaken for the proposed Ikomkhulu Solar Plant:-

- Ecological Assessment (Flora and fauna) by: Maanakana Projects (Pty) Ltd:
    - The ecological assessment as carried out is in favour of the proposed development. The findings are applicable as per the ecological assessment:
        - The site falls within the Kimberley thorn bushveld grassland of the flat sandy plains, with the following floral species found on site: *Acacia mellifera (Black thorn), Kimberley Thornveld (SVk 4), Acacia tortilis, Eragrostis racemosa and Aloe vera.*
    - As part of the recommendations, the due to its limitations in terms of the footprint, the Ecological Sensitive Areas and Critical Biodiversity areas in close proximity to the site will not be impacted on by the development. Additionally, the vegetation on site shows signs of transformation due to previous anthropogenic activities i.e. agricultural and mining.

- Wetland Assessment and Delineation Report by: Maanakana Projects (Pty) Ltd:

The wetland assessment identified two wetland systems, HGM 1 – Depression Wetland (known as a Pan Wetland) and HGM 2 - Flat wetland. Based on the findings, both the wetland systems were allocated a category D rating, as a result largely modified, this mainly as a result of previous mining, agricultural (grazing) activities that were undertaken within the site for the proposed development.

- Phase 1: Archaeological Impact Assessment (AIA) by Millennium Heritage Group (Pty) Ltd.

Ground truthing of the site found no important cultural heritage resource, archaeological materials, or graves within the proposed project footprints. No archaeological remains were found on site, it is possible that some significant features may be buried beneath the ground. Should buried heritage resources that represent, archaeological and historical material remains or burials be encountered during the construction phase work must stop immediately and the site be cordoned off, a professional archaeologist or nearest heritage authority must be contacted for further investigations and indication on clearance of activities to proceed.

The recommendations including mitigation measures provided within the specialist investigations have been applied in this assessment and are further included in the EMPr. The investigations were done to ensure that the proposed activity occurs in a sustainable manner and does not cause adverse environmental degradation.

Assessment findings

The land for the proposed Ikomkhulu Solar plant is currently vacant, with evidence of previous mining and agricultural activities, as a result is it largely disturbed. Based on the environmental impact assessment, the mitigation measures as provided for in the specialist's reports the proposed development will not have a detrimental impact on the receiving environment, as a result, the location for the development is well suited for the proposed project activities. The other finding in terms of the screening, the site falls within the Renewable Energy Development Zone, Kimberly 5-solar, based on this, as an added finding, the site is designated for solar energy projects.

EIA Regulations 2014, as amended listed activities

Based on the requirements as per the Environmental Impact Assessment Regulations (EIA) 2014 (as amended), an environmental authorisation is required for the following Listed activities prior to the proposed activities being implemented. The application for a record of decision was lodge with the Competent Authority (CA) Department of Environment and Nature Conservation (DENC).

Indicate the number of the relevant Government Notice:	**Activity No (s) (relevant notice): e.g. Listing notices 1, 2 or 3**	**Describe each listed activity as per the wording in the listing notices:**
GN R.325 - Activity 1	Listing Notice 2	"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more"
GN R.325 - Activity 15	Listing Notice 2	"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"

Based on the listed activities, the proposed development requires an Environmental Authorisation decision from the Competent Authority (DENC). The application for Environmental Authorisation was lodged on the 29 November 2022 with the CA. As per the EIA regulations 2014, as amended, the required level of application process is a Scoping/EIA process for activities under listing notice 2, however the proposed land for the proposed development falls under the Renewable Energy Development Zone: Kimberly 5-Solar, which triggers a Basic Assessment process for a decision on the Environmental Authorisation application in accordance with Government Notice No. 114 in Government Gazette No. 41445:- Renewable Energy Development Zones.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

AIA	Archaeological Impact Assessment
BAR	Basic Assessment Report
CLO	Community Liaison Officer
C-PLAN	Conservation Plan
CBA	Critical Biodiversity Area
DENC	Department of Environment and Nature Conservation
DFFE	Department of Forestry, Fisheries and Environment
DWS	Department of Water Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Ecological Support Areas
EMF	Environmental Management Framework
EMPr	Environmental Management Programme as per the EIA Regulations, 2014
IDP	Integrated Development Plan
I&AP	Interested and Affected Party
NFEPA	National Freshwater Priority Area
GHG	Greenhouse Gas
Ha	Hectare
HGM	Hydro-geomorphic
KWh	kilowatt hours
NWA	National Water Act 36 of 1998
PIA	Palaeontological Impact Assessment
PPP	Public Participation Process
PV	Photovoltaic
Rd	Road
SAHRA	South African Heritage Agency
SUDS	Sustainable Urban Drainage Systems
TEC	Tholoana Environmental Consulting CC

GLOSSARY

Term	Definition
Disposal	the burial, deposit, discharge, abandoning, dumping, placing or release of any waste into, or onto land.
Engineer	a person representing the Developer on site and who is responsible for the technical and contractual implementation of the works to be undertaken. This is usually the engineer, but may be any other person, such as an architect or project manager, authorized by the Developer to fulfil this role.
Environment	the surroundings within which humans exist and that are made up of the land, water and atmosphere of the earth: micro-organisms, plant and animal life; any part or combination of the above and the inter- relationships among and between them; and the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.
Environmental Systems	an area that have significant ecological and/or hydrological value, it is an integrated system of parkways natural land and connecting spaces that form the basis of broader open space system.
General Waste	waste that does not pose an immediate hazard or threat to health or to the environment and includes - domestic waste; building and demolition waste; business waste; and inert waste.
Ground Water	subsurface water that fills voids between highly permeable ground strata comprised of sand, gravel, broken rocks, porous rocks, etc. and move under the influence of gravitation.
Hazardous Waste	any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical, or toxicological characteristics of that waste, have a detrimental impact on health and the environment.
Heritage Resources	any place or object of cultural significance, including all human-made phenomena and intangible products that are the result of the human mind. Natural, technological, or industrial features may also be part of heritage resources, as places that have made an outstanding contribution to the cultures, traditions and lifestyles of the people or groups of people of South Africa.

Term	Definition
Impact	refers to a description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.
Incident	an undesired event which may result in a significant environmental impact but can be managed through an internal response.
Integrated Development Plan	a plan that integrate development and management of municipal areas as stipulated in the Municipal Systems Act, 2000.
Land use management system	the system that regulates and manages land uses and conferring land use rights using schemes and land development procedures.
Pollution	change in the environment caused by – substances; radioactive or other waves; or noise, odours, dust or heat emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future.
Public open space	land owned by an organ of state, or over which an organ of state has certain real rights arising from the filling in the Deeds office or other registration office of a general plan of a township, agricultural holding or other division of land, or any alteration, addition to or amendment of such land approved by the Surveyor-General, on which is marked the land to which the public has common right of use; and is controlled and managed by the municipal council.
Mitigation	measures designed to avoid, reduce, or remedy adverse impacts.
Safety, Health and Environmental Officer	the SHE officer is a Contractor representative, responsible for the safety, health, and environmental aspects on the construction site. The SHE officer will be responsible for the day-to-day monitoring of the EMP and Health and Safety Plan as per the OHSA.

Term	Definition
Socio-economic opportunities	activities that improve the social and economic well- being of the urban poor, e.g. improved health care, education, recreation, job opportunities, earning power and housing.
Spatial Development Framework	a frame work that seeks to guide overall spatial distribution of current and desirable land uses within a municipality in order to give effect to vision, goals and objection of the municipal IDP, as contemplated in spatial planning and land use management Act 16 of 2003.
Sustainable Development	a development that meets the needs of the present without compromising the ability of future generation to meet their own needs.
Waste	any substance, whether or not that substance can be reduced, re-used, recycled and recovered – that is surplus, unwanted, rejected, discarded, abandoned or disposed off; which the generator has no further use for the purposes of production; that must be treated or disposed off; or that is identified as a waste by the relevant Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but - a by-product is not considered waste; and any portion of waste, once re-used, recycled and recovered, ceases to be waste.
Waste Disposal Facility	any site or premise used for the accumulation of waste with the purpose of disposing of that waste at that site or on that premises.
Water Pollution	as defined in the National Water Act, 36 of 1998, water pollution refers to the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it – less fit for any beneficial purpose for which it may reasonably be expected to be used; or harmful or potentially harmful: a. to the welfare, health or safety of human beings; b. to any aquatic or non-aquatic organisms; c. to the resource quality; or d. to property.

agriculture, environmental affairs,
rural development and land reform

Department:
agriculture, environmental affairs,
rural development and land reform .
NORTHERN CAPE PROVINCE
REPUBLIC OF SOUTH AFRICA

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(For official use only)

File Reference Number:	
Application Number:	
Date Received:	

Basic Assessment Report in terms of the Environmental Impact Assessment Regulations, 2014, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.

Kindly note that:

1. This **basic assessment report** is a standard report that may be required by a competent authority in terms of the EIA Regulations, 2014 and is meant to streamline applications. Please make sure that it is the report used by the particular competent authority for the activity that is being applied for.
2. This report format is current as of 07 April 2017. It is the responsibility of the applicant to ascertain whether subsequent versions of the form have been published or produced by the competent authority
3. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.
4. Where applicable **tick** the boxes that are applicable in the report.
5. An incomplete report may be returned to the applicant for revision.
6. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the rejection of the application as provided for in the regulations.
7. This report must be handed in at offices of the relevant competent authority as determined by each authority.
8. No faxed or e-mailed reports will be accepted.
9. The signature of the EAP on the report must be an original signature.
10. The report must be compiled by an independent environmental assessment practitioner.
11. Unless protected by law, all information in the report will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this report on request, during any stage of the application process.
12. A competent authority may require that for specified types of activities in defined situations only parts of this report need to be completed.
13. Should a specialist report or report on a specialised process be submitted at any stage for any part of this application, the terms of reference for such report must also be submitted.

SECTION A: ACTIVITY INFORMATION

Has a specialist been consulted to assist with the completion of this section?		NO

If YES, please complete the form entitled "Details of specialist and declaration of interest" for the specialist appointed and attach in Appendix I.

1. ACTIVITY DESCRIPTION

a) Describe the project associated with the listed activities applied for

The proposed Ikomkhulu Solar Plant project entails the construction of Solar Photovoltaic (PV) power plant to feed into the National Grid (Eskom), at Portion 5 of the Farm Van Zoelen's Laagte No 158 Barkly Wes Rd, where the size of the property is approximately 642.4385 Hectares (Ha), however the footprint for the plant is approximately 300 Ha. The site area falls within ward 4, Dikgatlong Local Municipality, Frances Baard District Municipality in the Northern Cape Province, country South Africa.

The anticipated construction period for the proposed activities is approximately 10 months. The anticipated energy production for the proposed development during operation is 181 million kilowatt hours (kWh) per year over a 20year period. The energy is capable of supplying 33 000 households. Once the project is complete, it is anticipated that the energy from the plant will be supplied to another stakeholder (ESKOM), which will then undertake its own distribution to its clients.

SOLAR PLANT SETUP :

- Solar PV panels which receives the energy from the sun, from which the Direct Current (DC) energy goes through a combiner box, which combines the outputs of the different strings of PV modules to the inverter. Batteries are used for the storage of energy before the conversion takes place using the inverter.

- The energy from the sun in the form of DC is converted (factor in the stored energy from the batteries) to Alternating Current energy (electricity), by the invertor. The next phase is the smart transformer station facility which consists of equipment with controls for switching (this mainly comprises of various facilities for operational controls, including operational offices and protection of the current) from which it goes to the substation (Eskom-transformer), then transferred to the Eskom grid lines (pylons) for distribution. Refer to figure 1, below.

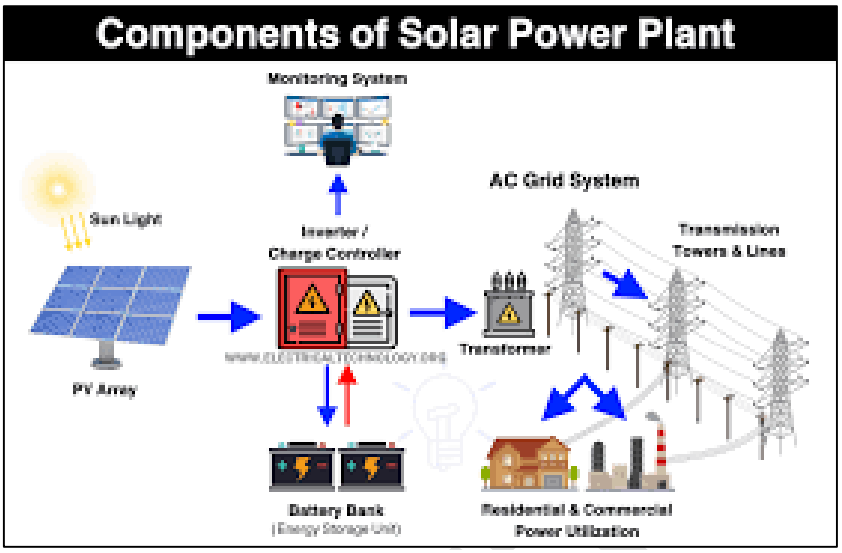


Figure 1 : Solar Plant system

Other key features for the solar plant, includes but not limited to Materials and equipment storage areas, security areas (access control). Refer to Figure 2: to the typical setup below.

Figure 2: Typical layout for the operations and maintenance centre

INSTALLATION PARAMETERS

- Mounting: The proposed system for mounting the solar panels is the fixed tilt systems (refer to figure 3, below), which are rack mounted at 30^0 for capturing the energy from the sun. As compared to the single axis tracking systems, the fixed tilt mountings has the following advantages and disadvantages:
    - Less weight and cost.
    - The only disadvantage is the less energy production.

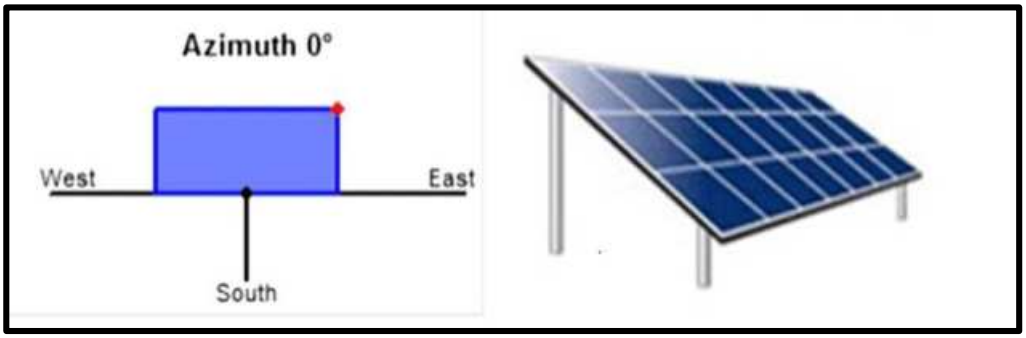


Figure 3 : Example of a fixed tilt mountings:

- PV Panels: The two types of panel systems in the market are mono-crystalline and polycrystalline solar panels. The difference between the two panels is mainly the materials i.e. the silicon ratio. Other than the silicon ratio, the other factor is limited availability on the market, maintenance costs and the amount of energy the panel can produce. The polycrystalline panels are the preferred option for the proposed development, as they would supplement the type of mounting to be used for the proposed project, thus resulting in higher energy output. Additionally, the one other advantage of the polycrystalline solar panels is that they do not degrade easily.

ASSOCIATED INFRASTRUCTURE/SERVICES :

The following associated infrastructure/services are applicable to the proposed project :

- Water supply: a borehole will be used as the main source for water supply for drinking, other domestic use, this can be supplemented by the additional rain water harvesting measures to be integrated with the water use system. The number of employment opportunities to be created during the construction phase is approximately 125, wherein an average water usage level for one person is approximately 50litres (according to the World Health Organisation), thus with an estimated construction phase (10 months), the required water for human use is (50 x 125= 6 250 litres/day), then (6 250 litres x 300 days= 1 875 000 litres), this amounts to approximately 1 875.00 m^3 for 10 months can be allocated for the construction phase, this excluding water for i.e. dust suppression and cement mixing, inclusive of other construction related activities the total water requirements to be allocated for this phase can be approximately 2 906.25 m^3 for 10 months.

- The operational phase water usage will be for the staff, ablution facilities, irrigation of landscaped areas, and maintenance of the solar panels and this can be estimated to approximately 7 520.80m^3 for a 20 year period. The proposed methods for storage of portable water is the 250 000 litres smart tanks can be considered as an option, and installation of grey water systems is recommended for use on irrigation activities.
- Electricity: The electricity required for the operations of the proposed development will be supplied internally from the generated solar energy.
- Roads: Internal roads will form part of the development, specifications on the type of roads will be determined, it is however a recommendation that the roads should be paved.

Sewerage: There are no sewer services on site, as such septic tank systems can be used as this would only be for the employees, visitors to the site, including normal household sewage. Technologies such as Bio-rock septic systems may be used for the sewage systems, however more research on the type of technologies should be explored prior to the construction phase.

b) Provide a detailed description of the listed activities associated with the project as applied for

Listed activity as described in GN 327, 325 and 324	Description of project activity
Listing Notice 2 - GN R.325 - 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"	The proposed development entails the establishment of a Solar PV power plant, which will generate 150MW of energy to feed into the national grid to increase capacity for electricity supply within the Dikgatlong local Municipality. The development is planned together with the municipality as part of initiatives aiming to curb the current challenges of electricity supply. The estimated energy to be generated from the proposed development is approximately 181 million kilowatt hours per year over a 20year period, which can supply approximately 33 000 households.
Listing Notice 2 – GN R.325; Activity 15 : "The clearance of an area of 20 hectares or more of	The land where the development will be located is currently vacant, however it cannot be

Listed activity as described in GN 327, 325 and 324	Description of project activity
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"	classified as a greenfield as it has been previously disturbed by mining activities, there are however certain sections within the property which were not impacted on by the mining activities i.e. the North Eastern section of the property. The estimated land required for the proposed development is approximately 300 Ha (2Ha per 1MW) to produce the targeted 150MW, including the associated infrastructure i.e. substation, invertor and the control room.

2. FEASIBLE AND REASONABLE ALTERNATIVES

"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 location 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.

Describe alternatives that are considered in this application as required by Appendix 1 (3)(h), Regulation 2014.Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity (NOT PROJECT) could be accomplished in the specific instance taking account of the interest of the applicant in the activity. The no-go alternative must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed.

The determination of whether site or activity (including different processes, etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment. After receipt of this report the, competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.

Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees, minutes and seconds. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

a) Site alternatives

Alternative 1 (preferred alternative)		
Description	Lat (DDMMSS)	Long (DDMMSS)
The preferred site alternative entails the construction and installation of a Solar PV plant at Portion 5 of the Farm Van Zoelen's Laagte No 158, Barkly Wes Rd. Alternative sites are not applicable as the study area falls within the Renewable Development Zones – Kimberly 5 Solar, as a result the site is well designated for the Solar PV development.	28°22'26.04"S 28°21'46.07"S 28°21'1.85"S 28°21'43.29"S	24°41'9.40"E 24°40'0.52"E 24°40'58.51"E 24°41'54.77"E
Alternative 2		
Description	Lat (DDMMSS)	Long (DDMMSS)
Alternative 3		
Description	Lat (DDMMSS)	Long (DDMMSS)

In the case of linear activities:

Alternative:	**Latitude (S):**	**Longitude (E):**
Alternative S1 (preferred)		
Starting point of the activity		
Middle/Additional point of the activity		
End point of the activity		
Alternative S2 (if any)		
Starting point of the activity		
Middle/Additional point of the activity		
End point of the activity		
Alternative S3 (if any)		
• Starting point of the activity		
• Middle/Additional point of the activity		
• End point of the activity		

For route alternatives that are longer than 500m, please provide an addendum with co-ordinates taken every 250 meters along the route for each alternative alignment.

In the case of an area being under application, please provide the co-ordinates of the corners of the site as indicated on the lay-out map provided in Appendix A of this form.

b) Lay-out alternatives

Alternative 1 (preferred alternative)		
Description	Lat (DDMMSS)	Long (DDMMSS)
The preferred layout for the proposed development entails, the construction of a Solar PV Plant, with polycrystalline solar panels on fixed tilt mountings (at 30°). As part of the Solar Plant, there will be an operational and maintenance centre, which will have the following sections and/or divisions: - Parking area, - Admin block, - Engineering workshop, - An ablution block and - Security area. The most important section of the preferred layout is the Smart cloud management centre (energy monitoring system, this forms part of the operations and maintenance centre), fitted with the data centre, telepresence conferencing centre, workstation and power plant KPIs.	28°22'26.04"S 28°21'46.07"S 28°21'1.85"S 28°21'43.29"S	24°41'9.40"E 24°40'0.52"E 24°40'58.51"E 24°41'54.77"E
Alternative 2		
Description	Lat (DDMMSS)	Long (DDMMSS)
N/A	N/A	N/A
Alternative 3		
Description	Lat (DDMMSS)	Long (DDMMSS)
N/A	N/A	N/A

c) Technology alternatives

Alternative 1 (preferred alternative)
The preferred technology is Solar PV system, which entails harnessing the energy from the sun, to an array of inverters , from which the energy goes to an integrated monitoring system (the system has a transformer, batteries for energy storage and a control room). The energy from the control room is transferred to the Eskom substation, from which to the distribution line (pylons).
Alternative 2
As an alternative to the Solar PV, hydro energy is another option. The Hydro energy process entails harnessing energy from movement of water, where the water flows from a higher level to the lowest point, or through a channel constructed at the lowest point of the dam (reservoir). The water goes pass a turbo generator with a turbine, that rotates (fitted with an electric cable), energy is generated which

is then transferred to the substation (or mini transfer station). The energy in the substation is then distributed to the grid lines (pylons), further distribution to the end user. Refer to figure 4, below:

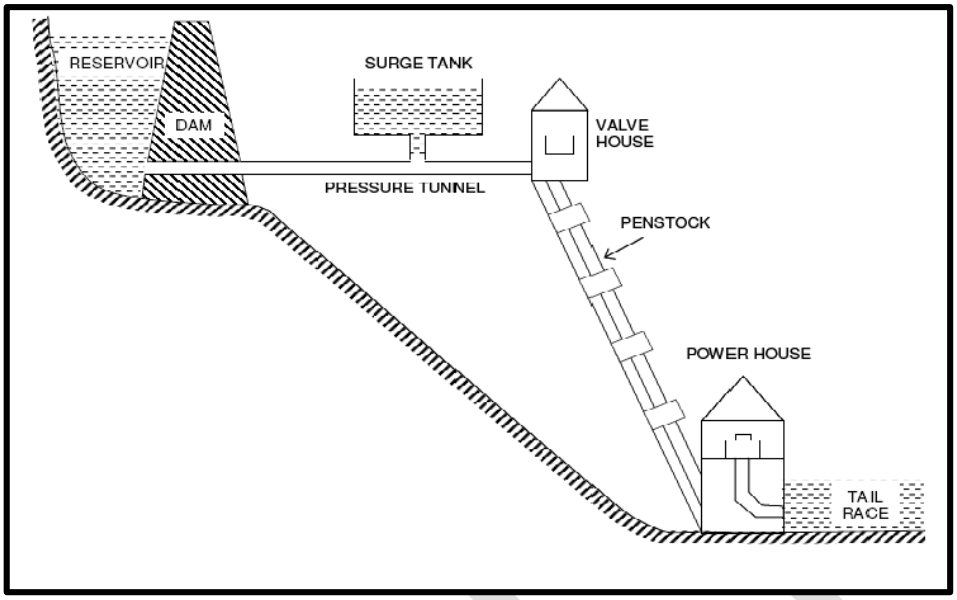


Figure 4 : Hydro power schematic

As compared to the Solar PV, the hydro power energy is suitable in an area or environment where there is sufficient and/or large volumes of water, i.e. the reservoir as mentioned in the description. In comparison, hydro power is not an option for the current study area, as there is no reservoir (or sufficient water). Additionally, the terrain is flat, which makes the Solar PV a preferred option.

Alternative 3

The other alternative as compared to Hydro power and Solar PV is Wind energy. The wind energy technology entails installation of wind turbines (the turbine is mounted on a tower fitted with electric cables from the generator), wherein energy is generated through windblown action. The turbine is fitted with rotor blade, which is mounted to a gear box linked with a generator. As wind blows, the rotor blades starts to rotate (slow rotation), this changes the gearbox rotation to a faster speed within the generator, which then generates energy. The generator is fitted with power cables, which transfers the energy to the transformer and or power station, from the transformer the energy goes to the grid lines (Pylons) for further distribution to the end user. Refer to figure 5, below:

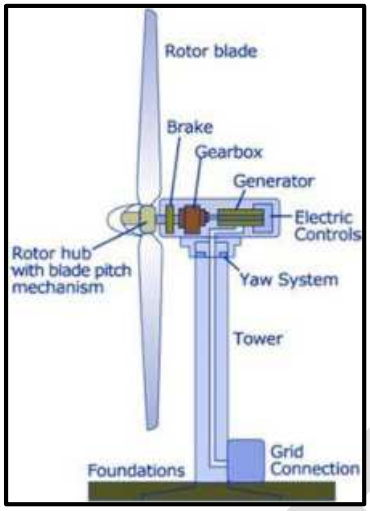


Figure 5 : Wind energy schematic

The wind energy production requires large piece of land and an area where there is sufficient wind. In comparison to the Solar PV and Hydro energy, the solar energy is the most reliable and cost efficient option, thus the Solar PV remains a preferred option for the study area, because is it best suited for the receiving environment (high solar radiation).

d) Other alternatives (e.g. scheduling, demand, input, scale and design alternatives)

Alternative 1 (preferred alternative)
In terms of design alternatives, the preferred option entails construction and installation of Solar PV Plant with a footprint of approximately 300 hectares. The associated infrastructure includes, a smart monitoring and control room, with a guardhouse, battery storage facility, equipment storage area, solar panels and inveters, including bulk services i.e. water, sewer. In terms of electricity, the plant will be self-sustainable on energy supply. The specifications of the preferred specifications and system designs are outlined below: - Type of mountings: The proposed system for mounting the solar panels is the fixed tilt systems, which are rack mounted at 30 degrees for capturing the energy from the sun. See figure 6, below:

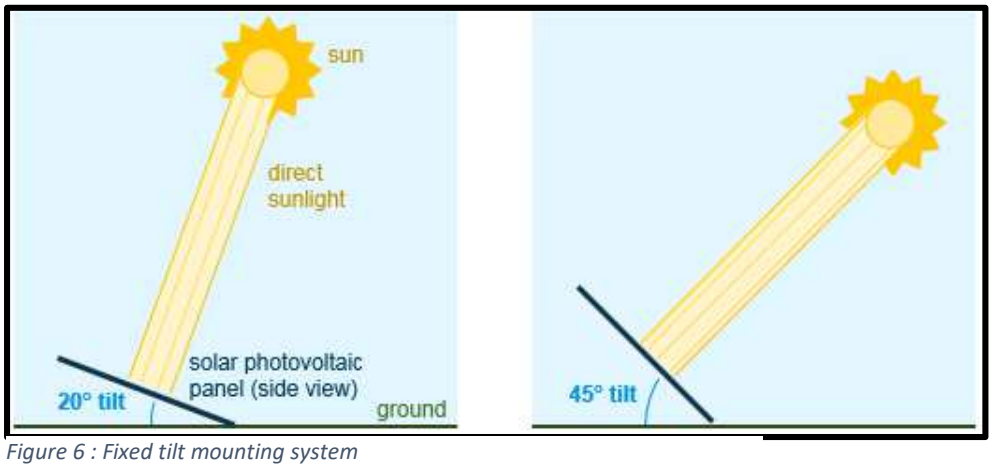


Figure 6 : Fixed tilt mounting system

- The advantages and disadvantages of the fixed tilt system are as follows:

    - Less weight and cost
    - The only disadvantage is the less energy production

The fixed tilt systems is the preferred option for the solar panel installation of the proposed development, this supplemented by the type of solar panels (polycrystalline, as outlined below) for a high energy output.

PV Panels: The preferred type of panel systems for the proposed development is polycrystalline solar panels. The panels are made up of many silicon crystal melted together. The panels are blue in texture, in comparison to the monocrystalline panels, the electrons within the polycrystalline panels move less efficiently as compared to the monocrystalline panels, thus the efficiency level is lower, which implies more panels are required for a higher output compared to the monocrystalline panels. The polycrystalline panels combined with the fixed tilt mounting system becomes more efficient, the combination is the preferred option for the proposed development.

Figure 7 : Polycrystalline panel.

The polycrystalline panels combined with the fixed tilt mounting system becomes more efficient, the combination is the preferred option for the proposed development. The polycrystalline panels are weigh less, cost less and required lower maintenance.

Alternative 2

Type of mountings: As compared to the fixed tilt system, the other option is the single axis tracking system. The single axis tracking systems tracks and/or follows the movement of the sun during the day, in an easterly to west direction. The panels are mounted on an axis, which aids in the rotation of the panels throughout the day (refer to figure 8, below).

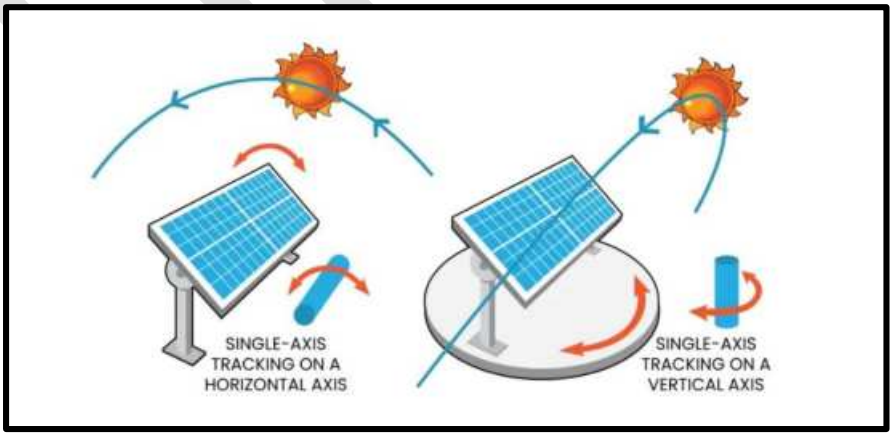


Figure 8 : Single Axis tracking System (the preferred option is the single axis tracking on a horizontal axis.

PV Panels: The alternative to polycrystalline panels is monocrystalline panels. The monocrystalline panels are made up of single silicon crystals, which allows electrons to move efficiently. Based on the silicon ratio,

monocrystalline panels are more efficient as compared to polycrystalline panels and are made up of a black texture (refer to figure 9, below).

Figure 9 : monocrystalline panels.

The monocrystalline panels have a higher maintenance as compared to the polycrystalline panels, cost more, and thus are not the preferred option for the proposed development.

Alternative 3

N/A

e) No-go alternative

The no go alternative entails, the option at which the proposed development does not go ahead and/or an option which should not be applied to the proposed development. The no go alternative explored for this assessment is the proposed development not going ahead, this will result in a loss of the local socio-economic boost i.e. loss of job and skills development opportunities, cumulatively, a loss in the investment opportunity that will be created by the proposed project.

The proposed project also contributes to boosting the current electricity shortages faced by the country and at the local scale, the Dikgatlong Local Municipality, thus not implementing the proposed project will result in the inappropriate land use (the land for the proposed project is earmarked for Solar PV plants), additionally as the country moves towards the 1.5 climate change goals as per the COP27 agreements, no implementation of the project results in loss of an opportunity which will assist in the reduction of fossil fuel based energy production methods.

Paragraphs 3 – 13 below should be completed for each alternative.

3. PHYSICAL SIZE OF THE ACTIVITY

a) Indicate the physical size of the preferred activity/technology as well as alternative activities/technologies (footprints):

Alternative:	**Size of the activity:**
Alternative A1[1] (preferred activity alternative)	4 000 000 m^2
Alternative A2 (if any)	4 000 000 m^2
Alternative A3 (if any)	N/A

or, for linear activities:

Alternative:	**Length of the activity:**
Alternative A1 (preferred activity alternative)	N/A
Alternative A2 (if any)	N/A
Alternative A3 (if any)	N/A

b) Indicate the size of the alternative sites or servitudes (within which the above footprints will occur):

Alternative:	**Size of the site/servitude:**
Alternative A1 (preferred activity alternative)	6 424 385 m^2
Alternative A2 (if any)	6 424 385 m^2
Alternative A3 (if any)	N/A

4. SITE ACCESS

Does ready access to the site exist?	YES	
If NO, what is the distance over which a new access road will be built		N/A

[1] "Alternative A.." refer to activity, process, technology or other alternatives.

Describe the type of access road planned:

The study area can be accessed from N12, turning right into R374 from Warrenton, whereas from Kimberly turning left into R 374. Once on R374, the site is approximately 16 Km, through the Windsorton town.

Figure 10 : Access Road

Starting from N12 into R374, the Vaal river leading into the Windsorton town is approximately 10 km, from which passing the Windsorton town, the distance is 3.74 km to a gravel road on the left, opposite to the Kutlwano and Windsorton waterworks (the waterworks is on the right hand side). Once on the left turn (gravel road), the distance to the site approximately 2 km.

Include the position of the access road on the site plan and required map, as well as an indication of the road in relation to the site.

5. LOCALITY MAP

An A3 locality map must be attached to the back of this document, as Appendix A. The scale of the locality map must be relevant to the size of the development (at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map.). The map must indicate the following:

- an accurate indication of the project site position as well as the positions of the alternative sites, if any;
- indication of all the alternatives identified;
- closest town(s;)
- road access from all major roads in the area;
- road names or numbers of all major roads as well as the roads that provide access to the site(s);
- all roads within a 1km radius of the site or alternative sites; and
- a north arrow;
- a legend; and
- locality GPS co-ordinates (Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection).

6. LAYOUT/ROUTE PLAN

A detailed site or route plan(s) must be prepared for each alternative site or alternative activity. It must be attached as Appendix A to this document.

The site or route plans must indicate the following:

- the property boundaries and numbers of all the properties within 50 metres of the site;
- the current land use as well as the land use zoning of the site;
- the current land use as well as the land use zoning each of the properties adjoining the site or sites;
- the exact position of each listed activity applied for (including alternatives);
- servitude(s) indicating the purpose of the servitude;
- a legend; and
- a north arrow.

7. SENSITIVITY MAP

The layout/route plan as indicated above must be overlain with a sensitivity map that indicates all the sensitive areas associated with the site, including, but not limited to:

- watercourses;
- the 1:100 year flood line (where available or where it is required by DWS);
- ridges;
- cultural and historical features;
- areas with indigenous vegetation (even if it is degraded or infested with alien species); and
- critical biodiversity areas.

The sensitivity map must also cover areas within 100m of the site and must be attached in Appendix A.

8. SITE PHOTOPGRAPHS

Colour photographs from the centre of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached under Appendix B to this report. It must be supplemented with additional photographs of relevant features on the site, if applicable.

9. FACILITY ILLUSTRATION

A detailed illustration of the activity must be provided at a scale of at least 1:200 as Appendix C for activities that include structures. The illustrations must be to scale and must represent a realistic image of the planned activity. The illustration must give a representative view of the activity.

10. ACTIVITY MOTIVATION

Motivate and explain the need and desirability of the activity (including demand for the activity):

1. Is the activity permitted in terms of the property's existing land use rights?		NO	Please explain
The current land use for the study area is agricultural, thus rezoning application process is required from agricultural to utility III. Additionally, in accordance with the Renewable Energy Development Zones (REDZs), the site falls within the REDZ 5– Kimberly Solar.			
2. Will the activity be in line with the following?			
(a) Provincial Spatial Development Framework (PSDF)	YES		Please explain
In accordance with the Northern Cape Spatial Development Framework (NCSDF), there is need to shift from fossil fuel energy based systems to large scale renewable energy based systems. The most important part of the transition is to contribute and improve energy supply within the local areas, limit energy imports, whilst reducing environmental impacts, this in turn contributes to limiting climate change associated effects. Furthermore, with the current shortage of electricity supply within the country, the NCSDF identifies the renewable energy system transition as a high priority, so as to play a vital role in curbing the current electricity shortage. According to the NCSDF, specifically on solar energy, the province receives radiation ranging between 8.501 and 9.500 kWh/m^2, with the Solar PV (the proposed project) identified as one of the main technologies, this including the concentrated solar power (CSP).			

(b) Urban edge / Edge of Built environment for the area		NO	Please explain
In terms of the Dikgatlong Local Municipality Spatial Development Framework, the site falls outside of the urban edge. The study area is however in close proximity to the Kutlwano location which is within the urban edge.			
(c) Integrated Development Plan (IDP) and Spatial Development Framework (SDF) of the Local Municipality (e.g. would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?).		NO	Please explain
The Dikgatlong Local Municipality IDP 2019/2020, identifies Solar Energy (solar plants) as part of its green economy initiatives. In turn, the main objective is for the municipality to align itself to the government's National Development Plan vision 2030. The proposed project is an independent, thus does not form of the projects as identified within the IDP, however it is aligned to the aims of the IDP on similar projects for exploration on both private and government land. In addition to the IDP, the Dikgatlong Local Municipality Spatial Development Framework (SDF) 2014/19 identifies the need for solar energy projects within low density areas, where there are inadequate services, however these areas will have to be developed into high density areas prior to the implementation of the proposed green energy initiatives. The proposed initiatives form part of the opportunities identified as part of the climate change theme. Other related opportunities identified by the SDF include the establishment of solar plants on both private and public land (note: at the time of the SDF, Scoping/EIA processes were already initiated). In relation to the proposed development, it can be concluded that the proposed project is aligned to the approved existing SDF, thus it will not be compromised.			
(d) Approved Structure Plan of the Municipality		NO	Please explain
The proposed development will be undertaken on the property zoned as agricultural, previously where mining activities were undertaken, as a result it is not in line with the municipality's structure plan, however most importantly the land is privately owned, this entails that an application for rezoning to Utility III for the proposed Solar Plant should be lodged to the municipality. In addition, other legal, policy and plans i.e. Dikgatlong SDF, are in support of similar project activities in both private and public land.			

(e) An Environmental Management Framework (EMF) adopted by the Department (e.g. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)		NO	Please explain
The Frances Baard District Municipality identifies energy generation within the Dikgatlong Local Municipality as a challenge, this in turn implies that there is more reliance on fossil fuel burning practices for energy generation and/or use within households, business and industrial areas. The impacts associated with this type of practice is increased CO_2 emissions, which in turn contributes to climate change related effects and at the local scale, the change in the ambient air quality. The need for a transition to a more green energy initiative is recognised by the SDF for the municipality, this including the use of solar for heating (geysers) and lighting. Additionally on a larger scale, the key activity as planned for included identification of both private and public land for installation of solar and wind plants. Based on the above, including the planned activities within the existing legal frameworks, policies, documents and guidelines (including the Renewable Energy Development Zones) the proposed development is well aligned with the existing and approved Environmental Management Framework, and yes it does contribute and play a critical role towards the objectives for sustainable developments.			

(f) Any other Plans (e.g. Guide Plan)	YES		Please explain

The following guideline and or plans are applicable :-

- Department of Environmental Affairs (2015). EIA Guideline for Renewable Energy Projects. Department of Environmental Affairs, Pretoria, South Africa
  - The guideline specifies the methods of application when assessing environmental impacts related to renewable energy, whilst providing an overview of related impacts associated such project activities, in this instance Solar PV, including the outline of applicable legal requirements i.e. National Environmental Management Act No 107 of 1998, as amended-: Environmental Impact Assessment Regulations 2014, as amended.
  - One of the key important aspect of this guideline is the identification and/or the view of renewable energy activities vs the non-renewable energy activities, in relation to the global, national, provincial and local climate change challenges and the overall aim to reaching the sustainable development goals. As a result, the need for the transition from non-renewable resources (coal) to renewable energy resource uses (Solar, Wind and Hydro-Energy, Biomass and Biofuels) as an example.
- Government Notice No. 114 in Government Gazette No. 41445:- Renewable Energy Development Zones:
  - The identified eight renewable energy development zones, provides for the geographic areas where renewable energy initiatives should be focused on, these were determined based on pre-strategic assessment to accommodate and open opportunities for the projects in order to achieve the set sustainable development goals, tackle issues of climate change related non-renewable energy use and address the current electricity supply challenges faced by the country.
  - The proposed project falls within the Renewable Energy Development Zone: Kimberly 5-Solar, this implying that the project is located well within the designated and applicable land use.

3. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP)?	Yes		Please explain
The current land use associated with the activity applied for is agricultural, with historic mining activities undertaken on the land. In order for the land use to be in line with the activity applied for, a rezoning application should be lodged with the local authority. In terms of the Renewable Energy Development Zone, the site as indicated in point 2 (f) above falls within the Kimberly 5 Solar (this identified in accordance with the strategic assessment for Large PV projects, as published in Government Notice No. 114 in Government Gazette No. 41445. Note-: the strategic assessments including implementation are done in consultation with various applicable environmental authorities.			
4. Does the community/area need the activity and the associated land use concerned (is it a societal priority)? (This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate.)	YES		Please explain
According to the Dikgatlong Local Municipality IDP, it estimates approximately 65.2% of the population using electricity, whereas 32% uses candles and the remaining 5.5% using either solar, gas or paraffin. Based on the outline above, with the increased high radiation the area receives, it can be said that the community does need the activity and associated land use for economic opportunities the activity may open up, this including other related effects the proposed activity may have in the local climate changes i.e. change in ambient air quality as a result of fossil fuel burning, reduced and/or controlled radiation.			
5. Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development? (Confirmation by the relevant Municipality in this regard must be attached to the final Basic Assessment Report as Appendix I.)	YES		Please explain
Currently within the study area, there is water supply, however no sewer services, the electricity supply is via solar energy. The proposed activity will be self-sustainable in terms of energy supply for operations, with the proposed septic tank system for sewer services. An application for a Water Use License should be lodged for the proposed activity, with regard to the use of the borehole on site. On access roads, the current roads are gravel, however these can be maintained during the construction and operational phases.			

6. Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)? (Comment by the relevant Municipality in this regard must be attached to the final Basic Assessment Report as Appendix I.)		NO	Please explain
The proposed development is private, thus the onus lies with the Developer to ensure adequate infrastructure services are on site, however this will be done in consultation with the Local Authority (Municipality) to ensure that the set legal requirements including the appropriate infrastructure requirements are met prior to any installations.			
7. Is this project part of a national programme to address an issue of national concern or importance?		NO	Please explain
The project does not fall under the Renewable Energy IPP Procurement Programme (REIPPPP), however it is aligned to the Independent Power Producer policy, which seeks to provide an opportunity to Independent Power Producers to initiate renewable energy projects, as part of the main transition from energy generation from non-renewable energy resources (i.e. Coal) to a more sustainable and greener approach of energy generation from renewable energy resources (i.e. Solar). In turn, this does contribute to the measures and/or initiatives set to combat climate change within the country.			
8. Do location factors favour this land use (associated with the activity applied for) at this place? (This relates to the contextualisation of the proposed land use on this site within its broader context.)	YES		Please explain
The previous land use for the proposed activity entailed mining activities, whereas currently the site is zoned agricultural, however, taking into consideration the re-zoning application to be lodged with the local authority, and as an alternative land use to mining activities and the flat terrain, the high radiation the area receives, the location does favour the proposed project activities. Additionally, with the pre-strategic assessments conducted for the area, leading to the demarcations of the Renewable Energy Development Zone: Kimberly 5 solar specifically, the proposed project activities are well within the preferred location.			

9. Is the development the best practicable environmental option for this land/site?	YES		Please explain
As outlined at point 8 above, the previous land use on the proposed site was mining, as a result the Solar plant is the preferred and/or best practicable environmental option post the activities that were undertaken on the land, this as an option taking into account the historic issues related to post mining closure activities. The basis of this statement stems from the evident investigations and/or studies, previously done on alternative post mining related activities, on which the most preferred option being agricultural (i.e. Grazing). The proposed development provides for a different approach, which can open up opportunities for other similar projects in future, additionally the development is of a greener approach, thus contributes to the country's sustainable development goals.			
10. Will the benefits of the proposed land use/development outweigh the negative impacts of it?	YES		Please explain
As compared to the previously mining related activities, the proposed Solar plant uses a green and cleaner technology (harnessing solar radiation for electrical energy generation), thus will result in less environmental degradation i.e. emission of greenhouse gases as compared to coal. The land were the proposed development will be undertaken was previously disturbed, as a result the impact on clearance of indigenous, protected vegetation is null, this unlike the implementation of the project on a green field.			
11. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?	YES		Please explain
The Dikgatlong Local Municipality comprises of areas that receives high energy radiation, as a result for other land uses where mining activities were undertaken, solar projects can be an alternative land use option, this as compared to the normal agricultural practices i.e. grazing. Note: Currently within the Dikgatlong Local Municipality, it is evident that the use of solar energy is the preferred option as an energy source.			
12. Will any person's rights be negatively affected by the proposed activity/ies?		NO	Please explain
The activity will be undertaken on a privately owned land, which is not located in close proximity to the local community, most importantly, the activity will provide economic opportunities for the residents and the municipality.			
13. Will the proposed activity/ies compromise the "urban edge" as defined by the local municipality?		NO	Please explain
The proposed activity falls outside of the urban edge, but will be undertaken on land previously used for mining. An application rezoning is required from Agricultural land use to Utility III, which in turn will not impact the current urban edge.			

14. Will the proposed activity/ies contribute to any of the 17 Strategic Integrated Projects (SIPS)?		NO	Please explain
The proposed activity does not form part of the 17 Strategic Integrated Projects.			

15. What will the benefits be to society in general and to the local communities?	Please explain
The development will result in socio-economic opportunities in a form of jobs and skills development during the construction and operational phases, cumulatively additional infrastructure capacity within the Local Municipality, may result in opening up other investment opportunities within the municipality.	

16. Any other need and desirability considerations related to the proposed activity?	Please explain
Other than the outline need for green technologies as part of the National transition from non-renewable resources in generating electricity, the proposed project will benefit the local community, including open up economic opportunities with the Local Municipality as a whole, due to the increased infrastructure capacity. Generally, the more sustainable and capacitated an area is, the interest in investment opportunities increases, cumulatively, this results in the improved socio-economic activity of an area. In a nutshell, the project will result in the following benefits:- - Direct employment opportunities for locals. - Skills transfer to the local contractors. Increased and green electrical energy to the grid, which in turn plays a pivotal role in fighting climate change related effects.	

17. How does the project fit into the National Development Plan for 2030?	Please explain
The National Development Plan 2030 (NDP), envisages an improved energy sector by the 2030, not excluding the job opportunities the sector provides directly and indirectly to the local communities and other external stakeholders. In turn, these envisaged investments should play a critical role in improving the social aspects of affected communities at an affordable tariff and/or rate. In accordance with the NDP, approximately 70% of South Africa's energy is generated from Coal, as a result there is a need for a policy shift, in that it needs to focus on an integration of energy supply with independent power producers, this in combat against the current energy supply shortages. Additionally, the plan sets a scene on the requirement for a shift to alternative energy sources, wherein coal will be the less preferred method for energy generation as compared to the greener energy sources i.e. solar, wind and imported hydroelectricity.	

18. Please describe how the general objectives of Integrated Environmental Management as set out in section 23 of NEMA have been taken into account.

As part of the planning process for the proposed development, an environmental impact assessment process has been initiated (this Basic Assessment Report with specialist assessments), which further investigates the project related impacts on land, air, water, vegetation and associated socio-economic aspects, part of the process includes a public consultation process, which provides an opportunity to interested and affected parties to provide comments on the project activities, including the determined and assessed impacts within this report.

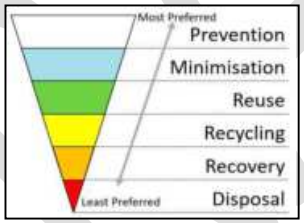
19. Please describe how the principles of environmental management as set out in section 2 of NEMA have been taken into account.

The proposed development in itself as a greener alternative technology as compared to non-renewable energy sources i.e. coal, adheres to the principles as set in Section 2 of the National Environmental Management Act No (107 of 1998-NEMA), as amended. The Section 2 principles as set in NEMA 107 of 1998, as amended requires that a development should embrace the various aspects of an integrated environmental approach, wherein the social, economic and environmental aspects are well balanced. The proposed project activities will result in less CO_2 emissions (a contributing aspect to reaching sustainable development goals), whilst contributing towards the broader social and economic activities, through skills provision and job creation. The land where the proposed activities will be undertaken has been previously degraded due to mining activities, as a result the activities are well suited for the land as an alternative land use, due to the fact that it will not result in high environmental impacts related to loss indigenous plants and/or animals.

11. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

List all legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations, if applicable:

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
Conservation of Agricultural Resources Act (Act No. 43 of 1983 as amended in 2001)	As specified in the Act, is the list of invasive weed and plant species, including prescribed actions to combat the spread thereof. Applicable to the study area, is category 1b invasive plant species, which requires control by an invasive species management programme.	National and Provincial	27 April 1983
National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended).	Section 28 of the act applies to the activities to be undertaken by the Applicant. The Applicant has a duty to ensure that any activities that cause or may cause environmental degradation are assessed and measures for prevention, avoidance or minimization of such impacts from occurring are in place for all phases of the proposed development.	National & Provincial	27 November 1998
The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996, as amended).	Section 24 of the constitution stipulates that everyone has the right — to an environment that is not harmful to their health or well-being; and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that — prevent pollution and ecological degradation; promote conservation; and secure	National	18 December 1996

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
	ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. The applicant has the responsibility to ensure that project activities are undertaken in a manner that does not cause environmental degradation, whilst ensuring the principle of sustainable development is adhered to. This should be achieved through implementation and adherence to the EMPr at all phases of the proposed activities.		
National Environmental Management: Waste Act, 2008 (Act 59 of 2008, as amended)	The Applicant should adhere to the following waste management practices:  *Figure 11: Waste Management Hierarchy* (Source: https://www.mdpi.com/2079- 276/7/1/21/htm) The waste management mitigation measures as provided within the EMPr should be adhered to achieve compliance with the requirements of this act.	National & Provincial	10 March 2009

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
National Heritage Resources, 1999 (Act No. 25 of 1999)	The Applicant should ensure compliance to Section 38 of this Act, thus ensuring that the Heritage Resources Agency is notified and provides comments on the proposed activities. Based on the conducted Phase 1 Archaeological Impact Assessment by Millenium Heritage Group (Pty) Ltd, no heritage resources have been identified on site.	National & Provincial	28 April 1999
National Water Act, 1989 (Act No. 36 of 1998, as amended - NWA)	In line with this act, the proposed project activities should ensure compliance to section 19 of the NWA, thus putting in place measures that prevent pollution and/degradation on water resources. Additionally, a Water Use License is required for Section 21 (a) – Taking water from a water-resource (in this instance this refers to the abstraction of water from the borehole).	National & Provincial	26 August 1998
National Environmental Biodiversity, 2004 (Act No. 10 of 2004)	This Act requires that any red data and sensitive species within the site development should be conserved during the project implementation phases. Although no Threatened species were encountered during the field survey, recommendation in the draft EMPr and ecological assessment should be adhered to on implementation of the proposed project activities.	National & Provincial	7 June 2004

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)	All persons at work are entitled to a healthy and safe working environment while undertaking their respective activities. The Applicant has a responsibility to ensure that this requirement is adhered to.	National & Provincial	23 June 1993
National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)	Project activities should be undertaken in manner which does not result in air pollution, through implementation of mitigation measures as per the EMPr on air quality related impacts.	National & Provincial	24 February 2005
Hazardous Substances amendment Act, 1992 (Act No.53 of 1992) (as amended)	To provide for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances, and for the control· of certain electronic products; to provide for the division of such substances or products into groups in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances and products; and to provide for matters connected therewith.	National	4 April 1973

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
Promotion of Access to Information Act, 2000 (Act No. 2 of 2000)	All documents relating to the project should be accessible to the Public. In line with the environmental impact assessment process all documents for review by the public should be made available on written request.	National	2 February 2000
Environmental Impact Assessment Regulations, 2014 (as amended)	**Listing Notice 2 - GN R.325 - 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" The proposed development entails the establishment of a Solar PV plant, which will generate 150 MW of energy to feed into the national grid to increase capacity for electricity supply within the Dikgatlong Local Municipality. The estimated energy to be generated from the proposed development is approximately 181 million kilowatt hours per year over a 20 year period, which can supply approximately 33 000 households. **Listing Notice 2 – GN R.325; Activity 15** : "The clearance of an area of 20 hectares or more of indigenous vegetation" The land where the development will be located is currently vacant, however it cannot be classified as a greenfield as it has	National & Provincial	7 April 2017

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
	been previously disturbed by mining activities, with evidence of transformation as a result of grazing. Based on the Ecological Assessment conducted by Maanakana Projects and Consulting (Pty) Ltd, the proposed project will not have an impact on the mapped ecological sensitive area and critical biodiversity area located at the south eastern section of the site.		
National Environmental Management: Biodiversity Act: Alien and Invasive Species Regulations R 598 of 2014	Regulations should be complied with for the removal and controlling of alien and invasive species within the proposed project area.	National	1 August 2014
National Environmental Management Act, 1998 (Act no.107 of 1998, as amended): Publication of Public Participation Guideline	This guideline is used for the Public Participation process undertaken as part of the Basic Assessment application process. The main objective is to ensure that the Public Participation requirements are complied with and the process is undertaken in a fair, unbiased and reasonable manner.	National	10 October 2012
Northern Cape Nature Conservation Act (Act No. 9 of 2009)	The act provides for the conservation of indigenous, red-data listed plant and animals, including the control for sustainable use where applicable. In relation to the proposed project, any red data listed plant and animal species protected in terms of	Provincial	21 January 2010

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
	this act, including aquatic habitats may be damaged and/or destroyed.		

12. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

a) Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?	YES	
If YES, what estimated quantity will be produced per month?	< 20 m^3	

How will the construction solid waste be disposed of (describe)?

The suggested method for disposal of construction solid waste within the site is by use of waste disposal bins, where applicable, a waste skin bin can be used. On a daily basis, the construction site should be clear of solid waste, thus through employees on site, the designated areas were waste bins are located should be used for disposal as highlighted above, this including waste separation.

Where will the construction solid waste be disposed of (describe)?

The construction solid waste will be transported from site to the Windsorton Landfill site. The options proposed for transportation of the includes:-

- Transportation by the contractor.

Alternatively, sourcing a local licensed service provider for collection and disposal of the waste to the landfill site.

Will the activity produce solid waste during its operational phase?	YES	
If YES, what estimated quantity will be produced per month?	<3 m^3	

How will the solid waste be disposed of (describe)?

As part of the layout, a designated area with sealed waste receptacles will be allocated and constructed on site, with various labels for waste separation purposes. The applicable approach entails the use of smaller waste receptacles at office areas, from which the responsible personnel will then discard the waste to the bigger waste receptacles, from which there will be collection on weekly basis.

If the solid waste will be disposed of into a municipal waste stream, indicate which registered landfill site will be used.

Windsorton Landfill Site

Where will the solid waste be disposed of if it does not feed into a municipal waste stream (describe)?

N/A

If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the NEM:WA?		NO
If YES, inform the competent authority and request a change to an application for scoping and EIA. An application for a waste permit in terms of the NEM:WA must also be submitted with this application.		
Is the activity that is being applied for a solid waste handling or treatment facility?		NO
If YES, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA. An application for a waste permit in terms of the NEM:WA must also be submitted with this application.		

b) Liquid effluent

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?		NO
If YES, what estimated quantity will be produced per month?		N/A m^3
Will the activity produce any effluent that will be treated and/or disposed of on site?		NO
If YES, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.		

Will the activity produce effluent that will be treated and/or disposed of at another facility?		NO
If YES, provide the particulars of the facility:		

Facility name:	N/A		
Contact person:	N/A		
Po0stal address:	N/A		
Postal code:	N/A		
Telephone:	N/A	**Cell:**	N/A
E-mail:	N/A	**Fax:**	N/A

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

N/A

c) Emissions into the atmosphere

Will the activity release emissions into the atmosphere other that exhaust emissions and dust associated with construction phase activities?		NO
If YES, is it controlled by any legislation of any sphere of government?		NO
If YES, the applicant must consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.		
If NO, describe the emissions in terms of type and concentration:		

The general anticipated air emissions associated with the proposed project activities are as outlined below:

- Dust (Particulate Matter) generated within the study area, due to the movement of construction vehicles (and access routes) during construction, including dust on access routes during the operational phase.
- Exhaust air emissions from construction vehicles, for the operational phase, these emissions will be mainly from plant operational machinery, employee vehicles and the use of generators as back emergency systems.
- Other possible emissions include lead, sulphuric acid, however these are applicable on emergency situations as a result of incident that may occur (Operational incidents).

The overall CO_2 emissions linked with the solar plant is on the life-cycle phases, which includes activities such as material transportation during the construction phase, maintenance activities (operational phase) and the decommissioning phase (closure). As compared to other forms of energy i.e. natural gas, the estimation of CO_2 emissions, life cycle linked is between 31.75g to 81.6g per kilowatt-hour.

d) Waste permit

Will any aspect of the activity produce waste that will require a waste permit in terms of the NEM:WA?		NO

If YES, please submit evidence that an application for a waste permit has been submitted to the competent authority

e) Generation of noise

Will the activity generate noise?		NO
If YES, is it controlled by any legislation of any sphere of government?		NO

Describe the noise in terms of type and level:

The type of noise anticipated for the proposed development is as follows:

- The movement of construction machinery.
- Noise emission from the string array of inverters, the substation and transformer, estimated as < 60 dBA in close proximity.
- The use of generators, were applicable.

Other related noise emissions will be from operational activities such as maintenance, whereas within the operations and maintenance centre the anticipated noise levels will be from the use and operation of technological equipment.

13. WATER USE

Please indicate the source(s) of water that will be used for the activity by ticking the appropriate box(es):

Municipal	Water board	Groundwater	River, stream, dam or lake	Other	The activity will not use water
		X			

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate the volume that will be extracted per month:	5 000 litres
Does the activity require a water use authorisation (general authorisation or water use license) from the Department of Water Affairs?	YES

If YES, please provide proof that the application has been submitted to the Department of Water Affairs.

14. ENERGY EFFICIENCY

Describe the design measures, if any, which have been taken to ensure that the activity is energy efficient:

The proposed design for the solar panels is the polycrystalline panels, which mainly consists of multi silicone crystals joined together, with a blue film. The type of panels produce less energy as compared to the mono-crystalline panels, however with the type of mountings (fixed tilt) to be used, the resultant energy output is enhanced.

The other feature is the operations and maintenance centre, which will incorporate the following features energy efficient lighting, office equipment which uses energy efficient smart technologies (these are energy star rated). The other key aspect for consideration is the building orientation, and the building materials to be used, which contributes to insulation (green insulation material i.e. polystyrene or cellulose can be a preferred option). The suggested building design is the use of various materials i.e. glass, in other sections brick and mortar where applicable, this not excluding retrofitting.

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

Alternative energy sources are not applicable for the proposed development, as it will be self-sustainable in terms of energy supply (Solar energy).

SECTION B: SITE/AREA/PROPERTY DESCRIPTION

Important notes:

1. For linear activities (pipelines, etc) as well as activities that cover very large sites, it may be necessary to complete this section for each part of the site that has a significantly different environment. In such cases please complete copies of Section B and indicate the area, which is covered by each copy No. on the Site Plan.

Section B Copy No. (e.g. A):

2. Paragraphs 1 - 6 below must be completed for each alternative.

3. Has a specialist been consulted to assist with the completion of this section? YES

If YES, please complete the form entitled "Details of specialist and declaration of interest" for each specialist thus appointed and attach it in Appendix I. All specialist reports must be contained in Appendix D.

Property description/physical address:

Province	Northern Cape
District Municipality	Frances Baard
Local Municipality	Dikgatlong
Ward Number(s)	4
Farm name and number	Zoelen's Laagte 158
Portion number	5
SG Code	C0070000000015800005

Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application including the same information as indicated above.

Current land-use zoning as per local municipality IDP/records:

Agricultural

In instances where there is more than one current land-use zoning, please attach a list of current land use zonings that also indicate which portions each use pertains to, to this application.

Is a change of land-use or a consent use application required? YES

1. GRADIENT OF THE SITE

Indicate the general gradient of the site.

Alternative S1:

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5
	X					

~~**Alternative S2 (if any):**~~

~~Flat~~	~~1:50 – 1:20~~	~~1:20 – 1:15~~	~~1:15 – 1:10~~	~~1:10 – 1:7,5~~	~~1:7,5 – 1:5~~	~~Steeper than 1:5~~

~~**Alternative S3 (if any):**~~

~~Flat~~	~~1:50 – 1:20~~	~~1:20 – 1:15~~	~~1:15 – 1:10~~	~~1:10 – 1:7,5~~	~~1:7,5 – 1:5~~	~~Steeper than 1:5~~

2. LOCATION LANDSCAPE

Indicate the landform(s) that best describes the site:

2.1 Ridgeline		2.4 Closed valley		2.7 Undulating plain / low hills	X
2.2 Plateau		2.5 Open valley		2.8 Dune	
2.3 Side slope of hill/mountain		2.6 Plain		2.9 Seafront	
2.10 At sea					

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

Is the site(s) located on any of the following?

	Alternative S1:		~~**Alternative S2 (if any):**~~		~~**Alternative S3 (if any):**~~	
Shallow water table (less than 1.5m deep)		NO	~~YES~~	~~NO~~	~~YES~~	~~NO~~
Dolomite, sinkhole or doline areas		NO	~~YES~~	~~NO~~	~~YES~~	~~NO~~
Seasonally wet soils (often close to water bodies)	YES		~~YES~~	~~NO~~	~~YES~~	~~NO~~
Unstable rocky slopes or steep slopes with loose soil		NO	~~YES~~	~~NO~~	~~YES~~	~~NO~~
Dispersive soils (soils that dissolve in water)		NO	~~YES~~	~~NO~~	~~YES~~	~~NO~~
Soils with high clay content (clay fraction more than 40%)	YES		~~YES~~	~~NO~~	~~YES~~	~~NO~~
Any other unstable soil or geological feature		NO	~~YES~~	~~NO~~	~~YES~~	~~NO~~
An area sensitive to erosion		NO	~~YES~~	~~NO~~	~~YES~~	~~NO~~

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. Information in respect of the above will often be available as part of the project

information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted.

4. GROUNDCOVER

Indicate the types of groundcover present on the site. The location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Natural veld - good condition[E]	Natural veld with scattered aliens[E] X	Natural veld with heavy alien infestation[E]	Veld dominated by alien species[E]	Gardens
Sport field	Cultivated land	Paved surface	Building or other structure	Bare soil

If any of the boxes marked with an "[E] "is ticked, please consult an appropriate specialist to assist in the completion of this section if the environmental assessment practitioner doesn't have the necessary expertise.

5. SURFACE WATER

Indicate the surface water present on and or adjacent to the site and alternative sites?

If any of the boxes marked YES or UNSURE is ticked, please provide a description of the relevant watercourse

Perennial River	YES	NO X	UNSURE
Non-Perennial River	YES	NO X	UNSURE
Permanent Wetland	YES	NO X	UNSURE
Seasonal Wetland	YES	NO	UNSURE
Artificial Wetland	YES X	NO	UNSURE
Estuarine / Lagoonal wetland	YES	NO X	UNSURE

Artificial Wetland: The Wetland Assessment and Delineation by Maanakana Projects and Consulting (Pty) Ltd, delineated two wetlands associated with the site as follows:

- HGM 1 – **Depression Wetland** (known as a Pan Wetland) : As defined within the wetland assessment report, with reference made to Kotze et al. (2007), is an inland aquatic system, wherein its depth increases from the perimeter to the central point (greatest depth). The main sources for water for the depression wetland is precipitation, groundwater discharge inflow recharge. The type of wetlands are characterised by flat or round bottomed surfaces with a combination of inlets or outlets, however some without this feature. Refer to figure 12, below:

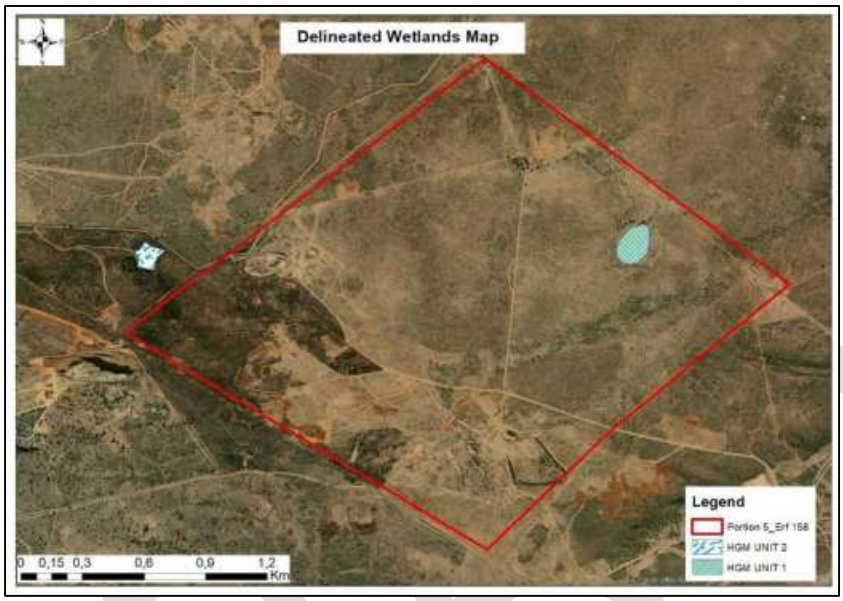


Figure 12 : HGM1 – Depression wetland.

  - The wetland health for HGM1 is determined as category D, which implies that is it largely modified, mainly as a result of previous mining, agricultural (grazing) activities that were undertaken within the site for the proposed development.

- HGM 2 - **Flat wetland**. The flat wetland system is characterised by its irregular shaped pattern and normally they are not linked to a stream. The wetland occurs in areas where there is waterlogging. The flat wetland is differs from the depression wetland due by its lack of defined margins. Refer to figure 13 below:

- The wetland health for HGM2 is determined as category D, which implies that is it largely modified, mainly as a result of previous mining, agricultural (grazing) activities that were undertaken within the site for the proposed development. Refer to figure 13, below:

Figure 13 : HGM2 - Flat Wetland

Perennial River: The Vaal River is located South East of Portion 5 of the Farm Zoelens Van Laagte 58, from the development footprint the Vaal River is approximately 2km South East.

6. LAND USE CHARACTER OF SURROUNDING AREA

Indicate land uses and/or prominent features that currently occur within a 500m radius of the site and give description of how this influences the application or may be impacted upon by the application:

Natural area X	Dam or reservoir	Polo fields
Low density residential	Hospital/medical centre	Filling station [H]
Medium density residential	School	Landfill or waste treatment site
High density residential X	Tertiary education facility	Plantation
Informal residential	Church	Agriculture
Retail commercial & warehousing	Old age home	River, stream or wetland X
Light industrial	Sewage treatment plant[A]	Nature conservation area
Medium industrial [AN]	Train station or shunting yard [N]	Mountain, Koppie or ridge
Heavy industrial [AN]	Railway line [N]	Museum
Power station	Major road (4 lanes or more) [N]	Historical building
Office/consulting room	Airport [N]	Protected Area
Military or police base/station/compound	Harbour	Graveyard

Spoil heap or slimes dam[A]	Sport facilities	Archaeological site
Quarry, sand or borrow pit X	Golf course	Other land uses (describe)

If any of the boxes marked with an "[N] "are ticked, how this impact will / be impacted upon by the proposed activity? Specify and explain:

N/A

If any of the boxes marked with an "[An]" are ticked, how will this impact / be impacted upon by the proposed activity? Specify and explain:

N/A

If any of the boxes marked with an "[H]" are ticked, how will this impact / be impacted upon by the proposed activity? Specify and explain:

N/A

Does the proposed site (including any alternative sites) fall within any of the following:

Critical Biodiversity Area (as per provincial conservation plan)	YES	
Core area of a protected area?		NO
Buffer area of a protected area?		NO
Planned expansion area of an existing protected area?		NO
Existing offset area associated with a previous Environmental Authorisation?		NO
Buffer area of the SKA?		NO

If the answer to any of these questions was YES, a map indicating the affected area must be included in Appendix A.

7. CULTURAL/HISTORICAL FEATURES

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including Archaeological or paleontological sites, on or close (within 20m) to the site? If YES, explain:		NO
	N/A	
N/A		

If uncertain, conduct a specialist investigation by a recognised specialist in the field (archaeology or palaeontology) to establish whether there is such a feature(s) present on or close to the site. Briefly explain the findings of the specialist:

Based on the conducted Phase 1 Archaeological Impact Assessment by Millenium Heritage Group (Pty) Ltd, there are no heritage resources or artefacts on site.

Will any building or structure older than 60 years be affected in any way?		NO

Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)? If YES, please provide proof that this permit application has been submitted to SAHRA or the relevant provincial authority.		NO

8. SOCIO-ECONOMIC CHARACTER

a) Local Municipality

Please provide details on the socio-economic character of the local municipality in which the proposed site(s) are situated.

Level of unemployment:

According to Census 2011 (data source: www.wazimap.co.za), the Dikgatlong Local Municipality level of employment outline theme is categorised into the following: - Discouraged work seekers (7%), employed (27%), other not economically active (49%), unemployed (17%) and un-specified (0%). The municipality has a population distribution of approximately 48 473 people. In terms of the employment sector distribution, including number estimates based on the population within the Dikgatlong Local municipality, the stats are as follows :-

- Unknown (359).
- Employed in the formal sector (5 309).
- Employed in the informal sector (1 296).
- Employed in private households (1 000).

In percentages, comparing the total population with the number of individuals employed, only 26.5% of individuals are employed within the municipality.

Economic profile of local municipality:

The economic activities within the Dikgatlong Local Municipality is mainly mining, livestock and irrigation farming. Approximately 39.7% of the population is unemployed, whereas the youth unemployment rate is 49%. The main contributing factor to the level of unemployed is the high number of individuals without senior/certificate and tertiary qualifications. (Data source: https://www.statssa.gov.za/?page_id=993&id=dikgatlong-municipality : accessed 1 December 2022).

Level of education:

The highest level of education within the Dikgatlong Local Municipality is both post grad and undergrad, wherein the level of postgrad is estimated to 1.2% (338), undergrad 0.7% (211). In terms of the senior certificate, there are approximately 6 910 individuals who holds the qualification, which is approximately 23.6% of the total population.

b) Socio-economic value of the activity

What is the expected capital value of the activity on completion?	R 1 857 326 953.67	
What is the expected yearly income that will be generated by or as a result of the activity?	R 108 364 246.89	
Will the activity contribute to service infrastructure?	YES	
Is the activity a public amenity?		NO
How many new employment opportunities will be created in the development and construction phase of the activity/ies?	40	
What is the expected value of the employment opportunities during the development and construction phase?	R 2 500 000.00	
What percentage of this will accrue to previously disadvantaged individuals?	93.41%	
How many permanent new employment opportunities will be created during the operational phase of the activity?	12	
What is the expected current value of the employment opportunities during the first 10 years?	R 22 267 281.25	
What percentage of this will accrue to previously disadvantaged individuals?	93.41%	

9. BIODIVERSITY

Please note: The Department may request specialist input/studies depending on the nature of the biodiversity occurring on the site and potential impact(s) of the proposed activity/ies. To assist with the identification of the biodiversity occurring on site and the ecosystem status consult http://bgis.sanbi.org or BGIShelp@sanbi.org. Information is also available on compact disc (cd) from the Biodiversity-GIS Unit, Ph (021) 799 8698. This information may be updated from time to time and it is the applicant/ EAP's responsibility to ensure that the latest version is used. A map of the relevant biodiversity information (including an indication of the habitat conditions as per (b) below) and must be provided as an overlay map to the property/site plan as Appendix D to this report.

a) Indicate the applicable biodiversity planning categories of all areas on site and indicate the reason(s) provided in the biodiversity plan for the selection of the specific area as part of the specific category)

Systematic Biodiversity Planning Category				If CBA or ESA, indicate the reason(s) for its selection in biodiversity plan
Critical Biodiversity Area (CBA)	Ecological Support Area (ESA)	Other Natural Area (ONA) X	No Natural Area Remaining (NNR)	A small portion of the proposed site is falling under CBA1.
				N/A
				N/A

b) Indicate and describe the habitat condition on site

Habitat Condition	Percentage of habitat condition class (adding up to 100%)	Description and additional Comments and Observations (including additional insight into condition, e.g. poor land management practises, presence of quarries, grazing, harvesting regimes etc).
Natural	%	10
Near Natural (includes areas with low to moderate level of alien invasive plants)	%	40
Degraded (includes areas heavily invaded by alien plants)	%	40
Transformed (includes cultivation, dams, urban, plantation, roads, etc)	%	10

c) Complete the table to indicate:

(i) the type of vegetation, including its ecosystem status, present on the site; and

(ii) whether an aquatic ecosystem is present on site.

Terrestrial Ecosystems		Aquatic Ecosystems						
Ecosystem threat status as per the National Environmental Management: Biodiversity Act (Act No. 10 of 2004)	Critical	Wetland (including rivers, depressions, channelled and unchanneled wetlands, flats, seeps pans, and artificial wetlands)			Estuary		Coastline	
	Endangered							
	Vulnerable							
	Least Threatened X	YES X	NO	UNSURE		NO		NO

d) Please provide a description of the vegetation type and/or aquatic ecosystem present on site, including any important biodiversity features/information identified on site (e.g. threatened species and special habitats)

Vegetation: In accordance with the Maanakana Projects and Consulting (Pty) Ltd, Ecological Assessment the study area fall within the Kimberly Thornveld grassland (SKv4), which can be categorised as an open savanna, within which it is a distribution of both grasses and trees. The Kimberly Thornveld grassland is further be divided into three categories as follows: -

- Kimberley thorn bushveld of the flat sandy plains,
- Koppie veld on the dolerite koppies and
- Panveld associated with the calcareous pans.

The sandy plains mainly support trees and grasses, whereas koppies within the distribution support mainly shrubs. The Calcareous pans support karoo like shrubs and scarce plants. The vegetation distribution within the study as determined by the ecological assessment is as follows :

- *Acacia mellifera (*Black thorn)
- *Kimberley Thornveld* (SVk 4)
- *Acacia tortilis*
- *Eragrostis racemosa*
- *Aloe vera*

The general vegetation distribution currently on site comprises of small trees, tall shrubs, graminoids, herbs, geophytic herbs, succulent herbs, low shrubs and succulent shrubs.

SECTION C: PUBLIC PARTICIPATION

1. ADVERTISEMENT AND NOTICE

Publication name	Diamond Field Advertiser	
Date published	N/A	
Site notice position	**Latitude**	**Longitude**
	N/A	N/A
Date placed	N/A	

Include proof of the placement of the relevant advertisements and notices in Appendix E1.

2. DETERMINATION OF APPROPRIATE MEASURES

Provide details of the measures taken to include all potential I&APs as required by Regulation 41(2)(e) and 41(6) of GN 733.

Key stakeholders (other than organs of state) identified in terms of Regulation 41(2)(b) of GN 733

Title, Name and Surname	Affiliation/ key stakeholder status	Contact details (tel number or e-mail address)
N/A	N/A	N/A

Include proof that the key stakeholder received written notification of the proposed activities as Appendix E2. This proof may include any of the following:

- e-mail delivery reports;
- registered mail receipts;
- courier waybills;
- signed acknowledgements of receipt; and/or
- or any other proof as agreed upon by the competent authority.

3. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

Summary of main issues raised by I&APs	Summary of response from EAP
N/A	N/A

4. COMMENTS AND RESPONSE REPORT

The practitioner must record all comments received from I&APs and respond to each comment before the Draft BAR is submitted. The comments and responses must be captured in a comments and response report as prescribed in the EIA regulations and be attached to the Final BAR as Appendix E3.

5. AUTHORITY PARTICIPATION

Authorities and organs of state identified as key stakeholders:

Authority/Organ of State	Contact person (Title, Name and Surname)	Tel No	Fax No	e-mail	Postal address
Department of Environment and Nature Conservation	Thulani Mthombeni	0113553000	N/A	tmthombeni013@gmail.com	Private Bag X6102, Kimberly, SASKO building
Frances Baard District Municipality : Health Manager	Masego Thebe	0538380970	N/A	masego.thebe@fbdm.co.za	N/A
Department of Forestry, Fisheries and Environment	Mahlatse Shubane	0123999400	N/A	MSHUBANE@dffe.gov.za	Private Bag X447, Pretoria 001
Department of Forestry, Fisheries and Environment	Makhosazane Yeni	0123999400	N/A	MYeni@dffe.gov.za	Private Bag X447, Pretoria 001

Authority/Organ of State	Contact person (Title, Name and Surname)	Tel No	Fax No	e-mail	Postal address
Department of Forestry, Fisheries and Environment	Thando Booi	0123999400	N/A	TBooi@dffe.gov.za	Private Bag X447, Pretoria 001
Department of Forestry, Fisheries and Environment	Portia Makitla	0123999400	N/A	PMakitla_environment.gov.za	Private Bag X447, Pretoria 001
Department of Forestry, Fisheries and Environment	Thembisile Hlatshwayo	0123999400	N/A	THLATSHWAYO@dffe.gov.za	Private Bag X447, Pretoria 001
Department of Forestry, Fisheries and Environment	Seoka Lekota	0123999400	N/A	SLEKOTA@dffe.gov.za	Private Bag X447, Pretoria 001
Department of Water and Sanitation	Gawie Van Dyk	0123367500	N/A	VanDykG@dws.gov.za	Private Bag X313, Pretoria, 0001
Department of Water and Sanitation	Rose Kelebogile Cwangae	0538312537	N/A	rcwangae@nbkb.org.za	1 Monridge Office Park, c/o Kekewich Drive & Memorial Road, Kimberley, Northern Cape

Authority/Organ of State	Contact person (Title, Name and Surname)	Tel No	Fax No	e-mail	Postal address
ESKOM	Geeringh John	N/A	N/A	john.geeringh@eskom.co.za	N/A
ESKOM	Khanye Nondwe	N/A	N/A	khanyen@eskom.co.za	N/A
Square Kilometre Array Project	Dr Adrian Tiplady	011 442 2434	N/A	atiplady@ska.ac.za	N/A
National Energy Regulator of South Africa	Gxasheka Andile	012 401 4775	N/A	andile.gxasheka@nersa.org.za	PO Box 40343. Arcadia. 0007
Department of Minerals Resources and Energy	Kika Ntsikelelo	(012) 444 – 3000	N/A	Ntsikelelo.Kika@dmr.gov.za	Private Bag X59 ARCADIA 0007

Include proof that the Authorities and Organs of State received written notification of the proposed activities as appendix E4.

In the case of renewable energy projects, Eskom and the SKA Project Office must be included in the list of Organs of State.

6. CONSULTATION WITH OTHER STAKEHOLDERS

Note that, for any activities (linear or other) where deviation from the public participation requirements may be appropriate, the person conducting the public participation process may deviate from the requirements of that sub-regulation to the extent and in the manner as may be agreed to by the competent authority.

Proof of any such agreement must be provided, where applicable. Application for any deviation from the regulations relating to the public participation process must be submitted prior to the commencement of the public participation process.

A list of registered I&APs must be included as appendix E5.

Copies of any correspondence and minutes of any meetings held must be included in Appendix E6.

SECTION D: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2014 and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts.

1. IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN, CONSTRUCTION, OPERATIONAL, DECOMMISSIONNG AND CLOSURE PHASES AS WELL AS PROPOSED MANAGEMENT OF IDENTIFIED IMPACTS AND PROPOSED MITIGATION MEASURES

Provide a summary and anticipated significance of the potential direct, indirect and cumulative impacts that are likely to occur as a result of the planning and design phase, construction phase, operational phase, decommissioning and closure phase, including impacts relating to the choice of site/activity/technology alternatives as well as the mitigation measures that may eliminate or reduce the potential impacts listed. This impact assessment must be applied to all the identified alternatives to the activities identified in Section A(2) of this report.

The following significance rating method applied for assessing impacts associated with the proposed project activities is outlined below:

The following significance rating method will be used to assess impacts associated with the proposed project activities.

- **Significance of the Impact(S):**

Each category is assigned points. These points are then computed by using the equation below and each potential impact is then assigned a significance rating (S).

- *The significance equation : S = (E+D+M) * P*

Table 1 : Significance(S) ratings

RATING	DESCRIPTIONS
(<30) Low	The impact will not have a direct influence on the decision to develop in the area.
(30-60) Medium	The impact can influence the decision to develop in the area unless it is effectively mitigated.
(>60) High	The impact should have an influence on the decision process to develop in the area

Method for determining Significance

Table 2 : Nature of the Impact (N)

Refers to the description of the activity impacting the environment.

RATING	DESCRIPTION
Positive	In most cases this would be a benefit
Negative	Could be a cost
Neutral	No implications on either cost or benefit

Table 3: Extent of The Impact (E)

Refers to the area which the activity will have an impact on (Geographic area).

RATING	DESCRIPTION
1	Site – impact extends to site only
2	Local – impact extends as far as the boundary of site and immediate surroundings
3	Regional
4	Provincial
5	National

Table 4 : Duration of the Impact (D)

The length of time that the impact will last.

RATING	DESCRIPTION
1	Immediate – less than one year
2	Short term – between one year & five years
3	Medium Term – between five years & 15 years
4	Long term – impact ceases after operational life span of the project
5	Permanent

Table 5: Probability (P)

Refers to the likelihood that the impact will occur.

RATING	DESCRIPTION
0	None – impact will not occur
1	Improbable – probability very low due to design or experience
2	Low – unlikely to occur
3	Medium – distinct probability that the impact will occur
4	High – most likely to occur
5	Definite

Table 6 : Severity/Magnitude (M)

Refers to degree at which the impact will occur.

RATING	DESCRIPTION
10	Very High – an irreversible and permanent change that cannot be mitigated
8	High – impacts that could be mitigated, however this mitigation would be costly
6	Medium – medium term impacts that could be mitigated
4	Low – short term impacts with very easy mitigation
0	No effect – the proposed development would have no impact

Briefly describe and compare the potential impacts (as appropriate), significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that are likely to occur as a result of the construction phase for the various alternatives of the proposed development. This must include an assessment of the significance of all impacts.

Table 7: Impact assessment on Planning and Design phase: Proposal

Impact assessment Planning and Design Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
Planning activities i.e. site layout, required authorisations, stormwater management, sewage systems, infrastructure design, and access routes.	• Water resource degradation (wetlands, ground and surface water). • Fines due to lack of required authorisations. • Health and Safety risks.	Negative	• The Applicant should ensure there is adequate financial provision to cater for the proposed development, including associated infrastructure. • All legal requirements and authorisations should be met prior to implementing the proposed development activities i.e. water use registration, environmental authorisation, rezoning certificates. • Recommendations from the specialist assessments i.e. ecological assessment, wetland assessment and heritage impact assessment should be implemented and should be incorporated into the layout, designs and planned operational	**Extent**	2	Medium
				Duration	2	
				Magnitude	8	
				Probability x	2	
				Outcome	24	
				Significance	Low	

Impact assessment Planning and Design Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
			aspects of the proposed development.			

Table 8 : Impact assessment construction phase: Proposal

Impact assessment Construction Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
▪ Site Camp Establishment ▪ Vegetation clearance for construction and installation/on of solar plant infrastructure. ▪ Excavations, landscaping, and soil compaction ▪ Movement of construction equipment (machinery). ▪ Grading for new access roads. ▪ Uncontrolled spillages of hydrocarbons.	Loss of Vegetation	Negative	▪ Relocation of plants should be supervised by the ECO. ▪ Environmental awareness training should be done prior to undertaking the proposed activities, topics should cover the importance of biodiversity, fire hazards, littering and pollution control, including handling of chemicals and delineated sensitive areas as no-go areas. ▪ The clearing of vegetation should be limited to the construction working areas. Sensitive areas should be marked as no-go areas. ▪ The project footprint should be clearly demarcated.	**Extent**	3	Medium
				Duration	1	
				Magnitude	6	
				Probability x	5	
				Outcome	50	
				Significance	Medium	

Impact assessment Construction Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
			▪ Open fires within the vegetated areas should is prohibited. ▪ Topsoil, where available, should be conserved, for landscaping all disturbed areas. Re-vegetation should make use of indigenous plants only. ▪ A temporary fence must be erected around the construction area (i.e. the servitude, construction camps, areas where material is stored and the actual footprint of the development); shade cloth fencing can be used ▪ Vehicular and pedestrian access into natural areas beyond the demarcated boundary of the construction area is prohibited. Use existing servitudes and access roads as far as possible. ▪ The collection of flora without permission from the local authority should be prohibited.			

Impact assessment Construction Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
			▪ Activities during rainy days should halt and resume at least 2 days afterwards. ▪ A vegetation rehabilitation plan should be implemented. Recommendations in the Ecological assessment by Maanakana Projects and Consulting (Pty) Ltd should be adhered to. ▪ A walk-through on site should be done prior to site establishment and construction activities in order to record and relocate any protected species within the study area (Note: no protected species were recorded on site).			
▪ Site Camp Establishment ▪ Vegetation clearance for construction and installation of solar plant infrastructure.	Loss of Fauna.	Negative	▪ A walk-through on site should be done prior to site establishment and construction activities in order to demarcate and mark sensitive areas to be avoided (no-go areas)	**Extent**	2	High
				Duration	4	
				Magnitude	6	
				Probability x	4	
				Outcome	48	
				Significance	Medium	

Impact assessment Construction Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
▪ Excavations, landscaping, and soil compaction ▪ Movement of construction equipment (machinery). ▪ Grading for new access roads. ▪ Uncontrolled spillages of hydrocarbons.			i.e. temporary vleis/wetlands and burrow systems. ▪ Construction on high sensitive areas is prohibited. ▪ Erosion control measures should be in place on access roads and sensitive areas i.e. wetlands. ▪ Bunded surfaces, free from storm-water run-off should be used storage of hazardous substances. Spillage kits should be on site, to clean any accidental spills which may occur. ▪ The illegal Hunting and collection of Fauna is prohibited on site. ▪ Off Road driving on sensitive areas is prohibited. ▪ Vehicular speed limits on access roads and the site should be regulated and maintained to 30Km/h, to avoid collisions. ▪ Any vulnerable fauna encountered on site should be relocated.			

Impact assessment Construction Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
			▪ Site access should be controlled to avoid un-authorised personnel on site. ▪ Working near highly sensitive areas i.e. wetlands should be limited to dry seasons.			

▪ Topsoil stockpiling adjacent to wetlands or watercourses.
  ○ Run-off from bare surfaces and stockpiles into watercourses.
▪ Site establishment, including construction.
  ○ Soil excavations to create trenches for pipes.
  ○ Infilling trenches
	Sedimentation, soil erosion and associated flow alterations.	Negative	▪ Measures to dissipate flow velocity below structures should be considered and designed during pre-construction (i.e. retention ponds or areas with rock riprap grassed. Long term attenuation measures, attenuation/infiltration trenches, swales along roadways/pavements).
			▪ Stockpiling of materials should not occur adjacent to watercourses.
			▪ Measures to control erosion should be in place at areas sensitive to erosion (i.e. Edges of slopes, exposed soil etc.) Measures such the use of sandbags, hessian sheets, silt fences, retention or replacement of vegetation and
				Extent	2	High

				Duration	2	
				Magnitude	8	
				Probability x	2	
				Outcome	24	
				Significance	Low	

Impact assessment Construction Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
			geotextiles such as soil cells can be applied - Do not allow surface water or storm water to be concentrated, or to flow down cut or fill slopes without erosion protection measures being in place. - Construction activities should take place preferably during the dry season. - Mining of soil/sand from the riverbanks is prohibited. - Vegetation should be removed in phases and where necessary. The entire construction area must not be stripped of vegetation prior to commencing construction activities. - Exposed soils should be rehabilitated as soon as practically possible to limit the risk of erosion. Methods can include, stabilizing, re-shaping, and rehabilitating disturbed areas with indigenous			

Impact assessment Construction Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
			wetland and riparian vegetation. Rehabilitation must be implemented by a suitable replanting and re-vegetation programme, sandbags, silt fencing, etc. Sustainable Urban Drainage Systems (SUDS): All storm water runoff from the site must be supplemented by an appropriate road drainage system that must include open, grass-lined channels/swales rather than simply relying on piped systems or concrete V-drains.			
Deliveries to the site. ○ Uncontrolled spillages of Hydro-carbons Parked or standing construction vehicles, Re-	Surface water and Ground Water degradation	Negative	Delineated riparian and in-stream habitats outside of the construction zone are considered sensitive "No-Go" areas and access/activities are	**Extent** **Duration** **Magnitude** **Probability x** **Outcome** **Significance**	2 3 6 3 33 Medium	High

Impact assessment Construction Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
fuelling of construction vehicles on site. ○ Surface run-off and ground infiltration of Hydro-carbon due to leakages. - Cement mixing. ○ Runoff from cement mixing areas. - Various activities by construction employees. ○ Littering. - In-appropriate disposal of waste within delineated wetlands. ○ Soil ○ Rocks ○ Concrete - Excavations within wetland systems. - Site preparation, Vegetation Clearance. - Alien plants infestation within riparian areas.	(disturbance or deterioration).		to be strictly prohibited in these areas. - The construction working servitude width should be restricted to 15 m. - Waste generated on site should be discarded at temporary designated areas, skip bins can used, for disposal at a licensed landfill site. - The washing of construction equipment near watercourses is prohibited. - No substance (i.e. cement, oil or bitumen) should be released to watercourses. Mixing of cement should take place on impervious surfaces and the areas for mixing should be controlled bermed areas. Catch nets must be installed to minimise cement and other debris (pollutants) from entering the delineated Wetland systems during the construction phase. - The construction camp or materials storage area should not be located within 50m from any watercourses. - Any spillages (i.e. fuels, oils) and other potentially harmful chemicals should			

Impact assessment Construction Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
			be cleaned up immediately, contaminants properly drained and disposed of using proper solid/hazardous waste facilities. Any contaminated soil must be removed, and the affected area rehabilitated immediately. - Portable toilets must be placed on impervious level surfaces that are lipped to prevent spillage. They must be at least 50 m away from any watercourses. - Cut-off trenches must be constructed to prevent any harmful substances from entering any watercourses. - Litter traps should be installed at all storm water outlets. Silt traps or silt barriers should be placed adjacent to the wetland to prohibit discharge of silt into watercourses or delineated wetlands. - Materials storages, including stockpiling of materials should be done outside of the wetland/watercourse buffer zone (>50m).			

Impact assessment Construction Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
			▪ Training programs must provide information on material handling and spill prevention and response. ▪ Storm water and any runoff generated by the road must be discharged into sustainable energy dissipation structures prior to being discharged back into the natural water courses. This must be designed and implemented by a qualified civil engineer.			
▪ Bulk earthworks and excavations: operation of construction machinery for rock breaking. ▪ Movement of construction vehicles during construction working hours.	Noise nuisance	Negative	▪ Construction noise should not exceed 85dB. Employees working on areas where noise may exceed the set level should be provided with ear protection equipment. ▪ Construction activities must be limited to working hours (from 7am to 5p.m) during the week, not including public holidays. ▪ A noise complaints register must be kept on site.	**Extent** **Duration** **Magnitude** **Probability x** **Outcome** **Significance**	1 2 4 2 14 Low	Medium

Impact assessment Construction Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
▪ Construction vehicles exhaust emissions. ▪ Construction activities including movement of construction vehicles,	Change in ambient air quality	Negative	▪ Speed limits should be implemented on working areas to limit the generation of dust by construction vehicles, this	**Extent**	2	Medium
				Duration	4	
				Magnitude	2	
				Probability x	2	
				Outcome	16	
				Significance	Low	

Impact assessment Construction Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
resulting in generation of dust. - Uncontrolled fires. - Evaporation from uncontrolled chemical storage areas.			including at access routes (30km/h). - Fire are prohibited in working areas to avoid generation of smoke. - Dust complaints register should be on site. The contractor should ensure that any complaints are recorded, with reasonable measures taken in addressing complaints. - Dust suppression measures should be implemented. Spraying water tank can be used; however, the water should be sprayed in a way it does not cause any runoff. - During windy conditions, construction vehicles carrying materials for construction should covered.			
		Negative		**Extent** **Duration**	2 4	Medium

Impact assessment Construction Phase: Proposal					
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**	**Risk of the impact and mitigation not being implemented**
▪ Site clearance for construction activities. ▪ Construction camp activities i.e. employee breaks and/or resting. ▪ Construction personnel working areas.	Increased vector borne diseases. Land pollution. Disturbed visual effects due to unsighty areas.		▪ Construction waste, for instance unused concrete must be disposed of at a licensed Waste disposal facility/Landfill site. ▪ Construction waste should be discarded at designated receptacles on site.	**Magnitude** 6 **Probability x** 3 **Outcome** 36 **Significance** Medium	

Impact assessment Construction Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
▪ Generation of waste			▪ Litter bins and waste skips should be used for temporary discarding waste from site, however collection of waste to the landfill site should be undertaken on an agreed schedule with the local authority (municipality) or as a when required. An independent waste collection operator can alternatively be contracted for collection and disposal of waste. The receptacles should be clearly marked with the type of waste. ▪ Proof of collection and proper waste disposal should be kept on site. ▪ Waste should be separated on site (hazardous and non-hazardous). ▪ Chemical spills should be contained and discarded to a licensed landfill site.			
▪ Bulk earthworks and excavation.	Temporary visual disturbances/intrusions.	Negative	▪ Bulk earthworks and excavations should be done in a phased	**Extent** **Duration** **Magnitude** **Probability x**	2 2 6 3	Medium

Impact assessment Construction Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
▪ Location and Establishment of construction camp and site office. ▪ Use of lighting during construction activities.			manner, thus as per the proposed construction phasing schedule. ▪ The location of the construction camp should not be located near sensitive receptors. ▪ The construction site should be kept neat and tidy, free from inappropriately disposed waste.	**Outcome** **Significance**	30 Low	
▪ Site Camp Establishment ▪ Vegetation clearance for construction and installation of solar plant infrastructure. ▪ Excavations, landscaping, and soil compaction ▪ Movement of construction equipment (machinery). ▪ Grading for new access roads. ▪ Uncontrolled spillages of hydrocarbons.	Degradation and/or loss of heritage artefacts/ resources of heritage significance.	Negative	▪ Should any heritage resources be encountered on site, during construction, all activities should stop, the Competent Authority to be alerted for further investigations. As an alternative a heritage specialist should be appointed for further investigation and communication to the Competent Authority for clearance on construction activities to continue.	**Extent** **Duration** **Magnitude** **Probability x** **Outcome** **Significance**	3 4 4 2 22 Low	Medium
▪ Movement of construction vehicles within the site and at access routes.	▪ Increased traffic	Negative	▪ All access routes to the site should be maintained and adherence to speed limits enforced.	**Extent** **Duration** **Magnitude** **Probability x**	2 2 6 3	High

Impact assessment Construction Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
	▪ Accidental incidents within the construction area.		▪ Warning signs must be erected in instances where traffic disruption or diversion along access roads will occur. ▪ During construction safe points for pedestrian and vehicular crossing at designated points must be erected and controlled. ▪ Maintain construction vehicular speed limit to 30km/h.	**Outcome** **Significance**	30 Low	
▪ Site Camp Establishment and installation of the solar plant associated infrastructure.	Temporary employment opportunities	Positive	▪ The contractor shall ensure that local labour is used where possible to improve the local economy of the area. ▪ Skills transfer programme should be in place and implemented for unskilled labour.	**Extent** **Duration** **Magnitude** **Probability x** **Outcome** **Significance**	2 2 8 4 48 Medium	High
				Extent	3	

Impact assessment Construction Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
▪ Site Camp Establishment ▪ Vegetation clearance for construction and installation of solar plant infrastructure. ▪ Excavations, landscaping, and soil compaction ▪ Movement of construction equipment (machinery). ▪ Grading for new access roads. ▪ Uncontrolled spillages of hydrocarbons. Construction camp (resting area).	▪ Health and Safety ▪ Accidental Incidents ▪ Spread of diseases ▪ Injuries from operation of heavy machinery by un-qualified personnel	Negative	▪ Signs on site must be erected on areas that require PPE. ▪ Trenches which have been excavated must be condoned off to prevent injury to people who are not aware of their existence. ▪ Emergency contact information should be provided and displayed at the contractor's office and site entrance. ▪ The use of PPE should always be enforced on site. This includes visitors. ▪ Measures to restrict un-authorised persons from entering the construction site, including the construction camp should be in place. ▪ Appropriate medical equipment must always be placed on onsite and made accessible. ▪ An HIV/AIDS policy should be place and implemented by the contractor.	**Duration**	2	High
				Magnitude	8	
				Probability x	3	
				Outcome	39	
				Significance	Medium	

Impact assessment Construction Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
			• 24 Hour security must be provided at the construction site. • Appropriate signage board/s must be placed on site informing the public on construction activities taking place on site.			

Table 9 : Impact assessment post-construction phase: Proposal

Impact assessment post-Construction phase : Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
Rehabilitation of disturbed development footprint during and post the construction phase	▪ Degradation of water resources (Ground, surface and wetland) ▪ Loss of indigenous vegetation ▪ Infestation of Alien Invasive Plant species.	Negative	▪ Upon remediation, re-seeding of indigenous grasses should be implemented in all impacted areas and strategic planting of grassland species should take place; ▪ As much vegetation growth as possible should be promoted surrounding the new development in order to protect soils. In this regard, special mention is made of the need to use indigenous vegetation species where hydro seeding and rehabilitation planting (where applicable) are to be implemented. ▪ All disturbed habitat areas must be rehabilitated as soon as possible to ensure that floral ecology is reinstated. ▪ Blocks of wetland vegetation and underlying soil along the trench through the wetland must be removed from the footprint of the trench and preserved to be	**Extent**	2	Medium
				Duration	3	
				Magnitude	6	
				Probability x	2	
				Outcome	22	
				Significance	Low	

Impact assessment post-Construction phase : Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
			returned into the same location once the trench is backfilled. - Watercourse/ Wetland soils should not be compacted as this could alter the hydrology of the watercourse/ wetland, restrict plant growth, and lead to erosion within the wetland.			

Table 10 : Impact assessment operational phase: Proposal

Impact assessment Operational Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
Disturbed areas (construction activities and continued operational activities).	Increased of alien invasive species.	Negative	▪ Areas that will not be sealed should be rehabilitated and re-vegetate as soon as practically possible. ▪ Access roads and paved areas should be kept free of alien vegetation through routine maintenance. ▪ Herbicides should be carefully applied (in accordance with the Alien Invasive Programme) Spraying of herbicides within or near to any watercourses is strictly forbidden.	**Extent**	2	Medium
				Duration	2	
				Magnitude	6	
				Probability x	2	
				Outcome	18	
				Significance	Low	
Storm water management	Increased sediment loads on watercourses (deterioration of watercourses/wetlands).	Negative	▪ Culverts and storm water drains should be monitored for blockages and other possible obstacles.	**Extent**	1	Medium
				Duration	2	
				Magnitude	6	
				Probability x	3	
				Outcome	27	
				Significance	Low	

Impact assessment Operational Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
	Deterioration of aquatic ecosystems.					
Operational activities for the solar plant (energy generation, this including day to day tasks).	Loss of Fauna	Negative	▪ Vehicle speeds limits should be maintained on access roads. ▪ Induction on environmental awareness should be undertaken for employees. ▪ Illegal trapping, hunting and collection of faunal species is prohibited on site. ▪ Use lighting for security and other activities only where required, with the preferred options of Yellow Sodium lights.	**Extent**	1	Medium
				Duration	2	
				Magnitude	6	
				Probability x	3	
				Outcome	27	
				Significance	Low	
	Loss of Flora	Negative	▪ Illegal harvesting of plant species on site is prohibited. ▪ Landscaping of disturbed areas should make use of indigenous vegetation.	**Extent**	2	Medium
				Duration	4	
				Magnitude	4	
				Probability x	3	
				Outcome	30	
				Significance	Low	

Impact assessment Operational Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
	Pollution on water resources.	Negative	▪ Clean up of large-scale hydrocarbons spillages because of incidents should be executed rapidly. ▪ On-going water quality monitoring measures should be implemented. ▪ Appropriate measures to dissipate flow velocity below structure must be considered and designed during pre-construction phase.	**Extent**	1	Medium
				Duration	2	
				Magnitude	6	
				Probability x	2	
				Outcome	18	
				Significance	Low	
Operational activities for the solar plant (energy generation, this including day to day tasks).	Employment opportunities	Positive	▪ Employment opportunities for the operational part of the plant should be provided to local residents.	**Extent**	2	High
				Duration	4	
				Magnitude	8	
				Probability x	5	
				Outcome	70	
				Significance	High	
Electricity generation	Increased electricity supply to the grid.	Positive	▪ Regular service maintenance for the added infrastructure to sustain the life of the solar plant.	**Extent**	3	Low
				Duration	4	
				Magnitude	8	
				Probability x	3	
				Outcome	45	
				Significance	Medium	

Impact assessment Operational Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
Infrastructure maintenance and daily operational activities i.e. Operations and maintenance centre.	Increased Water Use	Negative	▪ Regular Monitoring of infrastructure for leaks and malfunctions. ▪ Systems/procedures in place for reporting infrastructure faults. ▪ Landscaping, use of indigenous vegetation must be encouraged. ▪ Grey water systems should be integrated into the Solar Plant.	**Extent**	2	Medium
				Duration	1	
				Magnitude	6	
				Probability x	2	
				Outcome	18	
				Significance	Low	
Maintenance and storage facilities, including the operations and maintenance centre.	Fire incidents and/or outbreaks	Negative	▪ The plant must be equipped with firefighting equipment which will include: ○ Flame arresters ○ Water sprinklers	**Extent**	2	High
				Duration	4	
				Magnitude	8	
				Probability x	2	
				Outcome	28	
				Significance	Low	

Impact assessment Operational Phase: Proposal						
Activities	**Potential impacts:**	**Significance rating of impacts (positive or negative):**	**Proposed Mitigation:**	**Significance rating of impacts after mitigation:**		**Risk of the impact and mitigation not being implemented**
			○ Gas/ Fire detection equipment ○ Nitrogen and carbon dioxide blanketing equipment ○ Foam spraying Staff and management must undergo basic firefighting training on an annual basis. Regular fire drills must be undertaken.			

A complete impact assessment in terms of Regulation 19(3) of GN 733 must be included as Appendix F.

2. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that summarises the impact that the proposed activity and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account, with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

Alternative A (preferred alternative)

The overall project activities associated with the proposed Ikomkhulu Solar Plant will result in low medium to low environmental impacts, this taking into consideration that the mitigation measures as proposed will be implemented during both the construction and operational phases.

Based on the assessment carried out the identified biophysical impacts in relation to the proposed activities during the construction phase are as follows:

- Loss of indigenous flora:

  The impact on indigenous vegetation by the proposed development will only be applicable for the duration of the construction phase (note: the vegetation distribution on within the study area is rated as disturbed due to previous anthropogenic activities i.e. mining and agriculture), with the likelihood of the impact occurring determined as definite, thus the significance being of a medium impact, mainly due to the fact the existing vegetation, even though previously disturbed, will be cleared for the project activities. The significance on the loss of indigenous flora remains low for operational phase, with consideration that the landscaping activities will incorporate indigenous vegetation as part of the solar plant. Refer to figure 15 below.

Figure 14 : Tilted Solar Panels with landscaped surface area

- Loss of fauna:

  In terms of Fauna the proposed project will have a negative impact on foraging species, for both the construction and operational phases. The likelihood of this impact is high, as a result the significance of the impact is of a medium rating considering implementation on the proposed mitigation measures. The anticipation during the operational phase is that certain foraging animals may still frequently visit the site, due to the attraction that will be caused by the solar panels reflections, as such the mitigation measures that prohibit the illegal hunting of the species during these phases is prohibited.

- Sedimentation, soil erosion and associated flow alterations.

  The impacts associated with sedimentation, soil erosion and flow alterations by the proposed development are negative for the duration of both the construction and operational phases. As a result of stockpiles associated with the proposed project activities, the likelihood of the impacts occurring are low, with the significance rating being low.

- Surface water and Ground Water degradation (disturbance or deterioration).

  The impact of the proposed project on surface and groundwater is negative, for the duration of the construction phase. The impact has a distinct probability of occurring, and it is rated as of a medium sensitivity for the construction phase, with the operational phase anticipated to be of low significance, with a condition that the proposed mitigations as provided within the ecological assessment and the Environmental Management Programme (EMP) are implemented.

- Noise nuisance

  The impact of the proposed development in terms of noise has a negative impact on sensitive receptors during the construction phase, with a low significance. The sensitive receptors as determined would mainly be the employees on site, due to the construction vehicles and activities. The impact remains low during the operational phase, with a low significance, the critical aspect as part of the operational activities is ensuring that employees use ear-mufflers in areas where noise levels exceed the regulated 7decibels or more of the ambient noise levels set to 85 decibels.

- Change in ambient air quality

  The proposed development will result in a negative impact in terms of the ambient air quality for the duration of the construction phase. The impact is of low significance, with associated activities mainly being construction vehicle movement within the site and construction vehicles exhaust emissions. During the operational phase, the impact remains of low significance, with associated activities mainly being from the operations and management centre and the transformer.

- Generation of waste.

  The proposed development will result in the generation of waste during both the construction and operational phases (the impact remains negative for both phases). During the construction phase the impact is highly likely to occur, with the significance rated as medium, due to bulk earthworks and installation activities, however the impact becomes of low significance during the operational phase.

- Temporary visual disturbances/intrusions.

  The proposed project will result in visual disturbance and/or intrusions due to the overall construction activities and lighting effects. The impact to sensitive receptors is of low significance, wherein the impact is of a negative nature and is most likely to occur. The impact remains for the operational phase, however it would be improved visual impacts as the infrastructure would have been constructed.

- Degradation and/or loss of heritage artefacts/ resources of heritage significance.

  The impact on heritage resources is of a negative nature, with low significance, as there are no heritage resources and/or artefacts within the site for the proposed development. The impact is applicable for the construction phase, wherein, should any heritage resources be found during construction activities, work should stop, a heritage resource specialist should be appointed for further investigations and communications to the relevant authority for clearance on continuation of construction activities.

- Increased traffic, Accidental incidents within the construction area.

  The main activities related to the construction activities will be the movement of construction heavy machinery within the site and on access routes. The impact is of a negative nature and has a distinct probability of occurring.

- Temporary and Permanent employment opportunities

  The impact of employment opportunities by the proposed development is positive for both the construction and operational phases, the difference being that during construction employment will be on a temporary basis, whereas for operational phase the employment it will be on a permanent basis. The significance of employment opportunities for both the construction and operational phases is high, with a definite likelihood, based on the outcome of the successful implementation of the proposed project.

- Health and Safety

  The proposed project has potential of negative health and safety risks, as a result of the nature of activities i.e. operation of heavy machinery and bulk earthworks. The significance of this impact remains being of a medium rating with a high risk where mitigation measures as provided are not implemented during both the construction and operational phase. In a scenario where the mitigation measures are implemented the likelihood of the impacts occurring remains distinct, however the risk remains high with or without mitigation taken into consideration.

The above outline impact statements basically focus on the negative impacts associated with the proposed development, with only employment opportunities as a positive impact. The positive impacts associated with the proposed development are as follows:-

- Improved socio-economic activities including possible investment opportunities.
- Reduced CO_2 emissions due to the green energy production initiative as compared to non-renewable energy production i.e. coal, this cumulatively contributes to the reduction of climate change effects.

The other critical positive spin-off of the proposed development is the increase and contribution to the energy infrastructure within the associated area (the province, district and municipality), in turn this opens up and attracts other investment opportunities within the local sphere.

The identified positive impacts of the proposed development are mostly associated with the post-construction and operational aspects of the project; however, this is dependent on the successful implementation of the proposed activities and implementation of mitigation measures.

Alternative B

N/A

Alternative C

N/A

No-go alternative (compulsory)

In an instance where the proposed development does not proceed, this will result in the loss of the socio-economic impacts (job opportunities, skills development leading to improved livelihoods of the affected parties) associated with the construction and operational phase of the project. Additionally, the cumulative anticipated impacts of the local economic investment opportunities becomes null. The above options are likely to occur, however this is based on the decision from the competent authority.

SECTION E. RECOMMENDATION OF PRACTITIONER

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the environmental assessment practitioner)?	YES	

If "NO", indicate the aspects that should be assessed further as part of a Scoping and EIA process before a decision can be made (list the aspects that require further assessment).

N/A

If "YES", please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application.

The following recommendations are made in conjunction with the assessment contained in this report:

- Bulk service engineering investigations should be undertaken.
- The design layouts for the proposed project activities should be in place, this not excluding the Site Development Plan.
- The rezoning application should be initiated for rezoning of the site from the current agricultural land use to the Utility III Zone.
- Recommendations as detailed in the specialist's reports, the Environmental Management Programme and this assessment should be implemented.

In terms of other applicable specialist investigations, the geotechnical investigation for the use of borehole as a water-source should be completed, this should part of the Water Use License application process.

Is an EMPr attached?	YES	

The EMPr must be attached as Appendix G.

The details of the EAP who compiled the BAR and the expertise of the EAP to perform the Basic Assessment process must be included as Appendix H.

If any specialist reports were used during the compilation of this BAR, please attach the declaration of interest for each specialist in Appendix I.

Any other information relevant to this application and not previously included must be attached in Appendix J.

Mr Vusmuzi Hlatshwayo
NAME OF EAP

SIGNATURE OF EAP

26 January 2023
DATE

REFERENCES

Cape-Ducluzeau, L. and van der Westhuizen, C., 2015, April. Strategic environmental assessment for renewable energy in South Africa-Renewable energy development zones (REDZs). In Unpublished paper, annual conference of the international association for impact assessment, Florence, 20e23 April.

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Duffy, A., Rogers, M. and Ayompe, L., 2015. Renewable energy and energy efficiency: assessment of projects and policies. John Wiley & Sons.

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Department of Environmental Affairs, 2017. Public Participation Guideline in Terms of National Environmental Management Act, 1998 Environmental Impact Assessment Regulations.

Environmental Assessment of Energy and Industry Projects, Washington D.C. USA.

Maanakana Projects and Consulting (Pty) Ltd, 2022. Ecological Report for the Ikomkhulu Solar Plant on Portion 5 of the Farm Van Zoelen's Laagte No 158.

Maanakana Projects and Consulting (Pty) Ltd, 2019, Wetland Assessment and Delineation Report in support of the proposed Ikomkhulu Solar Plant project on Portion 5 of the Farm Van Zoelen's Laagte No 158.

Millenium Heritage Group (Pty) Ltd, 2019. Phase 1: Archaeological Impact Assessment Relating to the proposed Ikomkhulu's Solar Plant establishment on Portion 5 of the Farm Van Zoelen's Laagte 158 near Windsorton within Dikgatlong Local Municipality of the Frances Baard District, Northern Cape Province, South Africa.

MUCINA L. & RUTHERFORD M. C. (2006). Vegetation Map of South Africa, Lesotho and Swaziland, 1:1 000 000 scale sheet maps. South African National Biodiversity Institute., Pretoria;

South Africa, 2017. Environmental Impact Assessment Regulations, 2014 (as amended).

South Africa, 1998. National Environmental Management Act, 1998 (Act no.107 of 1998) (as amended).

South Africa, 1999. National Heritage Resources Act, 1999 (Act no.25 of 1999).

South Africa, 1998(b). National Water Act, 1998 (Act no. 36 of 1998).

Statistics South Africa: Census 2011

www.accuweather.com

SECTION F: APPENDIXES

The following appendixes must be attached:

Appendix A: Maps

Appendix B: Photographs

Appendix C: Facility illustration(s)

Appendix D: Specialist reports (including terms of reference)

Appendix E: Public Participation

Appendix F: Impact Assessment

Appendix G: Environmental Management Programme (EMPr)

Appendix H: Details of EAP and expertise

Appendix I: Specialist's declaration of interest

Appendix J: Additional Information

Appendix A: Maps


Ikomkhulu Solar Plant
Locality Map
Legend
28°21'50.07"S ; 24°41'16.30"E : 300Ha (Ptn 5 of the Farm Zoelens Laagte 158, Barkly Wes
Access Road
Kimberly Solar 5 : Renewable Energy Development Zone
Kimberly Solar 5 : Renewable Energy Development Zone Layer
Portion 5 of the Farm Zoelen's Laagte 158, Barkly Wes
Vaal River
Windsorton
Kimberly Solar 5 : Renewable Energy Development Zone
374
Windsorton Road
12
Holpan
28°21'50.07"S ; 24°41'16.30"E : 300Ha (Ptn 5 of the Farm Zoelens Laagte 158, Barkly Wes
Portion 5 of the Farm Zoelen's Laagte 158, Barkly Wes
R374
Google Earth
Image © 2023 Maxar Technologies
N
9 km

Appendix B: Photographs

Ikomkhulu Solar Site Pictures

Figure 1 : North View of the site

Figure 2: West View of the site

Figure 3 : South View of the site

Figure 4: East View of the site

Figure 5 : North West View of the site

Figure 6 : South West View of the site

Figure 7 : North East View of the site

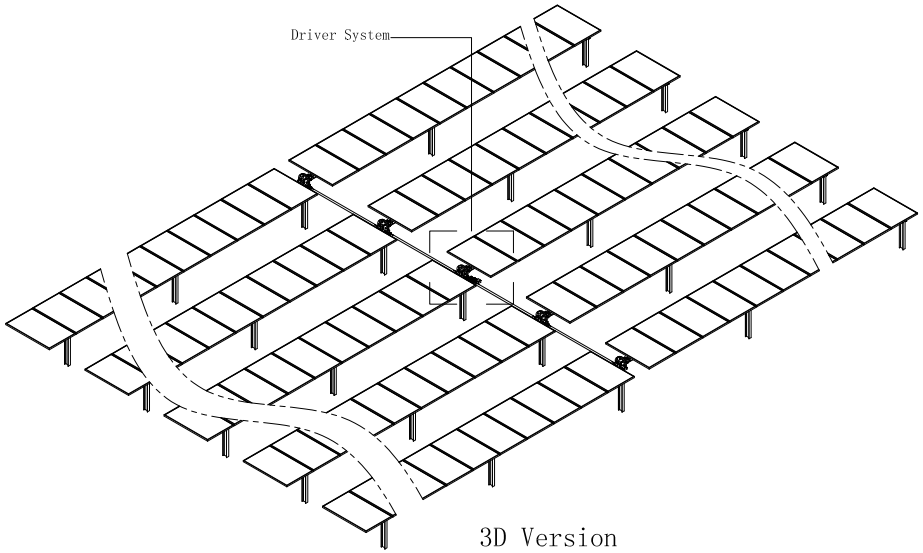
Figure 8: South East View of the site

Appendix C: Facility illustration(s)

Customer Approval	
Signature	Date

Security Classification			
Privary	√	Publicity	
Unit	mm		

Binding Line

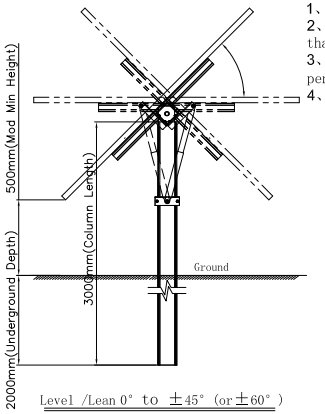


3D Version

Parameter Declaration:

1、Tracker Type: Single -Axis PowerLink.
2、Angle Range: 0°to ±45°(or±60°).
3、Tracking Accurationg : ≤2°.
4、Protecting Wind Load: 20m/s(3s).
5、Reverse Tracking:: Yes.
6、Communication Mode: RS485.
7、Anti - erosion Protection: Hot Galvanized Protection.

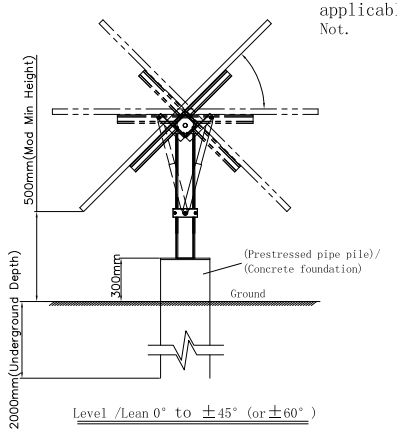
A



The following soillayer is not applicable to the Type A foundation:
1、High-PH Corrosive soil;
2、More humus or the backfill with no more than 5 years;
3、Geological soils with standard penetration values (N) greater than 30;
4、Rock layer.

A Note:
1、Mod Min Height: 500mm, Underground Depth:2000mm.Column Length:3000mm(recommanded).
2、Above data is for reference only. All of them will be based on the practctice measurement and the design.

B



The following soillayer is not applicable to the Type B foundation:
Not.

B Note:
1、Mod Min Height :500mm.(Prestressed pipe pile)/(Concrete foundation)Height : 300mm. Underground Depth:2000mm.(recommanded).Harsh geology or soil can choose B type foundation; Concrete pipe pile foundation orConcrete foundation and its accessories to be customer-owned.
2、Above data is for reference only. All of them will be based on the practctice measurement and the design..

Renewable Energy
POWERWAY

Architect:

Developer:

Notes:

1.Ruler is not allowed to be used to measure the drawing, and all should be in conformity to the labels on the drawing.

2.Please refer to the construction drawing and other relevant drawings. Please inform the designer when there is any discrepancies.

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Change Record :

Remark	Amendment	Sign	Date

DRAWN: V1.0

Project Name:
PowerWay Tracker Product

Design	Glenn
Check	Jim
Verify	Sven
Approval	Sven
Chief	--
Design Stage	Preliminary design
Scale	1:100
Drawing Title	PowerLink Tracker
Drawing No.	PowerLink-01
Date	2017

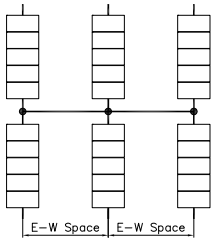
Customer Approval	
Signature	Date

Security Classification			
Privary	√	Publicity	
Unit	mm		

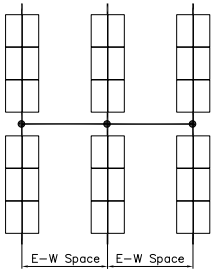
Binding Line

PV Module Direction:

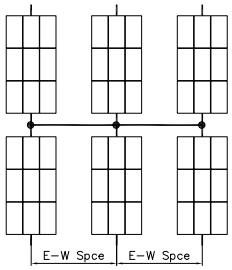
Vertical+single row



Horizonal+double row



Horizonal+triple row



Note:

1、For the vertical-placed module table(1*numble of modules a sinlge module*row): 1*60*12 (recommanded), and the module power over 300Wp, vertical+single row will be applied .

2、For the horizonal-placed module table(N*numble of modules in a sinlge module*row): 2*30*12/3*30*12(recommanded), while the module power less than 300Wp, horizonal+double/triple row is advised.

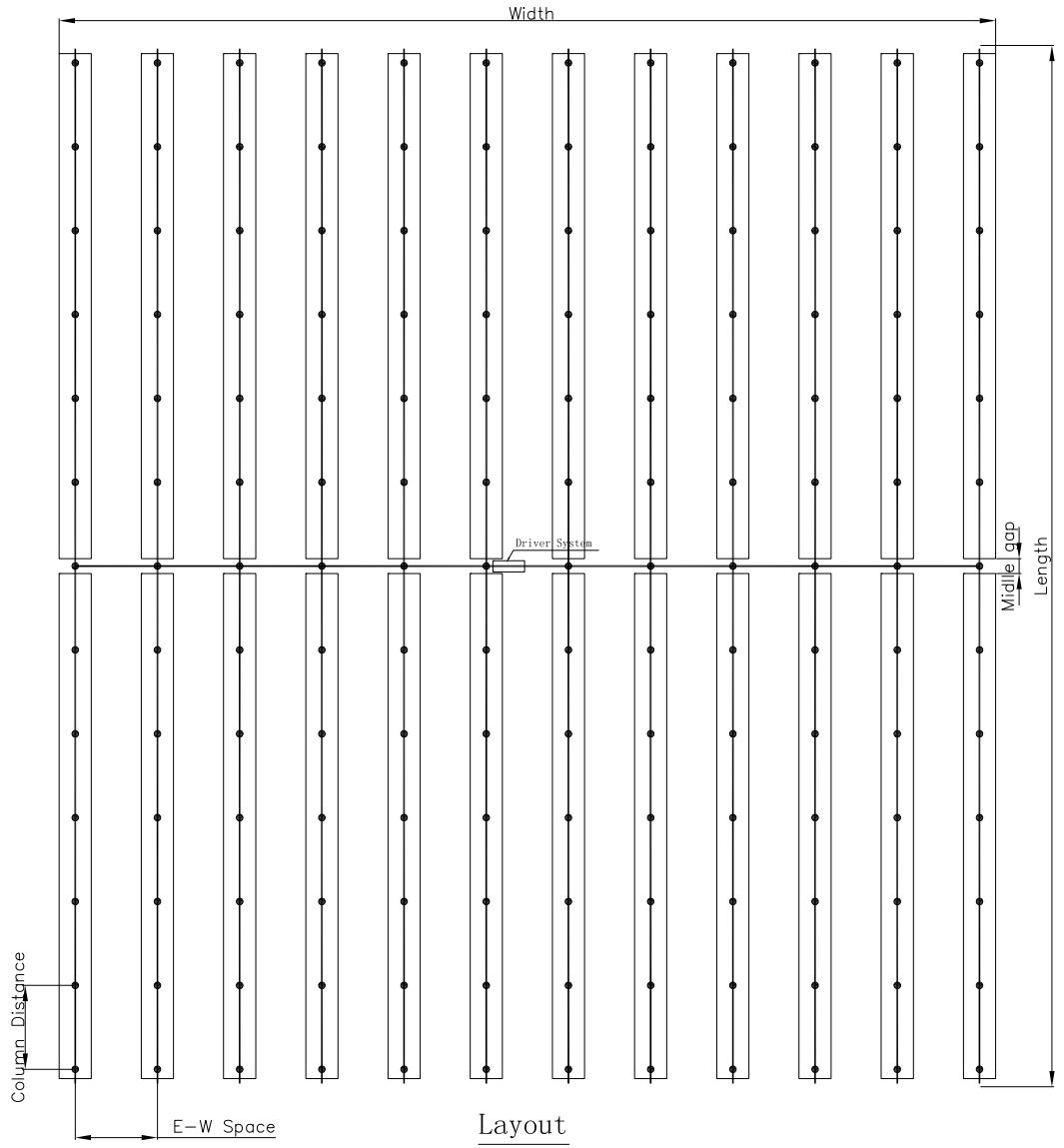
3、The layout is compliant to different size of monocrystalline, polysilicon, membrane PV module.

4、Column Distance:5100mm~6100mm.(recommanded)

5、Midlle gap:900mm.(recommanded)

6、E-W Space:5000mm.(recommanded)

7、Above data is for reference only. All of them will be based on the practctice measurement and design.



Layout

Renewable Energy
POWERWAY

Architect:

Developer:

Notes:

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Change Record :

Remark	Amendment	Sign	Date

DRAWN: V1.0

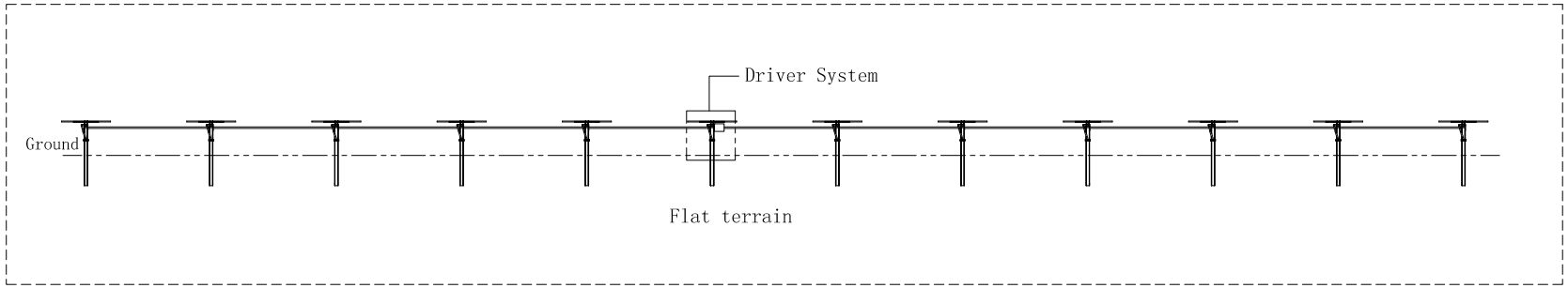
Project Name:
PowerWay Tracker Product

Design	Glenn
Check	Jim
Verify	Sven
Approval	Sven
Chief	--
Design Stage	Preliminary design
Scale	1:100
Drawing Title	PowerLink Tracker
Drawing No.	PowerLink-02
Date	2017

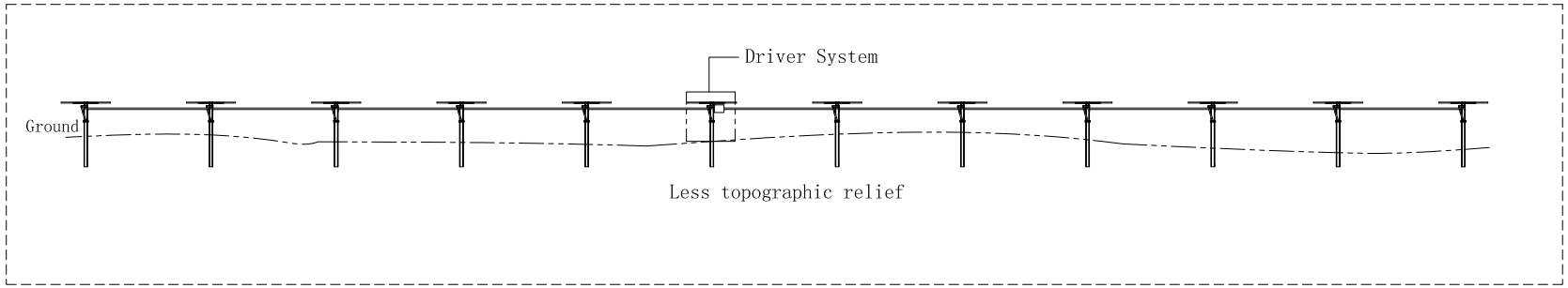
Customer Approval	
Signature	Date

Security Classification			
Privary	√	Publicity	
Unit	mm		

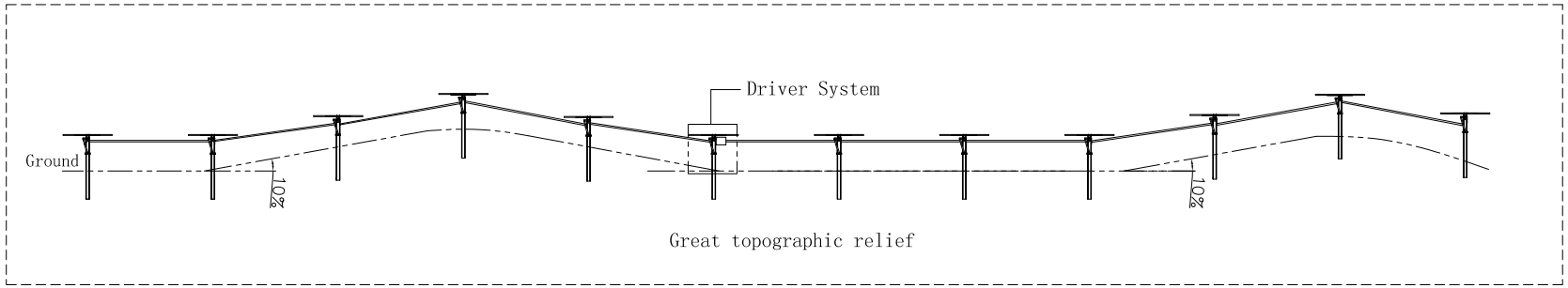
Binding Line



Flat terrain



Less topographic relief



Great topographic relief

Note:
1、Tracker can be applied to the terrain with continuous flat, less or great topographic elief within10% in west-east direction.
2、Tracker can only aceept the terrain flucuation within10% in west-east direction.

Terrain ajustment in west-east direction

Renewable Energy
POWERWAY

Architect:

Developer:

Notes:

1.Ruler is not allowed to be used to measure the drawing, and all should be in conformity to the labels on the drawing.

2.Please refer to the construction drawing and other relevant drawings. Please inform the designer when there is any discrepancies.

Change Record :

Remark	Amendment	Sign	Date

DRAWN: V1.0

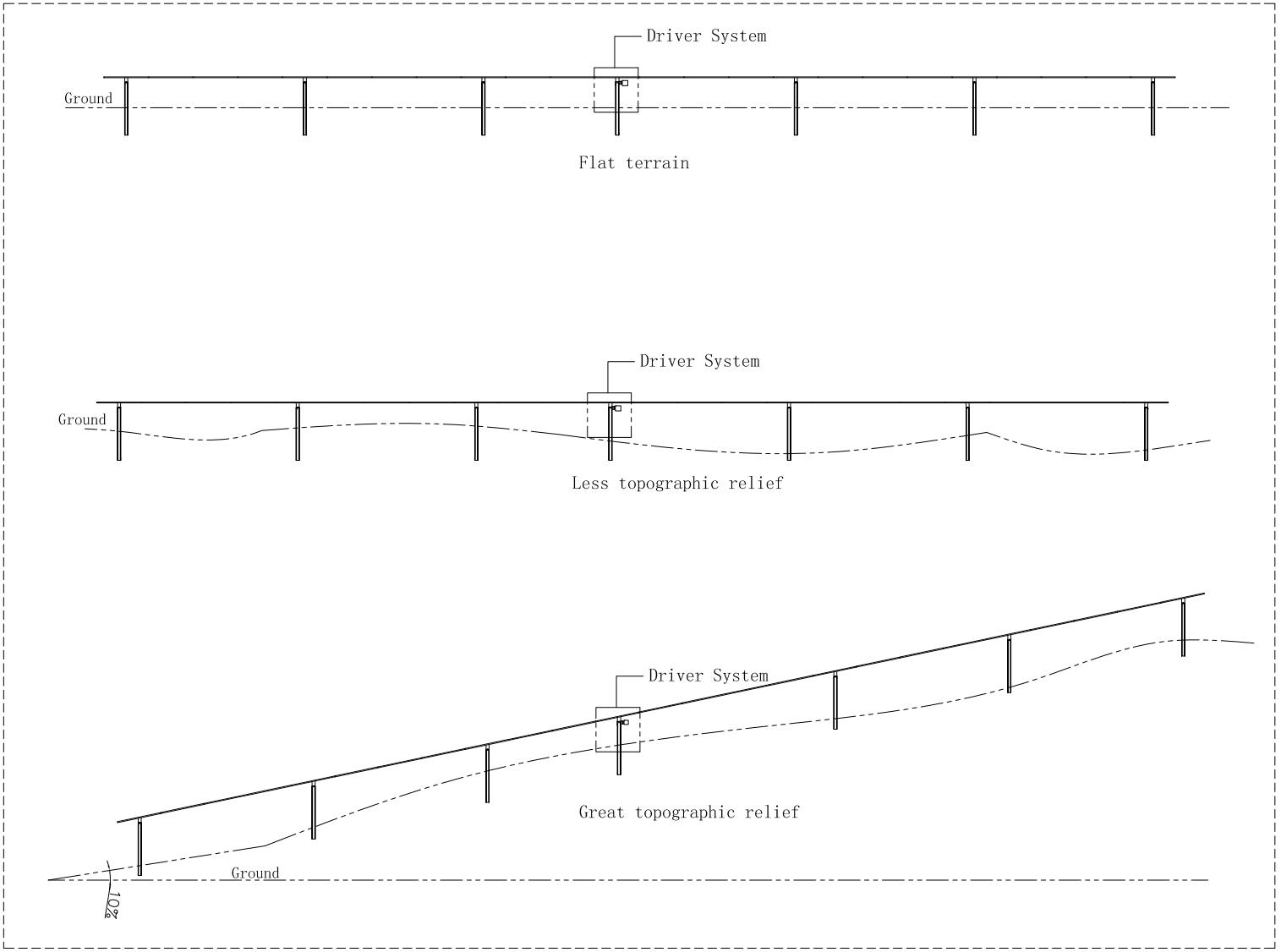
Project Name:
PowerWay Tracker Product

Design	Glenn
Check	Jim
Verify	Sven
Approval	Sven
Chief	--
Design Stage	Preliminary design
Scale	1:100
Drawing Title	PowerLink Tracker
Drawing No.	PowerLink-03
Date	2017

Customer Approval	
Signature	Date

Security Classification			
Privary	√	Publicity	
Unit	mm		

Binding Line



Note:
1、Tracker can be applied to the terrain with continuous flat, less or great topographic elief within10% in south-north direction.
2、Tracker can only aceept the terrain flucuation within10% in west-east direction.

Terrain ajustment in south-north direction

Renewable Energy POWERWAY

Architect:

Developer:

Notes:

1.Ruler is not allowed to be used to measure the drawing, and all should be in conformity to the labels on the drawing.

2.Please refer to the construction drawing and other relevant drawings. Please inform the designer when there is any discrepancies.

Change Record :

Remark	Amendment	Sign	Date

DRAWN: V1.0

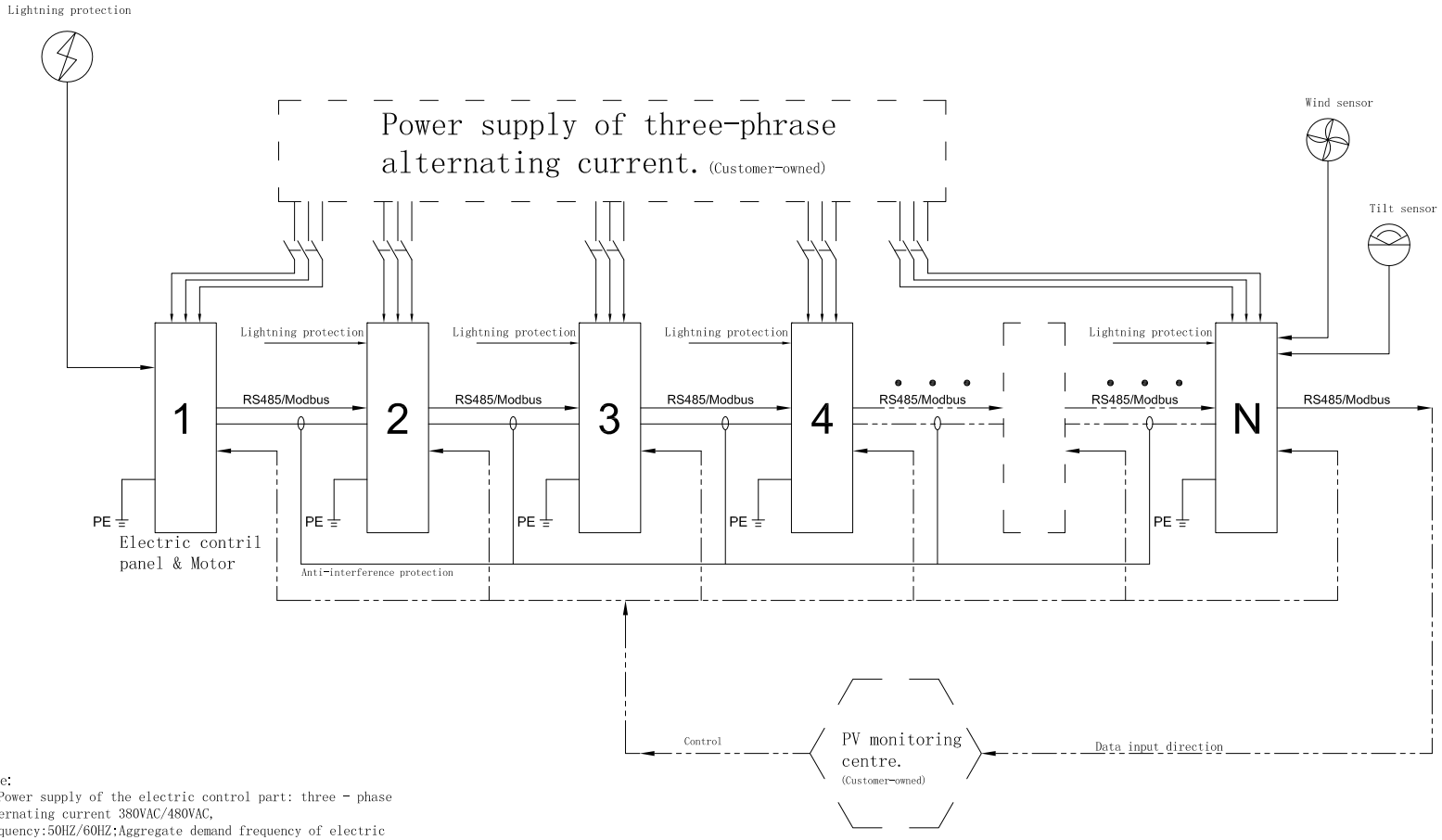
Project Name:
PowerWay Tracker Product

Design	Glenn
Check	Jim
Verify	Sven
Approval	Sven
Chief	--
Design Stage	Preliminary design
Scale	1:100
Drawing Title	PowerLink Tracker
Drawing No.	PowerLink-04
Date	2017

Customer Approval	
Signature	Date

Security Classification			
Privary	√	Publicity	
Unit	mm		

Binding Line



Note:
1、Power supply of the electric control part: three - phase alternating current 380VAC/480VAC, frequency:50HZ/60HZ;Aggregate demand frequency of electric control part and motor is 2KW; three-phase cable+PE wire.
2、Tracker supports the features, including: winde sensor , tilt sensor, rain cleaning, snow cleaning, flatten, lightning prohe tection,etc.
3、Customer needs to provide three-phrase cable,communication wire, PE wire and the PV monitoring centre, connecting three - phase alternating current and the electric control. Tracker tracker only owns the interface for its own data output.

Electric control principles & communication explaination

Renewable Energy POWERWAY

Architect:

Developer:

Notes:

1.Ruler is not allowed to be used to measure the drawing, and all should be in conformity to the labels on the drawing.

2.Please refer to the construction drawing and other relevant drawings. Please inform the designer when there is any discrepancies.

Change Record :

Remark	Amendment	Sign	Date

DRAWN: V1.0

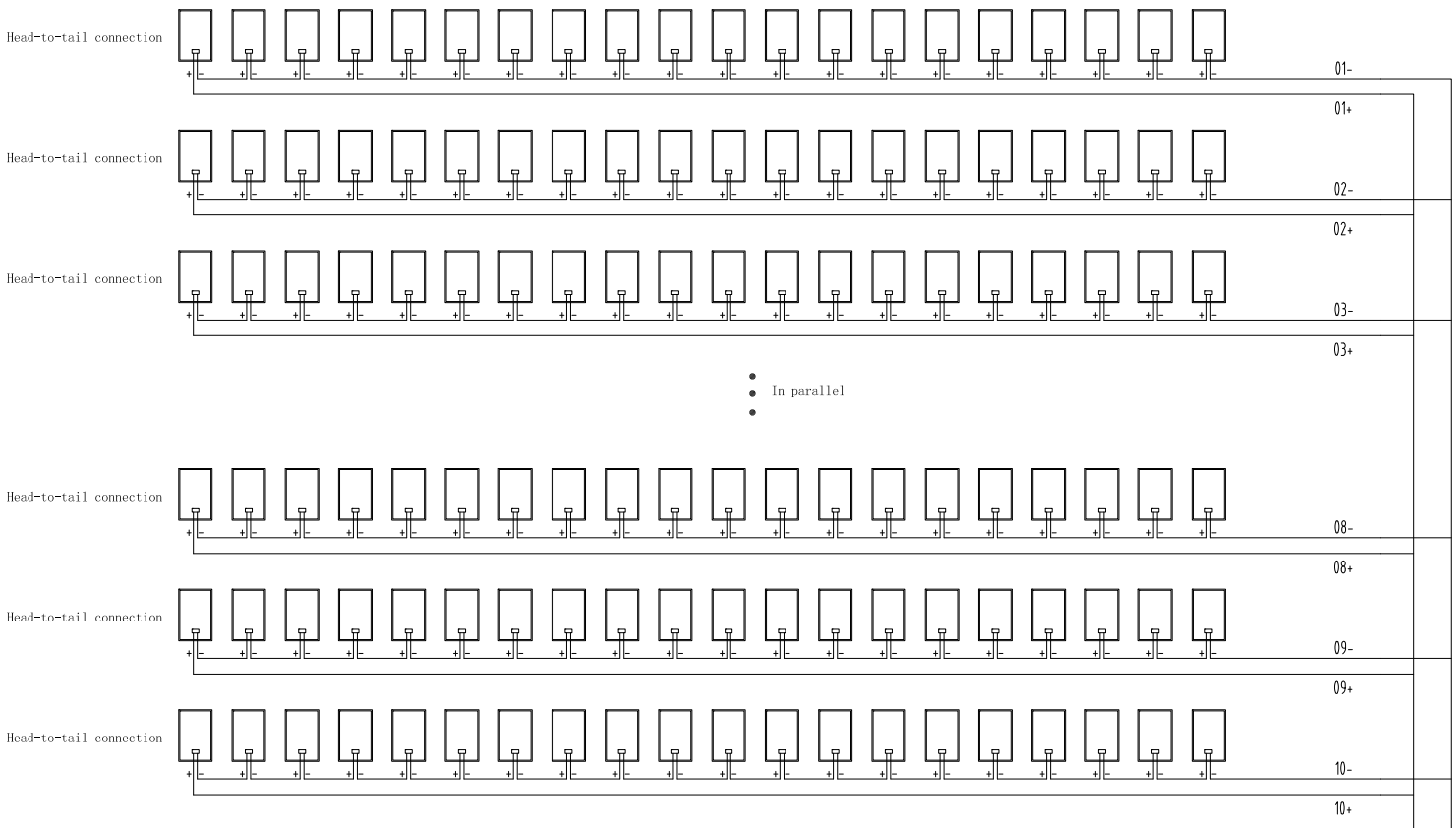
Project Name:
PowerWay Tracker Product

Design	Glenn
Check	Jim
Verify	Sven
Approval	Sven
Chief	--
Design Stage	Preliminary design
Scale	1:100
Drawing Title	PowerLink Tracker
Drawing No.	PowerLink-05
Date	2017

Customer Approval	
Signature	Date

Security Classification			
Privary	√	Publicity	
Unit	mm		

Binding Line



PV Wiring Type

Convergence box or inverter, and installation structure for convergence box or inverter will prepared by user or purchase separately.

Note:
1、Module wires head-to-tail connection or cross-connect does not affect the tracker layout.
2、Above wire seris types is only for reference.

Renewable Energy POWERWAY

Architect:

Developer:

Notes:

1.Ruler is not allowed to be used to measure the drawing, and all should be in conformity to the labels on the drawing.

2.Please refer to the construction drawing and other relevant drawings. Please inform the designer when there is any discrepancies.

Change Record :

Remark	Amendment	Sign	Date

DRAWN: V1.0

Project Name:
PowerWay Tracker Product

Design	Glenn
Check	Jim
Verify	Sven
Approval	Sven
Chief	--
Design Stage	Preliminary design
Scale	1:100
Drawing Title	PowerLink Tracker
Drawing No.	PowerLink-06
Date	2017

Appendix D: Specialist reports (including terms of reference)

Ecological Report

Maanakana Projects
and Consulting (Pty) Ltd

1262 Embankment Road I Centurion 0157 I Email: mftshiala@maanakana.co.zal web site: maanakana.co.za I
Tel/Cell: 0836691702

ECOLOGICAL ASSESSMENT REPORT FOR THE PROPOSED IKOMKHULU SOLAR PLANT ON PORTION 5 OF THE FARM VAN ZOELEN'S LAAGTE No. 158

Compiled

by

Maanakana Projects and Consulting (Pty) Ltd

for

Tholoana Consulting on behalf of
Ikomkhulu Solar (Pty) Ltd

December 2022

DOCUMENT CONTROL AND PROJECT TEAM

CLIENT		**SPECIALIST**
Tholoana Consulting on behalf of Ikomkhulu Solar (Pty) Ltd		**Maanakana Projects and Consulting (Pty) Ltd**
	SPECIALIST NAMES & QUALIFICATIONS	**SIGNATURES**
Fieldwork Specialist & Report Writing	Dr Milambo Freddy Tshiala (BSc in Agriculture, MSc & PhD in Environment and Society (Pr.Sci.Nat.:: 4000021/18))	
Report Reviewer	Ms Nonkanyiso Zungu (BSc Hons Ecology & MSc in Environmental Management, PhD Candidate Pr.Sci.Nat.:400194/10)	
Draft Report Ref. No.	MPC01/2022	30-11- 2022
Final Report Ref.No.		

DECLARATION

We, Maanakana Projects and Consulting (Pty) Ltd, in our capacity as a specialist consultant, hereby declare that we:

- Act as an independent consultant;
- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- Undertake to disclose to the competent authority, any material and/or information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- As a registered member of the South African Council for Natural Scientific Professions, will undertake our profession in accordance with the Code of Conduct of the Council, as well as any other societies to which we are members; and
- Based on information provided to us by the project proponent, and in addition to the information obtained during desktop study, fieldwork investigations have presented the results and conclusion to the best of our professional judgment.

.....

Dr Milambo Freddy Tshiala

EXECUTIVE SUMMARY

Based on the findings of the ecological assessment, it is the opinion of the ecologist that from an ecological point of view, the proposed project be considered favourably mainly because the proposed area has been transformed with the anthropogenic activities, such as animal grazing and mining activities. Despite that, all essential mitigation measures and recommendations presented in this report should be adhered to,ensure that the ecology within the proposed development area is protected and the rehabilitation will be considered should the need arise. This approach will minimise the deviations from the present ecological state. Particular attention needs to be paid to the location and the extent of sensitive terrestrial habitat to ensure that development-related activities do not unnecessarily encroach into these zones and that the ongoing functionality of these systems is guaranteed.

Maanakana Projects and Consulting was appointed by Tholoana Consulting on behalf of Ikomkhulu Solar (Pty) Ltd to undertake the Ecological Assessment for the Portion 5 of the Farm Van Zoelen's Laagte No. 158, which falls within Kimberley Thornveld (SVk 4).

The ecological assessment was conducted within the proposed site.The purpose of this report is to guide and inform the Environmental Assessment Practitioner (EAP) of the ecological sensitivities when conducting an Environmental Impact Assessment.

Floral and Faunal Assessments

The fieldwork for conducting ecological assessment took place on the 12th of November 2022 over approximately 400 Hectares (Ha) of the area of the proposed project. The evaluation on the proposed area focused on the faunal species and floral species such as small trees, woody climbers, tall shrubs, geoxylic suffrutex, graminoids, geophytic herbs, and herbs, succulent and low shrubs. During pre-construction, the contractor must follow mitigation measures proposed in this report to reduce excessive loss of vegetation and soil erosion.

Impact Assessment and Conclusion

The specialist took into consideration the proposed activity from planning to construction. The appointed Environmental Control Officer (ECO) should ensure that mitigation measures are adequate to protect the sensitive area within the study footprint during construction. The following are some of the main envisaged impacts:

- Introduction of alien species;
- Faunal displacement

Recommendations

- The specialist recommends the approval of the project.
- The developer should employ an Environmental Control Officer (ECO) to monitor activities and ensure that activities aligned with the conditions set out by the Competent Authority and Environmental Management Programme (EMPr).
- Any animals rescued or recovered will be relocated to a suitable habitat away from the solar plant activity area, and in case of any protected animals, they will be moved to a nature reserve in close proximity to the proposed site, but that will depend on the authority responsible for protecting the animals;
- Protection of trees, including stumps; bark and holes in trees, are vital habitats for numerous arboreal reptiles (chameleons, snakes, agamas, geckos and monitors);
- The vegetation clearance must be in line with the mitigation measures set in the report.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

GLOSSARY

Alliance for Zero Extinction (AZE) site: highest priority KBAs. AZEs will trigger critical habitat status due to their extreme importance for the last known populations of highly threatened (CR and EN) species.

Biodiversity Hotspot: Regions defined by the presence of high levels of threat (at least 70% habitat loss) in areas with high levels of species endemism (at least 1,500 endemic plant species)identified by Conservation International.

Bird Migration Flyways: Broad outline of central flyways used globally by migrating birds, based on the shared distributions and common migration routes of individual migratory bird speciesidentified by Birdlife International.

Ecoregions: Relatively large units of land or water containing a distinct assemblage of natural communities sharing a large majority of species, dynamics, and environmental conditions. Eco-regions represent the original distribution of distinct assemblages of species and communities,identified by World Wildlife Fund.

Endemic Bird Area: Regions where the distributions of two or more restricted-range bird species overlap as identified by birdlife International.

High Biodiversity Wilderness Area: Large areas (at least 10,000 sq.km.) consisting of regions defined by their relatively undisturbed nature (at least 70% intact) and high level of species endemism (at least 1,500 endemic plant species), asidentified by Conservation International.

IUCN Protected Area Management Categories: assigned to legally protected areas by national government agencies to allow international comparison between national protected area networks, based on management objectives of a protected area.

The six categories are:
Ia: Strict Nature Reserve: strictly protected areas set aside to protect biodiversity and possibly geological/ geomorphical features, where human visitation, use and impacts are strictly controlled and limited to ensure the protection of the conservation values. Such protected areas can serve as crucial reference areas for scientific research and monitoring.

Ib: Wilderness Area: usually large unmodified or slightly modified areas, retaining their natural character and influence without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition.

II: National Park: large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible, spiritual, scientific, educational, recreational, and visitor opportunities.

III: National Monument or Feature: set aside to protect a specific natural monument, which can be a landform, seamount, submarine cavern, geological features such as a cave or even a living feature such as an ancient grove. They are generally relatively small protected areas and often have high visitor value.

IV: Habitat/Species Management Area: aim to protect particular species or habitats, and management reflects this priority. Many Category IV protected areas will need regular, active interventions to address the requirements of particular species or to maintain habitats, but this is not a requirement of the category.

V: Protected Landscape/Seascape: the protected area where the interaction of people and nature over time has produced an area of distinct character with significant, ecological, biological, cultural and scenic value: and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.

VI: Protected Area with sustainable use of natural resources: conserve ecosystems and habitats together with associated cultural values and traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and where low-level non-industrial use of natural resources compatible with nature conservation is seen as one of the main aims of the area.

IUCN Red List of Threatened Species (IUCN RL or Red List): the international standard for assessing threat status for species. The Red List is compiled by IUCN's global network of experts, specialist groups and partners.

Red List categories are:

Critically Endangered (CR): Highest risk of extinction.
Endangered (EN): Very high risk of extinction.
Vulnerable (VU): Risk of extinction.
Near Threatened (NT): Some evidence of decline but not sufficient to be confirmed as one of the categories of threatened species (CR, EN or VU).
Least Concern (LC): No known risk of extinction.
Data Deficient (DD): Insufficient data to assign a Red List category.

1. INTRODUCTION

1.1 Project Background

Maanakana Projects and Consulting (Pty) Ltd was appointed by Tholoana Consulting on behalf of Ikomkhulu Solar (Pty) Ltd to undertake the ecological assessment of the proposed project of Ikomkhulu Solar Plant. The proposed project area is situated within Kimberley Thornveld (SVk 4).

The proposed River View Solar Plant project entails the construction of Solar Photovoltaic (PV) power plant to feed into the National Grid (Eskom), at the Remaining Extent of Portion 3 of the Farm Rietputs 15, where the size of the property is approximately 1 313.5298 Ha, however the footprint for the plant is approximately 359Ha. The site area falls within ward 4, Magareng Local Municipality, Frances Baard District Municipality in the Northern Cape Province.

1.2 Project Locality

The proposed site is located in Portion 5 of the Farm Van Zoelen's Laagte No 158 within the District Municipality of Kimberley in the province of Northern Cape (Figure 1).

The proposed project has falling under the location details as described in Table 1.

Table 1. Site Location

Location	28°21'43.01"S, 24°40'52.23"E
District Municipality	Kimberley
Province	Northern Cape

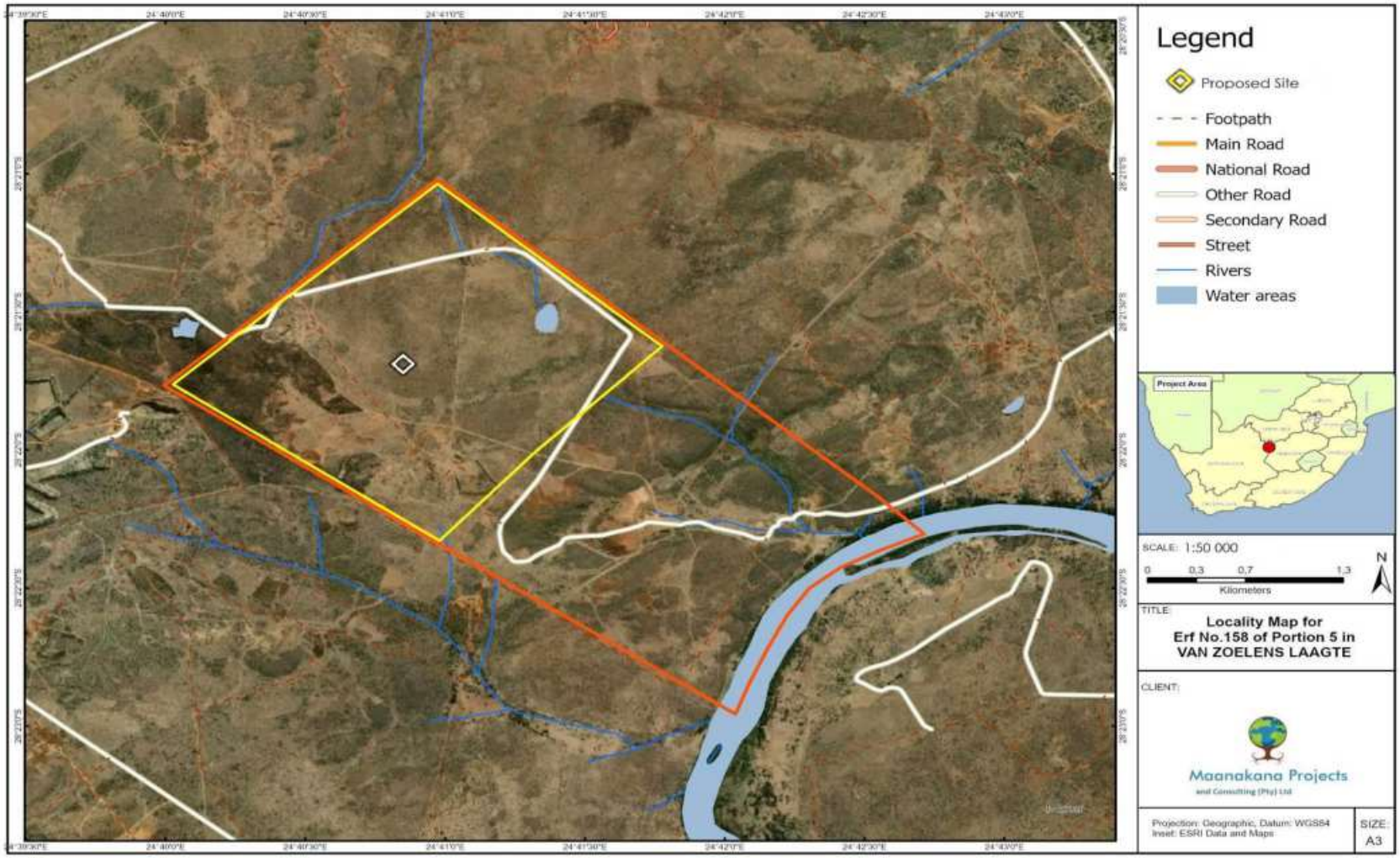


Figure 1. Site Location

1.3 Assumptions and Limitations

The following assumptions and limitations apply to this report:

- The ecological assessment is confined to the study area and does not include the neighbouring and adjacent lands or areas; these were, however, considered as part of the desktop assessment.
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most floral communities have been accurately assessed and considered.
- Sampling, by its nature, means that not all individuals are assessed and identified. Some species and taxa on the study area may therefore have been missed during the assessment.
- It is important to note that the absence of species on site does not conclude that the species is not present at the site.

2. Applicable Legislation

The national and provincial legislation, policies and guidelines, which could apply to impacts on the proposed project of biodiversity, are listed below. Although the list is comprehensive, additional legislation, policies and guidelines that have not been mentioned may apply.

Relevant legislation is provided below to provide a description of the applicable legal considerations of relevance to the proposed project.

Convention on Biodiversity (CBD)

The CBD requires signatory states to implement objectives of the Convention, which are the conservation of biodiversity; the sustainable use of biological resources and the fair and equitable sharing of benefits arising from the use of genetic resources. South Africa became a signatory to the CBD in 1993, which was ratified in 1995. Article 14 (a) of the CBD states that "Each Contracting Party, as far as possible and as appropriate, shall: (a) Introduce appropriate procedures requiring environmental impact assessment of its proposed projects that are likely to have significant adverse effects on biological diversity with a view to avoiding or minimizing such effects and, where appropriate, allow for public participation in such procedures".

National Environmental Management Act (Act No. 107 of 1998, NEMA)

Section 24 of the Constitution of the Republic of South Africa provides the right to every person for a non-harmful environment and simultaneously mandates the government to protect the environment. NEMA is the framework to enforce Section 24 of the Constitution.

NEMA requires, amongst others, that:

- Development must be socially, environmentally, and economically sustainable;

- Disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied; and
- A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions.

Government Notice No. 40733 of 2017: Draft National Biodiversity Offset Policy published under NEMA is to ensure that significant residual impacts of developments are remedied, thereby ensuring sustainable development as required by section 24 of the Constitution of the Republic of South Africa, 1996. This policy should be taken into consideration with every development application that still has significant residual impact after the mitigation has been followed. The mitigation sequence entails the consecutive application of avoiding or preventing loss, then at minimizing or mitigating what cannot be avoided, rehabilitating where possible and, as a last resort, offsetting the residual impact. As these developments fall within the distribution range of threatened vegetation types and may result in at least some loss of natural vegetation, it is recommended that rehabilitation of degraded areas takes place on the project site.

The National Gazette, No. 43110 of 20 March, 2020: "National Environmental Management Act (107/1998) Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24 (5) (a) and (h) and 44 of the Act, when applying for Environmental Authorisation" lists protocols and minimum report requirements for environmental impacts on terrestrial biodiversity. The assessment and minimum reporting requirements are associated with a level of environmental sensitivity identified by the national web-based screening tool. The proposed project site falls within an area identified by the screening tool as 'very high sensitivity' in the Terrestrial Biodiversity Theme due to the proposed route crossing a small section delineated as critical biodiversity areas as well as an ecological support area. The ecological support area is, however, a result of the Important Bird Area surrounding De Aar. Furthermore, this legislation makes provision for linear activities such as power lines such as the proposed development by stating that the assessment and reporting requirements for 'very high sensitivity' need not apply as impacts on terrestrial biodiversity are temporary. The land disturbed by the power line development, in the specialist's opinion can be returned to the current state within two years of the completion of the construction phase, and as such a Terrestrial Biodiversity Compliance Statement applies. This document exceeds the minimum requirements prescribed by this legislation for linear activities.

National Environmental Management: Biodiversity Act (Act No. 10 of 2004, NEMBA)

NEMBA is the principal national act that regulates biodiversity protection, and is concerned with the management and conservation of biological diversity, as well as the use of indigenous biological resources in a sustainable manner. Section 57 (1) states that a person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7 (2) The

Minister may, by notice in the Gazette, prohibit the carrying out of any activity- (a) which is of a nature that may negatively impact on the survival of a listed threatened or protected species. Restricted activities include damaging, uprooting or destroying specimens of listed threatened or protected species as well as movement and possession of these species. NEMBA also aims to, inter alia, (a) prevent the unauthorized introduction and spread of alien species and invasive species to ecosystems and habitats where they do not naturally occur; (b) to manage and control alien species and invasive species to prevent or minimize harm to the environment and to biodiversity in particular and (c) to eradicate alien species and invasive species from ecosystems and habitats where they may harm such ecosystems or habitats.

National Forests Act (Act No. 84 of 1998)

This act lists protected tree species and prohibits certain activities. The prohibitions provide that "no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister".

National Water Act (Act No. 36 of 1998)

This act defines a watercourse as: "a river or spring; natural channel in which water flows regularly or intermittently; wetland, lake or dam into which, or from which, water flows; and any collection of water which the Minister may, by notice in the gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks". This act regulates certain activities in and around a watercourse and aims, amongst others to protect aquatic and associated ecosystems and their biological diversity and reduce and prevent pollution of water resources.

Conservation of Agricultural Resources Act (Act No. 43 of 1983 as amended in 2001)

This act lists declared weed and invader species of plants and prescribes the required actions to comb their spread depending on their listed category, the three categories are:

- Category 1 plants: prohibited and must be controlled;
- Category 2 plants: may be grown in demarcated areas providing that there is a permit and that steps are taken to prevent their spread; and
- Category 3 plants: may not be planted; existing plants may remain as long as reasonable steps are taken to prevent their spread, except within the flood line of watercourses and wetlands.

National Veld and Forest Fire Act (Act No. 101 of 1998)

The purpose of the National Veld and Forest Fire Act, as amended by the National Fire Laws Amendment Act, is to prevent and combat veld, forest and mountain fires throughout South Africa. The Act applies to the open countryside beyond the urban limit and puts in place a range of requirements. It also specifies the responsibilities of land owners. The term 'owners' includes lessees, people in control of land, the executive body of a community, the manager of State land, and the chief executive officer of any local authority. The

requirements include, but are not limited to, the maintenance of firebreaks and availability of firefighting equipment to reasonably prevent the spread of fires to neighbouring properties.

Northern Cape Nature Conservation Act (Act No. 9 of 2009)

This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project: Aquatic habitats may not be destroyed or damaged restricted activities involving protected animals and plants, including the uprooting, breaking, damage or destruction of listed plant species. The Act provides lists of species offered protection in the Province.

3. DESCRIPTION OF RECEIVING ENVIRONMENT

3.1 CURRENT LAND-USE

The area within the proposed site is covered with the vegetation such as small trees, tall shrubs, graminoids, herbs, geophytic herbs, succulent herbs, succulent shrubs, low shrubs. The description of the environment provided in this report is the current status of the proposed site (Figure 2).

Figure 2. Overview of current land use

3.2 CLIMATE

The climate of the proposed site is summer and autumn rainfall and very dry winters. MAP about 300 mm in the southwest to about 500 mm in the northeast.. Frost frequent in winter. Mean monthly maximum and minimum temperatures for Kimberley 37.5ºC and -4.1ºC for January and July, respectively corresponding values for Vaalharts-Agr 37.4ºC and -3.9ºC, respectively (Mucina and Rutherford, 2006).

However, the unpredictable rainfall mostly occurs in the form of short downpours or thunderstorms. On average about 400mm of rain falls annually and long droughts are common. Most of the rain usually falls during October to November and February to March (Jonk and Wilson, 2016).

3.3 GEOLOGY AND SOILS

Andesitic lavas of the Allanridge Formation in the North and West and fine-grained sediments of the Karoo supergroup in the south and east. Deep (0.6-1.2m) sandy to loamy soils of the Hutton soil form (Ae and Ah land types) on slightly undulating sandy plains (Mucina and Rutherford, 2006).

The basic geology of the area consists mostly of red sands overlaying a calcrete bank. These sands were deposited by wind action. An interesting feature of these coarse sands is their ability to rapidly absorb the rainfall, which moves deeper into the lower sand layers. This does not occur in other finer soil types. Less moisture is then lost through evaporation and there is therefore soil water available during the dry winter months. Other interesting geological features of the landscape include rocks known and Dwyka tillite, which are deposits from glaciers that moved over this area millions of years ago (Jonk and Wilson, 2016).

3.4 Important taxa

Table 2– Important taxa (Mucina and Rutherford, 2006)

Tall Tree	Small Trees	Tall Shrubs	Low Shrubs	Succulent Shrubs	Graminoids	Herbs	Succulent Herbs
Acacia erioloba	*Acacia karroo, A. mellifera subsp. detinens, A. tortilis subsp. Heteracantha, Rhus lancea.*	*Tarchonanthus camphoratus, Diospyros pallens, Ehretia rigida subsp. Rigida, Euclea crispa subsp. Ovata, Grewia flava, Lycium Arenicola, L. hirsutum, Rhus tridactyla.*	*Acacia hebeclada subsp. Hebeclada., Anthospermum rigidum subsp. Pumilum, Helichrysum zeyheri, Hermania comosa, Lycium pilifolium, Melolobium microphyllum, Pavonia burchellii, Peliostomum leucorrhizum, Plinthus sericeus, Wahlenbergia nodosa,*	*Aloe hereroensis var. hereroensis, Lycium cinereum*	*Eragrostis lehmanniana, Aristida canescens, A. congesta, A. mollissima subsp. Argentea, Cymbopogon porspisschilii, Digitaria argyrograpta, D. eriantha subsp. Eriantha, Enneapogon cenchroides, E. scoparius, Eragrostis regidor, Heteropogon contortus, Themeda triandra.*	*Barleria macrostegia, Dicoma schinzii, Harpagophytum procumbens subsp. Procumbens, Helichrysum cerastioides, Hermbstaedtia odorata, Hibiscus marlothianus, Jamesbrittenia aurantiaca, Lippia scaberrima, Osteospermum muricatum, Vahlia capensis subsp. vulgaris*	*Aloe grandidentata, Piaranthus decipiens.*

3.5 Vegetation and Landscape Features

The vegetation surrounding Kimberley is classified as Kimberley thornveld, and is an open savanna of mostly trees and grasses. The vegetation can be further subdivided into three basic veld types: the Kimberley thorn bushveld of the flat sandy plains, the koppie veld on the dolerite koppies and the panveld associated with the calcareous pans. The sandy plains support mainly trees and grasses, whilst shrubs are more abundant on the koppies and in the ecotone between the koppies and the plains. Calcareous pans support smaller, Karoo-like shrubs and a number of specialised and scarce plants (Jonk and Wilson, 2016).

Furthermore, the proposed site is plain often slightly irregular with well developed tree layer with Acacia erioloba, A. tortilis, A. karroo and Boscia albitrunca and well developed shrub layer with occasional dense stands of Tarchonanthus camphoratus and A. mellifera. Grass layer open with much uncovered soil. In places the land already disturbed continuous grassland cover and few varities of trees scattered within the proposed site.The vegetation on the proposed site is classified under vegetation types of Kimberley Thornveld (SVk 4) (Figure 3) (Mucina and Rutherford, 2006).

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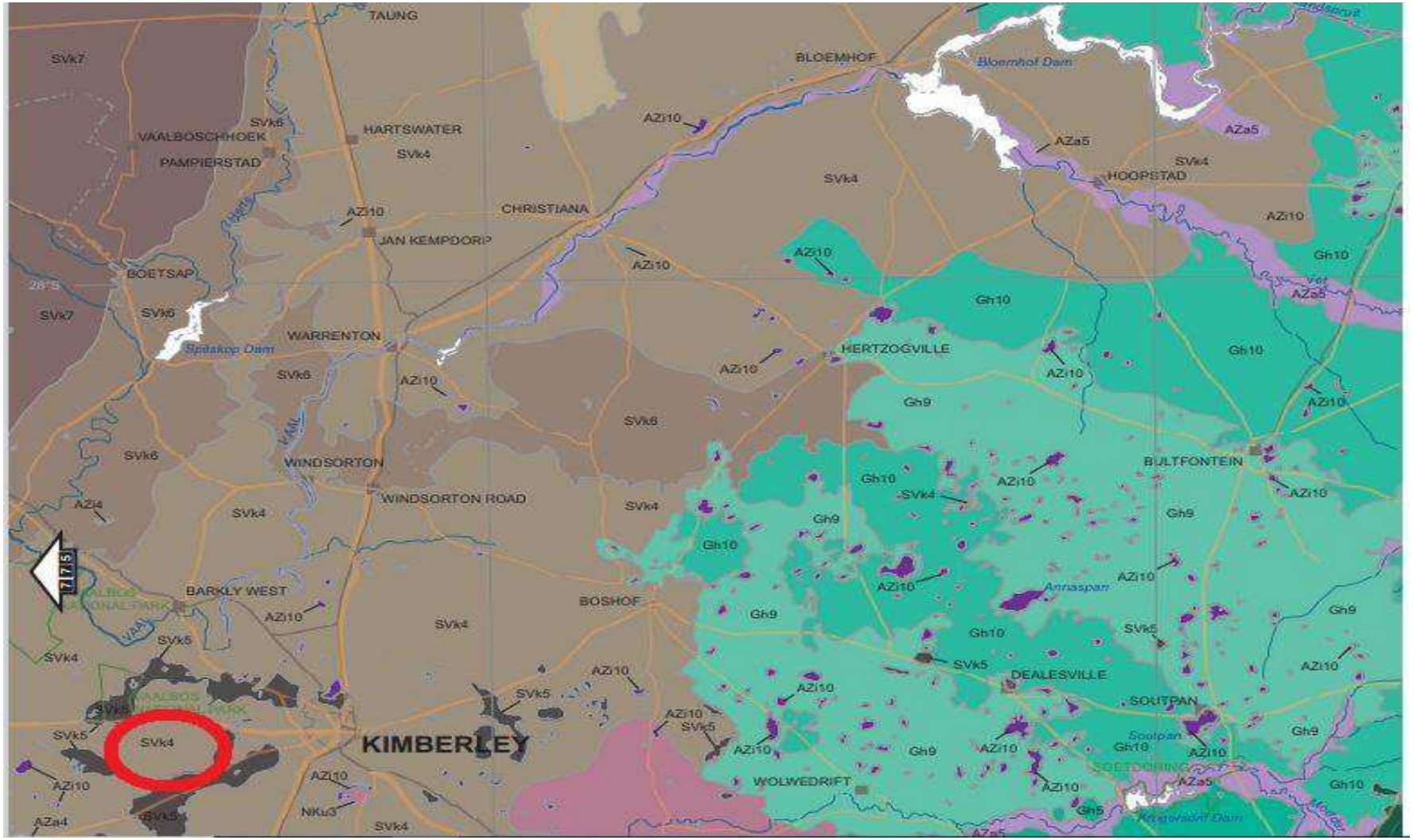

Figure 3 – Vegetation type Map

4. METHODOLOGY

4.1 Floral Assessment

4.1.1 Literature Review

The description of the vegetation of the proposed site was taken from the literature of Mucina and Rutherford, 2006. The identification of grasses was identified from the guide to grasses of Southern Africa (Oudtshoorn, 2012). Plant names were identified from Van Wyk and Malan (2013), identification of Red data species by Taylor (1996) and identification of Invasive Alien Plant species (Bromilow, 2010).

4.1.2 Field survey

Before the study, a desktop study was undertaken. As a follow up, fieldwork and a reconnaissance "walk through" was undertaken to determine the general habitat types found throughout the study area. The walk through investigation was done in order to identify the occurrence of the dominant faunal communities, species and habitat diversities. Any faunal inhabitants of the study area were also assessed through direct visual observation or identifying such species through calls, tracks, scats, and burrows.

It is important to note that faunal species have varied life cycles and breeding patterns, subject to seasonal fluctuations. As such, it is unlikely that all faunal species would have been recorded during the site assessment. However, even though some faunal species may not have been identified during the site assessment, some activities and degree of transformation because most of the lands have undergone anthropogenic activities in regards to that, the evaluation was done to establish an accurate understanding of faunal assemblages most likely associated with the study area.

4.1.3 Mapping

Mapping was done by comparing georeferenced ground survey data to the visual inspection of available Google-Earth imagery (which is a generalised colour composite image without any actual reflectance data attached to it), and in that way extrapolating survey reference points to the entire study area. Mapped associations provided in this report, indicates the extent of the vegetation on site as well as importance.

4.1.4 Sensitivity Analysis

It has been clearly demonstrated that vegetation forms the basis of the trophic pyramid in an ecosystem and plays a crucial role in providing the physical habitat within which organisms complete their life cycles (Kent and Coker, 1992).

The determination of specific ecosystem services and the sensitivity of ecosystem components, both biotic and abiotic, is rather complex, and no single overarching criterion will apply to all habitats studied. The main aspects of an ecosystem that need to be incorporated in a sensitivity analysis include the following:

- Describing the nature and number of species present, considering their conservation value and the ability of such species to survive or re-establish themselves following disturbances and alterations of various magnitudes to their specific habitats.
- Identifying the species or habitat features that are the "key ecosystem providers" and characterising their functional relationships (Kremen, 2005).
- Determining the aspects of community structure that influence function, especially elements influencing stability or rapid decline of communities (Kremen, 2005).
- Assessing key environmental factors that influence the provision of services (Kremen, 2005).
- Gaining knowledge about the spatio-temporal scales over which these aspects operate (Kremen, 2005).

The vegetation sensitivity assessment aims to identify whether the vegetation within the study area is of conservation concern and thus sensitive to development if it is amongst other things:

- Situated in a listed ecosystem or threatened vegetation unit;
- Endangered conservation type;
- Habitat or potential habitat to threatened plants, protected plants or protected trees;
- Untransformed and un-fragmented natural vegetation.

An ecological sensitivity map was produced through the integration of the information collected during the site visit with the available biodiversity data in the literature (Figure 4). Sensitive features such as rivers, dams, wetlands, temporary pans, drainage lines, rocky outcrops and other important habitat features such as animal burrows were mapped and rated. The ecological sensitivity rating of landscape features were categorised as follows:

- **Low** – Areas with a low sensitivity where there is likely to be a low impact on terrestrial biodiversity and ecological processes. The impact of development is likely to be local in extent and of low significance with the implementation of mitigation measures.
- **Medium** – Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impact such as erosion low. These areas usually comprise the bulk of habitats within an area. Development within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.
- **High** – Areas with a high sensitivity where there is likely to be a high impact on terrestrial biodiversity and ecological processes. The impact of development in these areas is likely to extend beyond the local scale and be of high significance as there exists a direct risk of impact to ecological processes and critical or unique habitats for species of conservation concern. Existing infrastructure such as access roads and servitudes must be used when traversing these areas.

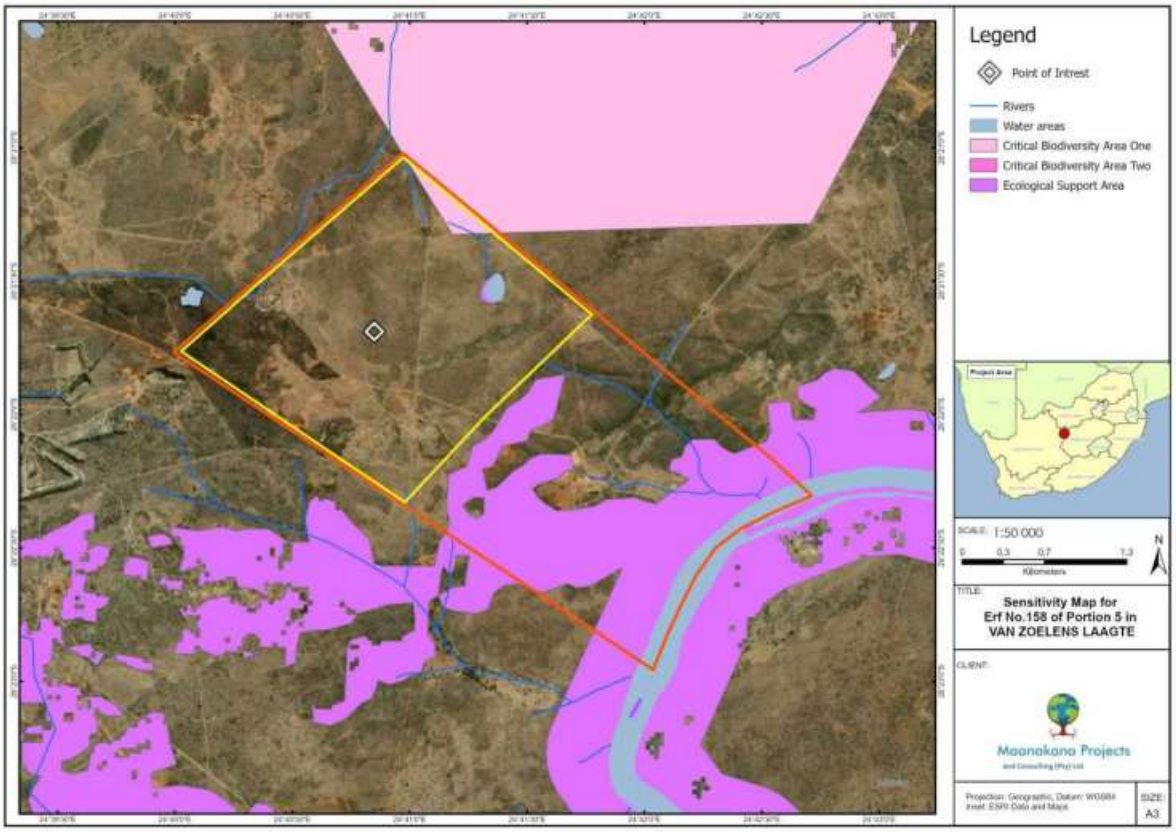

Figure 4. Sensitivity Map

5. IMPACT ASSESSMENT

5.1 Identification of Potential Impacts

Potential impacts on the ecology of the study area include the following (issues assessed by other specialists, e.g. on birds and on hydrological function are not included here):

- Impacts on biodiversity: Any impacts on populations of species of concern (flora and fauna) and on overall species richness, genetic variability, population dynamics and habitats important for species of concern;
- Impacts on sensitive habitats: Impacts on any sensitive or protected habitats, including indigenous grassland and wetland vegetation that leads to direct or indirect loss of such habitat;
- Impacts on threatened ecosystems: any impacts on threatened or protected ecosystems, critical biodiversity areas, areas of high biodiversity and centres of endemism;
- Impacts on ecosystem functions: any impacts on processes or factors that maintain ecosystem health and character, including the following:
    - Habitat fragmentation;
    - Disruption to ecological corridors;

- Changes to abiotic environmental conditions;
- Changes to disturbance regimes, e.g. increased or decreased incidence of fire;
- Disruption to nutrient-flow dynamics;
- Impedance of movement of material or water;
- Changes to successional processes;
- Effects on pollinators; and
- Increase invasion by alien plant.

- Cumulative impacts: this includes an assessment of the impacts of the proposed project taken in combination with the impacts of other known projects for the area or secondary impacts that may arise from changes in the social, economic or ecological environment.

5.2 Construction Phase Impacts

- Construction phase impacts for this project will include the following:
- Loss and/or fragmentation of indigenous natural vegetation due to clearing;
- Loss of individuals of plant species of conservation concern and/or protected plants;
- Loss of faunal habitat and refugia;
- Direct mortality of fauna due to machinery and construction;
- Displacement and/or disturbance of fauna due to increased activity and noise levels;
- Increased poaching and/or illegal collecting due to increased access to the area; and
- Contamination of the environment by construction vehicles and machinery.

5.3 Operational Phase Impacts

Ongoing operational impacts for this project will include the following:

- Direct impact of fauna through traffic, illegal collecting, poaching and collisions and/or entanglement with infrastructure;
- Establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance; and
- Runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape.

5.4 Cumulative Impacts

Impacts on broad-scale ecological processes and cumulative habitat loss, connectivity or potential for the area to meet long-term conservation objectives (such as CBAs and ESAs, areas).

5.5 Assessment of Impacts

The assessment of impacts takes into account the position of the solar installation within the proposed site. There are no alternative site option to assess.

5.2.1 Construction Phase Impacts

5.2.1.1 Impact 1: Loss or fragmentation of indigenous natural vegetation

Due to the high probability of the loss of at least some natural vegetation, the impact calculated by the impact table is of **MODERATE** significance, despite mitigation reducing the intensity of the impact. As the two vegetation types on the project site classified nationally as Least Threatened, are largely contiguous and cover extensive areas, the impact on these vegetation types as a whole in the specialist's opinion should be considered to be of **LOW** significance.

Impact Phase: Construction							
Potential impact description: Impact on vegetation through the destruction of plants from construction activities. Solar structures will affect relatively small, localised areas of vegetation. Access roads may affect slightly larger areas. The installation of solar will result in the clearing of an area of up to.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	M	H	Negative	M	H	H
With Mitigation	L	M	M	Negative	M	H	H
Can the impact be reversed?			No. Some long-term loss of vegetation is likely.				
Will impact cause irreplaceable loss or resources?			No. The vegetation is widespread in the area and the size of the project footprint is comparatively low.				
Can impact be avoided, managed or mitigated?			Partly. Some residual impact is likely, however the intensity of the impact can be reduced through mitigation.				

Mitigation measures to reduce residual risk or enhance opportunities: • Solar structure footprints to be constructed outside of HIGH sensitivity areas; • Preconstruction walk-though of the solar development footprints (new servitudes, lay-down areas and temporary infrastructure) once finalised to ensure that sensitive habitats are avoided where possible; • Ensure that lay-down and other temporary infrastructure are within MEDIUM or LOW sensitivity areas; • Minimise the development footprint as far as possible and rehabilitate disturbed areas that are not required by the operational phase of the development; • Utilize existing servitudes and access roads wherever possible, any new roads or the upgrading of roads should be minimized as far as possible and not be larger than required; • All construction vehicles should adhere to clearly defined and demarcated roads, no off-road driving should be allowed; • Ensure that sufficient erosion control measures are constructed on all servitudes and access roads in the project area; • Rehabilitate existing servitude and access roads in the project area with sufficient erosion control measures to prevent the loss of soil and the degradation of vegetation; • An environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes topics such as avoiding fire hazards, no littering, appropriate handling of pollution and chemical spills, minimizing wildlife interactions, remaining within demarcated construction areas, avoidance of no-go areas and sensitive habitats (i.e. wetlands); • Demarcate sensitive areas in close proximity to the development footprint as no-go areas with construction tape or similar and clearly marked as no-go areas; • No open fires should be permitted outside of designated areas; • Construction activities in or near drainage lines, washes or temporary inundated depressions (as indicated by MEDIUM sensitivity areas on the map) must only take place during the dry season; • An environmental management programme (EMPr) must be implemented, and must provide a detailed description of how construction activities must be conducted to reduce unnecessary destruction of habitat.	
Impact to be addressed/ further investigated	Yes. Micrositing of infrastructure is required after finalization of locations and prior to construction to ensure sensitive areas are avoided where possible.

5.2.1.2 Impact 2: Loss of individuals of threatened or protected plant species

None of the plant species recorded on site were listed as protected by NEMBA. Most of the species identified on the project site are not protected under the Northern Cape Nature Conservation Act. One tree species, the Shepherd's Tree is protected under the National Forest Act. However, this species was not recorded to be present on the study site during the ecological survey. While the probability of the loss of some protected plants is likely, resulting in a **MODERATE** significance rating in the impact table, many of the species are common and widespread through the area, which is largely intact and therefore it is the specialist's opinion that the impact should be considered to be of **LOW** significance.

Impact Phase: Construction

Potential impact description: Loss or damage of threatened or protected plant species through construction activities. The illegal collecting of plant species may increase if access to the site is increased during construction activities.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	L	M	H	Negative	M	H	H

With Mitigation	L	M	M	Negative	M	H	H
Can the impact be reversed?			No. Some permanent loss of plants is likely.				
Will impact cause irreplaceable loss or resources?			No. The species are widespread in the area and the size of the project footprint is big.				
Can impact be avoided, managed or mitigated?			Yes.				
Mitigation measures to reduce residual risk or enhance opportunities: • Preconstruction walk-through the solar development footprints (new servitudes, lay-down areas and temporary infrastructure) once finalised for micrositing to ensure that protected species are avoided where possible; • Compile a comprehensive species list of plants that may be cut, chopped, uprooted, damaged or destroyed and obtain relevant permits for these restricted activities if required; • Utilize existing servitudes and access roads wherever possible, any new roads or the upgrading of roads should be minimized as far as possible and not be larger than required; • All construction vehicles should adhere to clearly defined and demarcated roads, no off-road driving should be allowed; • Site access should be controlled and no unauthorised persons should be allowed onto the site; • The collection or harvesting of any plants at the site should be strictly forbidden; • Personnel should not be allowed to wander off the demarcated construction site; and • An environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to.							
Impact to be addressed/ further investigated			Yes. Micrositing of infrastructure is required after finalization of locations and prior to construction to compile a list of species that may be damaged during construction.				

5.2.1.3 Impact 3: Loss of faunal habitat and refugia

This impact includes the temporary loss of faunal habitat and refugia associated with laydown areas and temporary contractor's facilities as well as the permanent loss associated with the construction of permanent structures such as the solar structure. The risk to habitats also includes pollution and contamination, particularly wetland and aquatic environments, from construction activities (e.g. oil leaks or chemical spills). The risk of destruction of habitat such as temporary vleis and wetlands or refugia such as burrow systems would be reduced to acceptable levels if mitigation measures are adhered to.

Impact Phase: Construction							
Potential impact description: Loss or damage of faunal habitat and refugia such as burrow systems and temporary vleis/wetlands due to construction activities. The damage to faunal habitat (especially aquatic environments) due to increased erosion and contamination form chemical leaks/spills.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	M	H	Negative	M	H	H
With Mitigation	L	L	M	Negative	M	H	H
Can the impact be reversed?			Partially. Some habitats such as temporary vleis can be artificially constructed, however loss due to contamination is more difficult to reverse.				

Will impact cause irreplaceable loss or resources?	No. Habitats available on the project site are widespread in the area.
Can impact be avoided, managed or mitigated?	Yes. The probability and intensity of this impact can be reduced through mitigation.

Mitigation measures to reduce residual risk or enhance opportunities:

- Preconstruction walk-through of the solar development footprints (new servitudes, lay-down areas and temporary infrastructure) once finalised for micrositing to ensure that temporary vleis/wetlands and burrow systems are avoided where possible;
- No construction of solar structure in **HIGH** sensitivity areas;
- Ensure that lay-down and other temporary infrastructure are within **MEDIUM** or **LOW** sensitivity areas;
- No-go areas around sensitive habitats such as wetlands or burrow systems should be clearly marked;
- All construction vehicles should adhere to clearly defined and demarcated roads, no off-road driving
- should be allowed;
- Ensure that sufficient erosion control measures are constructed on all servitudes and access roads in the project area;
- Rehabilitate existing servitude and access roads in the project area with sufficient erosion control measures to prevent the loss of soil and the degradation of vegetation;
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill;
- Utilize existing servitudes and access roads wherever possible, any new roads or the upgrading of roads should be minimized as far as possible and not be larger than required; and
- All construction vehicles should adhere to clearly defined and demarcated roads, no off-road driving should be allowed.

Impact to be addressed/ further investigated	Yes. Micrositing of infrastructure is required after finalization of locations and prior to construction to ensure that no active burrow systems are destroyed.

5.2.1.4 Impact 4: Direct impact to fauna due to construction

Sensitive and shy fauna are likely to move away from the affected areas during construction, while some slow-moving species would not be able to avoid the construction activities and might be killed. Increased traffic during construction will pose a risk of collisions with susceptible fauna. Tortoises, snakes and amphibians are particularly susceptible to collisions, however many other species are also at risk such as rabbits/hares and porcupine, particularly at night. Some mammals and reptiles would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present. Many of these impacts can however be effectively managed or mitigated. After mitigation, direct faunal impacts are likely to be of low significance. It is unlikely that construction activities will have a negative impact on this species if mitigation measures are adhered to. The probability of direct mortalities due to construction activities can be reduced to acceptable levels through the implementation of mitigation measures.

Impact Phase: Construction							
Potential impact description: Direct impact to fauna caused by construction activities, such as increased risk of injury or mortality from collision with vehicles due to increased traffic, the increased possibility of illegal hunting, poaching, persecution or harvesting of fauna.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	L	H	Negative	M	H	H
With Mitigation	L	L	M	Negative	L	L	H
Can the impact be reversed?	No.						
Will impact cause irreplaceable loss or resources?	Potentially. If rare or threatened species suffer direct mortality.						
Can impact be avoided, managed or mitigated?	Yes. The probability and intensity of this impact can be reduced through mitigation.						
Mitigation measures to reduce residual risk or enhance opportunities: • Construction of infrastructure in or near aquatic environments (as indicated by **MEDIUM** sensitivity on the map) must be conducted during the dry season; • All construction vehicles should adhere to clearly defined and demarcated roads, no off-road driving should be allowed; • All construction vehicles should adhere to a low speed limit (30km/h) to avoid collisions with susceptible species; • Speed limits must apply within the project site as well as on the public gravel access roads to the site; • Night driving must be avoided where possible; • Site access should be controlled and no unauthorised persons should be allowed onto the site; • All personnel should undergo an initial environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes or tortoises; • The illegal collection, hunting or harvesting of animals at the site should be strictly forbidden; • No animals such as dogs or cats to be allowed on site other than those of the landowners; • Personnel should not be allowed to wander off the construction site; • No open fires should be permitted outside of designated areas; • Any fauna directly threatened by the construction activities should be removed to a safe location by the environmental control officer or other suitably qualified person.							
Impact to be addressed/ further investigated	No.						

5.2.1.5 Impact 5: Displacement or disturbance of fauna due to increased activity and noise levels

Increased levels of noise and disturbance by vehicles, machinery and human presence during construction will likely impact sensitive species causing them to move away from the project site potentially influencing movement, foraging activity, breeding and impacting energy budgets. Even with the reduction of the probability of disturbance through mitigation, the impact table calculates the significance of the impact to be **MODERATE** as the probability that some disturbance of fauna will occur. As large areas of contiguous natural habitat are available, the displacement distance would not be excessively far and as the impact is only

for a relatively short period of time it is therefore the specialist's opinion that following the implementation of mitigation measures the impact should be considered to be of **LOW** significance.

Impact Phase: Construction							
Potential impact description: The displacement or disturbance of fauna due to construction activities. Species sensitive to human activity such as Reedbuck would likely move away from construction activities.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	L	L	Negative	M	H	H
With Mitigation	L	L	L	Negative	M	M	H
Can the impact be reversed?	Yes. The disturbance resulting from construction activities will be transient in nature.						
Will impact cause irreplaceable loss or resources?	No. Most species would be able to move away from disturbance, large areas of natural habitat available means displacement distance would not be excessively far.						
Can impact be avoided, managed or mitigated?	Partly, noise and activity cannot be entirely avoided or mitigated against.						
• Mitigation measures to reduce residual risk or enhance opportunities: • Construction camps should be lit with as little light as practically possible, with the lights directed downwards where appropriate to reduce the disturbance and foraging activities of nocturnal species;							
• The movement of construction personnel should be restricted to the construction areas on the project site; • Speed limits should be strictly enforced to reduce unnecessary noise and dust; and • No dogs or cats other than those of the landowners should be allowed on site as these animals cause unnecessary disturbance such as chasing fauna.							
Impact to be addressed/ further investigated	No.						

5.3 Operational Phase Impacts

5.3.1 Impact 6: Direct faunal impacts due to operation

Direct mortality through road fatalities is a risk to many animal species, and particularly for the tortoise and snake populations on the site. The operational activities may lead to disturbance or persecution of fauna within or adjacent to the facilities. The impact can be reduced to acceptable levels following the implementation of mitigation measures.

Impact Phase: Operational							
Potential impact description: Disturbance, direct mortality through collision and illegal collecting or poaching of fauna.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	M	H	Negative	M	M	H
With Mitigation	L	M	M	Negative	L	L	H
Can the impact be reversed?	No.						
Will impact cause irreplaceable loss or resources?	Potentially. If rare or threatened species suffer direct mortality.						

Can impact be avoided, managed or mitigated?	Yes. The probability and intensity of this impact can be reduced through mitigation.
Mitigation measures to reduce residual risk or enhance opportunities: • All vehicles should adhere to a low speed limit (30km/h) to avoid collisions with susceptible species; • General maintenance should be conducted during the dry season where possible; • Speed limits must apply within the project site as well as on the public gravel access roads to the site; • Night driving must be avoided where possible; • Site access should be controlled and no unauthorised persons should be allowed onto the site; • All personnel should undergo an initial environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes or tortoises; • The illegal collection, hunting or harvesting of animals at the site should be strictly forbidden; and ll No animals such as dogs or cats to be allowed on site other than those of the landowners.	
Impact to be addressed/ further investigated	No.

5.3.2 Impact 7: Alien Plant Invasion

The clearing and disturbance of areas during the construction phase of the project can result in an increased and ongoing risk of invasion of alien plant species, particularly pioneer species, within the solar project development during the operational phase. Regular alien clearing activities would be required, particularly during the initial stages of the operational phase to limit the spread of alien species. Once the natural vegetation has re-established in previously disturbed areas then the level of alien control required would likely be reduced.

Impact Phase: Operational

Potential impact description: Clearing and disturbance from construction activities leaves areas along the power line route susceptible to invasion by alien plant species.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	L	M	H	Negative	M	M	H
With Mitigation	L	M	M	Negative	L	L	H

Can the impact be reversed?	Yes.
Will impact cause irreplaceable loss or resources?	No.
Can impact be avoided, managed or mitigated?	Yes.

Mitigation measures to reduce residual risk or enhance opportunities: • Disturbed areas such as road verges, lay-down areas and areas utilised by temporary construction facilities must be regularly monitored to detect the establishment of alien species and those species should be eradicated before they spread; • Regular alien clearing should be conducted, as needed, using the best-practice methods for the species concerned, the use of herbicides should be avoided as far as possible; and • The use of herbicides (if absolutely required) for the control and eradication of alien grasses should be done in accordance with the alien eradication programme in the EMPr to reduce unintended ecological impacts.

Impact to be addressed/ further investigated	No.

5.3.3 Impact 8: Soil Erosion Risk

The large amount of disturbance created during construction would leave the disturbed areas vulnerable to soil erosion. Consequently, specific measures such as erosion berms and water dispersion features will be required within the solar project development access roads and servitudes. Although this impact has a **MODERATE** significance before mitigation, it can be effectively mitigated against through the maximum use of existing access roads and servitudes and the implementation of erosion control measures.

Impact Phase: Operational							
Potential impact description: Following construction, the site will be vulnerable to soil erosion.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	H	M	Negative	M	H	H
With Mitigation	L	H	L	Negative	L	L	H
Can the impact be reversed?			No. Once erosion takes place some irreversible damage occurs.				
Will impact cause irreplaceable loss or resources?			Yes. Without mitigation the loss of topsoil would result in an irreversible loss of resources.				
Can impact be avoided, managed or mitigated?			Yes. Erosion control measures can be very effective.				
• Mitigation measures to reduce residual risk or enhance opportunities: • Erosion management at the site should take place according to the Erosion Management Plan and Rehabilitation Plan should be included in the EMPr; • All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate energy in the water stream which may pose an erosion risk;							
• Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance.							
Impact to be addressed/ further investigated			Yes. Existing servitude and access roads to be surveyed with problem areas identified for erosion restoration and additional erosion control.				

5.4.1 Cumulative Impacts

5.4.1.1 Impact 9: Impacts on Broad-Scale Ecological Processes

Multiple existing power lines traverse the broader area. As the proposed power lines considered in this assessment run adjacent to existing power lines for the large majority of their route the cumulative impact is considered to be lower than if they were following novel routes across undisturbed vegetation. Ecological corridors allow for the dispersal and movement of plants and animals across the landscape. This is a vital ecosystem process as it allows for pollination and gene flow. At the large scale the connectivity of the site is excellent. The proposed development would not have a significant impact on gene flow of flora or fauna. The use of existing access roads and servitudes, combined with the use of erosion control measures and the position of the switching station footprint on the plateau, means the proposed development is unlikely to significantly increase any negative impact on the De Aar Region SWSA or freshwater ecosystem priority areas. The cumulative impact on ecological processes such as moisture-, soil/sedimentation-, fire regimes and ecological corridors is considered to be of low significance if mitigation measures are adhered to.

Impact Phase: Cumulative							
Potential impact description: Disruption of dispersal and gene flow of flora and fauna across the landscape, disruption of moisture-, soil/sedimentation- and fire regimes.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	H	L	Negative	L	L	H
With Mitigation	L	H	L	Negative	L	L	H
Can the impact be reversed?	No.						
Will impact cause irreplaceable loss or resources?	No.						
Can impact be avoided, managed or mitigated?	Yes.						
Mitigation measures to reduce residual risk or enhance opportunities: • The various mitigation and management plans associated with the development should be followed and implemented effectively to reduce the cumulative contribution of the current development.							
Impact to be addressed/ further investigated	No.						

Impact Phase: Cumulative							
Potential impact description: Cumulative impact on CBAs and Conservation Objectives							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	H	L	Negative	L	L	H
With Mitigation	L	H	L	Negative	L	L	H
Can the impact be reversed?	No.						

Will impact cause irreplaceable loss or resources?	No.
Can impact be avoided, managed or mitigated?	Yes.
Mitigation measures to reduce residual risk or enhance opportunities: • The final position of new servitudes and pylons should be identified in the field through a reconstruction walk-through to microsite these features and avoid impact on sensitive species and habitats. • The various mitigation and management plans associated with the development should be followed and implemented effectively to reduce the cumulative contribution of the current development.	
Impact to be addressed/ further investigated	No.

5.4.2Impact Significance Rating System

The impact significance rating system used in this assessment follows Hacking (2001)[1]. The significance of the impacts associated with the significant aspects can be determined by considering the risk:

Significance of Environmental Impact (Risk) = Probability x Consequence

The consequence of impacts can be described by considering the severity, spatial extent and duration of the impact.

Table 3: Ranking the Duration and Spatial Scale of impacts

	Ranking Criteria		
	L	**M**	**H**
Duration	Quickly reversible Less than the project life Short-term	Reversible over time Life of the project Medium-term	Permanent Beyond closure Long-term
Spatial Scale	Localised	Fairly widespread Beyond site boundary Local	Widespread
	Within site boundary Site		Far beyond site boundary Regional/national

Table 4: Criteria for ranking the Severity of negative impacts on the bio-physical environment

Environment	Ranking Criteria		
	L-	**M-**	**H-**
Soils and land capability	Minor deterioration in land capability. Soil alteration resulting in a low negative impact on one of the other environments	Partial loss of land capability. Soil alteration resulting in a moderate negative impact on one of the other environments (e.g. ecology).	Complete loss of land capability. Soil alteration resulting in a high negative impact on one of the other environments (e.g. ecology).
Ecology (Plant and animal life)	Disturbance of areas that are degraded, have little conservation value or are unimportant to humans as a resource. Minor change in species variety or prevalence.	Disturbance of areas that have some conservation value or are of some potential use to humans. Complete change in species variety or	Disturbance of areas that are pristine, have conservation value or are an important resource to humans. Destruction of rare or endangered species.
Surface and Groundwater	Quality deterioration resulting in a low negative impact on one of the other environments (ecology, community health etc.)	Quality deterioration resulting in a moderate negative impact on one of the other environments (ecology, community health etc.).	Quality deterioration resulting in a high negative impact on one of the other environments (ecology, community health etc.).

Consequence of Impacts

Having ranked the severity, duration and spatial extent, the overall consequence of impacts can be determined using the following qualitative guidelines:

Table 3: Ranking the Consequence of an impact

SEVERITY = L					
DURATION	Long-term	**H**			**MODERATE**
	Medium-term	**M**	**LOW**		
	Short-term	**L**			
SEVERITY = M					
	Long-term	**H**			**HIGH**

DURATION	Medium-term	M		MODERATE	
	Short-term	L	LOW		
SEVERITY = H					
DURATION	Long-term	H			HIGH
	Medium-term	M	MODERATE		
	Short-term	L			
			L	M	H
			Localised Within site boundary	Fairly widespread Beyond site boundary Local	Widespread Far beyond site
			SPATIAL SCALE		

Significance of Impacts

Combining the consequence of the impact and the probability of occurrence, as shown by Table 6, provides the overall significance (risk) of impacts.

Table 4: Ranking the Overall Significance of impacts

PROBABILITY	Definite Continuous	H	MODERATE		HIGH
	Possible Frequent	M		MODERATE	
	Unlikely Seldom	L	LOW		MODERATE
			L	M	H
			CONSEQUENCE (from Table 3)		

The following points were considered when undertaking the assessment:

- Risks and impacts were sanalysed in the context of the project's area of influence encompassing:
  - Primary project site and related facilities that the client and its contractors develop or controls;
  - Areas potentially impacted by cumulative impacts for further planned development of the project, any existing project or condition and other project-related developments;
  - Areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location;
- Risks/ Impacts were assessed for all stages of the project cycle including:
  - Pre-construction;
  - Construction; and
  - Operation.

6. RESULTS

6.1 Floral Assessment

The fieldwork was conducted on the 12th of November 2022. The vegetation assessment was performed within the study area and the following map was produced (Figure 4) and the extent of vegetation was assessed. The area has been recorded from the quarter degree grid (2824BC) in which the study site is situated.

The floral species identified within the proposed site were listed in **Appendix 1** and the potential floral species supposed to be within the proposed site were listed in **Appendix 1a.**

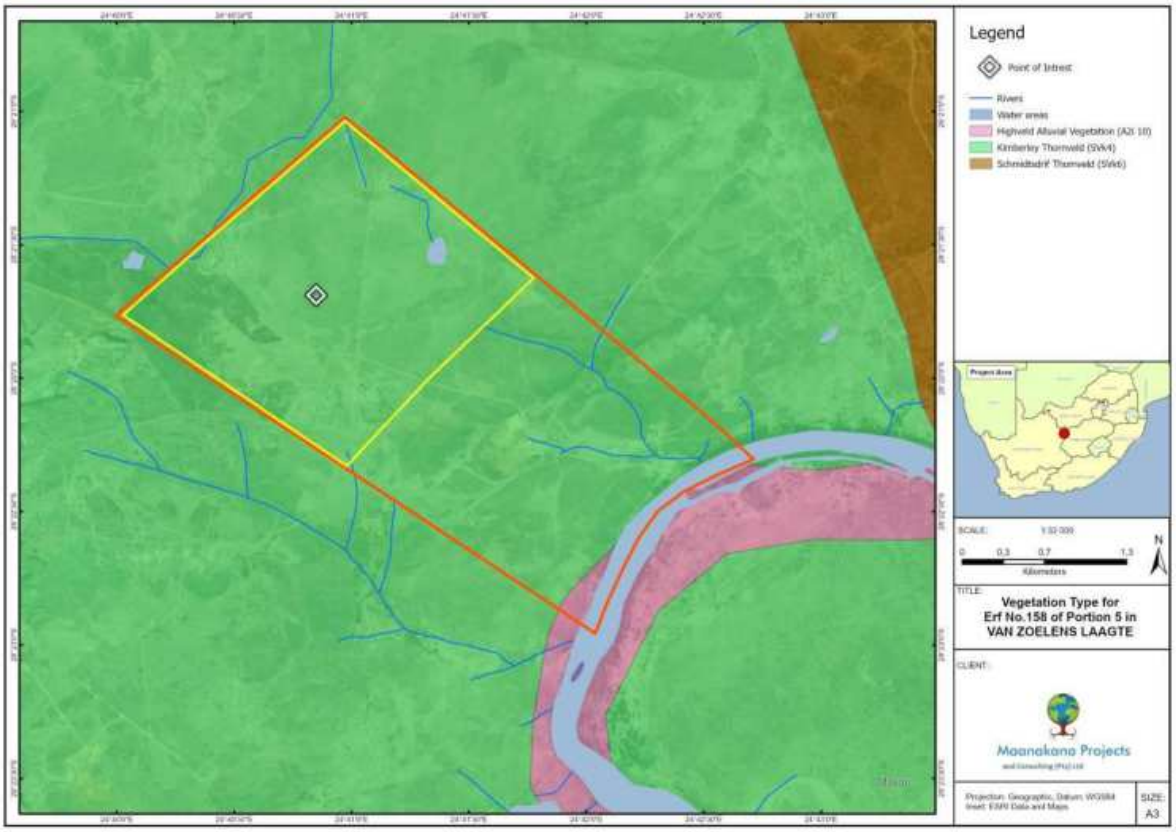

Figure 4 – Vegetation Map

6.1.1 Red data plant species

Red Lists and Red Data Books are scientific publications that document the conservation status of species. They are based on a system that categorizes species according to their risk of extinction. Red Lists are not in themselves legislation to protect species, but are used to inform of threatened species legislation. A review of the site by botanist indicates that the red listed plants were not recorded on the proposed site.

6.1.2 Protected Species

Protected species are species protected by international, national and provincial legislation. Hunting, picking, owning, importing, exporting, transporting, growing, breeding and trading of such species are illegal without valid permits or licenses. The largest part of the area is cover with the *Acacia mellifera (Senegalia mellifera)* (Black

thorn), the young trees are very palatable to livestock and should be protected during the first two years and there are also a large presence of Eragrostis racemose. The main vegetations on-site are indigenous. Indigenous species are protected species. However, the type of indigenous species on site does not require a license before removal. Among all the species identified onsite there are no protected plants species. All the plants on site are classified as being of **Least Concern (See Appendix 1)**. No special permits will be required to clear the area. However, during remediation, only indigenous plants should be used to recover, preferably similar to those that were removed.

6.1.3 Alien Invasive Plants Species (AIPs)

Invasion by destructive alien plant species erodes the natural capital of ecosystems, compromises their stability and is a growing problem in South Africa (Richardson and van Wilgen, 2004). Alien invasion within the proposed project was not much. The Invasive Aliens Plants Species identified within the proposed project site.

A management plan and monitoring programme is recommended to control these plants.
Alien species in South Africa are categorised according to the Alien and Invasive Species Lists, 2014 (GN R599 in GG 37886 of 1 August 2014) of the NEMBA (Act 10 of 2004).
The national list of invasive plant species listed in NEMBA represents the following categories:

- Category 1a: Species requiring compulsory control;
- Category 1b: Invasive species controlled by an invasive species management programme;
- Category 2: Invasive species controlled by area, and
- Category 3: Invasive species controlled by activity

Table 5. Invasive Alien Plants Species (IAPs) within the study area

Invasive Alien Plants Species		
Family Names	**Scientific Names**	**Category**
Solanaceae	*Datura ferox*	1b
Solanaceae	*Solanum mauritianum*	1b

6.2 FAUNAL ASSESSMENT

6.2.1 Avifauna

Avifauna most commonly refers to birds. A list of bird species that occur in the proposed project is presented in **Appendix 2.2.** However, a list of potential birds species were presented in **Appendix 4.1.**

6.2.2 Amphibians

The word **amphibian** means two-lives. Amphibians spend their lives in the water and on land. A list of amphibian's species that could be present in the proposed project is presented in **Appendix 4.2.**

6.2.3 Invertebrates

An invertebrate is an animal without a vertebral column. This group includes 95% of all animal species (Gregory, 2006). A list of invertebrate's species that occur in the proposed site is presented in **Appendix 2.1.** However the potential invertebrates that could be present within the proposed site were presented in **Appendix 4.3.**

6.2.4 Mammals

Mammals are the vertebrates within the class Mammalia. The only mammal has been identifie' onsite is Bos taurus. However, a list of potential mammals that could be on-site were presented in **Appendix 4.4.**

6.2.5 Reptiles

Reptiles are tetrapod animals in the class Reptilia, comprising today's turtles, crocodilians, snakes, amphisbaenas, lizards**,** tuatara, and their extinct relatives. A list of potential reptiles species that could be present in the proposed project is presented in Appendix **4.5.**

7. IMPACTS AND MITIGATION MEASURES

The purpose of this section is to discuss the potential impacts that will arise because of the proposed Ikomkhulu's Solar Plant project. It is surrounded by tall trees, small trees, lw shrubs, tall shrubs, succulent shrubs, graminoids, succulent herbs.

The earthworks, construction and operation of the facility will change habitats and the ecological environment, infiltration rates, amount of runoff, therefore, the hydrological regime of the site. This impact evaluation will assess and rate the extent, magnitude, duration and significance of each potential impact together with possible mitigation measures.

7.1 Impact Assessment Criteria

7.1.1 Extent of the Impact

Items	Extent of the Impact
Study site	1
Local study area	2
Regional	3
National	4
International	5

7.1.2 Duration of the impact

Short term: the impact will disappear with mitigation or will be mitigated through a natural process in a period shorter than that of the construction phase – 1;

Short to Medium term: the impact will be relevant to the end of a construction phase – 2;

Medium term: the impact will last up to the end of the development phases, whereafter it will be entirely negated – 3;

Long term: the impact will continue or last for the entire operational lifetime of the development but will be mitigated by direct human action or by natural processes thereafter – 4; and

Permanent: environmental ceases to exist - 5

7.1.3 Intensity

This indicates the degree to which the impact changes or could change the conditions or quality of the environment.

None – 2;

Low: the impact alters the affected environment in such a way that the natural processes or functions are not affected – 4;

Medium: the affected environment is altered, but functions and processes continue, albeit in a modified way – 6;

High: function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases- 8; and

Very high: the process will cease – 10

7.1.4 Probability of Occurrence

This describes the probability of the impact occurring. This is rated as:

Improbable: chances of this impact are 0 – 1;

Improbable: low likelihood - the chance of this impact occurring is between 0 and 25%. However, mitigation measures might be needed in the event of this impact occurring – 2;

Probable: a distinct possibility - the chance of this impact occurring is approximately 50% and therefore it needs to be mitigated – 3;

Highly probable: the impact is most likely to occur and the planning phase must address the relevant mitigation measures to limit the impact – 4; and

Definite: this impact will occur regardless of any prevention measures, or is currently occurring. Mitigation measures or contingency plans must be implemented to contain the impact – 5.

7.1.5 Significance mitigation measures

Without mitigation measures (WOMM):

0 – 33	Low: the impact is of little importance, but may require some mitigation.
34 – 66	Medium: the impact is of importance and is therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.
67 - 100	High: the impact is of major importance and mitigation is essential. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable.

Significance with mitigation measures (WMM):

0 – 33	Low: the impact will be mitigated to the point where it is of limited importance.
34 – 66	Medium: despite the successful implementation of the mitigation measures that reduce the negative impacts to acceptable levels, the negative impact remains significant. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw.
67 - 100	High: The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance after mitigation could render the entire development option or entire project proposal unacceptable.

7.2 Identified Impacts and mitigation measures

7.2.1 The Introduction of Alien invasive species

Construction Phase

Impacts

Introduction and spread of alien invasive vegetation due to both opportunistic invasions after disturbance and the introduction of seed on vehicles.

Ratings

	Without mitigation	**With mitigation**
Extent	Local – 2	Study Site – 1
Duration	Medium – 3	Short – 1
Intensity	High – 8	Medium - 6
Probability	Highly Probable – 4	Probable - 3
Status	Negative	Negative
Significance	Medium – 52	Low - 24

Mitigation Measures

- Weed control;
- Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area and returning it where possible afterwards;
- Rehabilitate or re-vegetate the remaining open space; and
- Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to be established.

Operational Phase

Impacts

Loss of vegetation due to the disturbance of the area within the proposed site.

Ratings

	Without mitigation	**With mitigation**
Extent	Local – 2	Study Site – 1
Duration	Long term – 4	Short to Med – 2
Intensity	Low – 4	None – 2
Probability	Probable – 3	Low Likelihood - 2
Status	Negative	Negative
Significance	Low – 30	Low - 10

Mitigation Measures

- Prohibit the planting of plants species without the approval of a qualified and registered Ecological Specialist.

7.2.2 Loss of Vegetation

Construction Phase

Nature of Impact

Removal of vegetation as part of creating a footprint for any development within the study area.

Ratings

	Without mitigation	**With mitigation**
Probability	Definite – 5	Definite- 5
Duration	Long – 4	Short - 1
Intensity	High- 8	Medium – 6

Extent	Regional – 4	Local – 3
Status	Negative	Negative
Significance	High – 75	Medium - 66

Mitigation Measures

- ECO should supervise the relocation of plants where possible;
- Prior to the construction phase, the crew must be briefed on:
  - ✓ The importance of biodiversity;
  - ✓ They must know what alien invasive species are and which ones occur on site;
  - ✓ They must also be aware of potentially threatening faunal species and the reporting procedure when these are detected (e.g. Snakes);
- The Environmental Control Officer (ECO) must be trained in snake awareness and have the contact details of snake handlers within the area should one be required to remove snakes off the construction site;
- The development footprint should be clearly demarcated to ensure that the area of disturbance is minimised. The demarcations must be maintained in position until the cessation of construction works;
- Minimise the road network by utilising existing roads where possible, minimise the frequency of driving within the buffer zone, utilise only light equipment for access and deliveries into areas of unstable soils, in areas where erosion is evident;
- Topsoil, where available, should be conserved and used to re-landscape all disturbed areas if necessary;
- Re-vegetate with indigenous plants only;
- A temporary fence or demarcation must be erected around the construction area (include the servitude, construction camps, areas where material is stored and the actual footprint of the development);
- Prohibit vehicular or pedestrian access into natural areas beyond the demarcated boundary of the construction area;
- No open fires are permitted within naturally vegetated areas;
- A vegetation rehabilitation plan should be implemented. Grassland can be removed as sods and stored within transformed vegetation – remove alien invasive vegetation prior to storing grassland sods in transformed areas. The sods must preferably be removed during the winter months and be replanted at the latest by springtime. The sods should not be stacked on top of each other. Once construction is completed, these sods should be used to cover the areas where it is necessary. In the absence of timely rainfall, the sods should be watered well after planting and at least twice more over the next 2 weeks;
- Construction workers may not remove flora and neither may anyone collect seed from the plants without permission from the local authority;

- No activities should take place on rainy days and at least 2 days afterwards

Operational Phase

Nature of Impact

Illegal harvesting of Plant species

Rating

	Without mitigation	**With mitigation**
Probability	Improbable – 2	Improbable – 1
Duration	Long Term – 4	Short – 2
Intensity	Low – 2	None – 1
Extent	Study Site – 1	Study Site – 1
Status	Negative	Negative
Significance	Low – 14	Low - 4

Mitigation Measures

Prohibit the random harvesting of plant species on site

7.2.3 Noise and Artificial Lighting Impact

Construction Phase

Nature of Impact

Increased noise during construction is likely to chase away fauna from within the study site if any, and surroundings. Numerous species will be attracted towards the light sources and this will result in the disruption of natural cycles, such as the reproductive cycle and foraging behaviour.

Rating

	Without mitigation	With mitigation
Probability	Highly Probable - 4	Probable – 3
Duration	Long term – 4	Long term – 4
Intensity	Low – 2	None – 0
Extent	Local – 2	Study site – 1
Status	Negative	Negative
Significance	Low – 32	Low - 15

Mitigation Measures

- Ensure noise levels are not more than 80 decibels;
- A large part of the noise emitted is due to engine air intake and exhaust cycle. Specifying the use of adequate muffler systems can control much of this engine noise;
- Construction should be restricted to daytime hours;
- It may be appropriate to require contractors to participate in training programs related to project-specific noise requirements, specifications, and/or equipment operations. This may include awareness on the need to limit movement from the proposed site;
- ECO to monitor noise levels regularly and ensure noise is within acceptable levels always.
- Where lighting is required for safety or security reasons, this should be targeted at the areas requiring attention.
- Yellow sodium lights should be prescribed as they do not attract invertebrates at night and will not disturb the existing wildlife. Sodium lamps require a third less energy than conventional light bulbs.

Operational

Nature of Impact

Increased light will attract species to the area

Rating

	Without mitigation	**With mitigation**
Probability	Improbable – 1	Improbable – 0
Duration	Long term – 4	Long term – 4
Intensity	None – 2	None – 2
Extent	Study site – 1	Study Site - 1
Status	Negative	Negative
Significance	Low – 7	Low – 7

Mitigation Measures

- Where lighting is required for safety or security reasons, this should be targeted at the areas requiring attention.
- Yellow sodium lights should be prescribed as they do not attract invertebrates at night. sodium lamps require a third less energy than conventional light bulbs.

7.2.4 Dust Management

Construction Phase

Nature of Impact

Most of the plant communities are affected by dust deposition so that community structure is altered.

Rating

	Without mitigation	With mitigation
Probability	Probable- 3	Low likelihood – 2
Duration	Long term – 4	Long term – 4
Intensity	Medium – 3	Low – 2
Extent	Local – 2	Study site – 1
Status	Negative	Negative
Significance	Low – 27	Low - 14

Mitigation Measures

Adequate dust control strategies should be applied to minimise dust emissions to a level where minimal impact on surrounding habitats can be expected; for example:

- Periodic spraying of roads with water or dust inhibitors;
- Cover trucks to prevent dust emission during transportation; and
- Construction vehicles transporting materials to and from the construction site must be covered to reduce the formation of dust.

Operational Phase

Nature of Impact

Increased dust from vehicular movement

Rating

	Without mitigation	With mitigation
Probability	Low likelihood – 2	Low likelihood – 2
Duration	Long term – 4	Long term – 4
Intensity	Low – 2	Low – 2
Extent	Study Site – 1	Study Site – 1
Status	Negative	Negative
Significance	Low – 14	Low - 14

Mitigation Measures

Only authorised and expanded routes should be used at all times.

8. RECOMMENDATIONS

Recommendations were developed to address and mitigate impacts associated with the proposed development. These recommendations also include general management measures which apply to the proposed development. Mitigation measures have been developed to address issues in all phases throughout the course of the operation from planning, through construction, operation and closure, to the after-care and maintenance.

8.1 Construction and operational footprint

- Limit the footprint area of the construction activities to what is essential to minimise environmental damage. Construction vehicles must use existing roads where possible;
- All informal fires near operations and new construction areas should be prohibited.
- The vegetation clearance during the operational phase will be limited only on the foot print area of the construction activities;
- Edge effects of all construction and operational activities, such as erosion and alien plant species proliferation, which may affect faunal habitat, need to be strictly managed in all areas of increased ecological sensitivity;
- Keep all sensitive demarcated zones outside of the construction area off-limits during the construction and rehabilitation phases of the development; and
- Appropriate sanitary facilities must be provided during the construction phase and all waste removed to an appropriate waste facility.

8.2 Vehicle access and speed management

- All construction footprint areas should remain as small as possible and should not encroach onto surrounding more sensitive areas. It must be ensured that these areas are off-limits to construction vehicles and personnel as much as possible;
- In the event of a breakdown, maintenance of vehicles must take place with care and the recollection of spillage should be practiced near the surface area to prevent ingress of hydrocarbons into the topsoil;
- It must be ensured that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. All vehicles must be regularly inspected for leaks. Re-fueling must take place on a sealed surface area to prevent ingress of hydrocarbons into the topsoil; and
- All spills should be immediately cleaned up and treated accordingly.
- A speed restriction of 30 km/h should be placed on all construction vehicles within the project area;
- Drivers should receive regular training and awareness of the need for speed control and the enforcing a maximum speed limit of 30 km/h on all the roads within the construction area;
- Driving at night should be strictly controlled and only allowed where urgent and sauthorised by senior management staff; there should also be a written record of all staff driving at night;

8.3 Alien plant species

- Proliferation of alien and invasive species is expected within any disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the linear development. Alien plant seed dispersal within the top layers of the soil within footprint areas must be controlled as it will have an impact on future rehabilitation;
- Removal of the alien and weed species encountered within the sites must take place to comply with existing legislation (amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998). Removal of species should take place throughout the construction, operational, and rehabilitation/ maintenance phases;
- Species specific and area specific eradication recommendations:
    - Care should be taken with the choice of an appropriate method such as mechanical method to use for the removal of alien species;
    - Footprint areas should be kept as small as possible when removing alien plant species; and
    - No vehicles should be allowed to drive through designated sensitive areas during the eradication of alien and weed species.

8.4 Soils

- All soils excavated and compacted during the operational phase will be taken care to avoid erosion. Special attention should be paid to alien and invasive control within these areas. Alien and invasive vegetation control should take place throughout the life span of the project; and
- Monitor all systems for erosion and incision.

8.5 Remediation

- Upon remediation, re-seeding of indigenous grasses should be implemented in all impacted areas and strategic planting of grassland species should take place;
- As much as vegetation growth possibly should be promoted surrounding the new development in order to protect soils. In this regard, special mention is made of the need to use indigenous vegetation species where seeding and rehabilitation planting (where applicable) are to be implemented.

9. CONCLUSION

The low overall footprint of the development near the ESAs and CBAs of the proposed site, will not going to be affected by the development because it would not compromise the ecological functioning or the long-term conservation value of the area. The vegetation types found onsite it is reflecting the transformation through animals grazing, the species and habitats found within them are therefore fairly widespread and not unique to the project site. The impact of the proposed project is considered to be low and acceptable following mitigation.

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APPENDIX 1: SAMPLES OF FLORAL SPECIES

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>Acacia mellifera (Black thorn)</td><td>Vegetation type: Kimberley Thornveld (SVk 4)</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Acacia tortilis</td><td>Eragrostis racemosa</td></tr>
</table>

Aloe vera

APPENDIX 2: FAUNAL SPECIES STATUS

APPENDIX 2.1: INVERTEBRATES

Fig. 2.1.1 *Danaus chrysippus*

Fig. 2.1.2. Gaudy grasshoppers (Green Milkweed locust)

Fig. 2.1.3 *Truxaloides braziliensis*

Fig. 2.1.4 *Colotis euippe*

APPENDIX 2.2: AVIFAUNA SPECIES

Speckled pigeon (*Columba guinea*)

Greater Sand Plover (Charadrius leschenaultii)

APPENDIX 2.3. Mammals

Domesticated cows (*Bos taurus*)

APPENDIX 3: FLORAL SPECIES

APPENDIX 3.1 POTENTIAL FLORAL SPECIES

This list was compiled by extracting a list of species from http://newposa.sanbi.org/ accessed on the 29th of November 2022.

Family	Species	Family	Species	Family	Species
Acanthaceae	*Barleria rigida*	*Colchicaceae*	*Ornithoglossum vulgare*		*Eragrostis*
	Dicliptera clinopodia	*Commelinaceae*	*Commelina africana*		*Eragrostis bicolor*
Aizoaceae	*Galenia pubescens*	*Crassulaceae*	*Tylecodon ventricosus*		*Eragrostis*
	Delosperma sp.		*Crassula corallina*		*Eragrostis curvula*
	Chasmatophyllum		*Adromischus*		*Eragrostis*
	Galenia sarcophylla	*Cucurbitaceae*	*Cucumis africanus*		*Eragrostis*
	Galenia secunda		*Cucumis heptadactylus*		*Eragrostis*
	Mesembryanthemum		*Cucumis myriocarpus*		*Eragrostis*
	Oscularia deltoides	*Cyperaceae*	*Bulbostylis humilis*		*Eragrostis obtusa*
	Ruschia sp.		*Cyperus congestus*		*Eragrostis*
	Tetragonia fruticosa		*Cyperus marginatus*		*Eragrostis*
Amaranthaceae	*Atriplex vestita*	*Dryopteridacea*	*Arachniodes webbiana*		*Eragrostis tef*
	Bassia salsoloides	*Ebenaceae*	*Euclea crispa*		*Eragrostis*
	Salsola calluna	*Euphorbiaceae*	*Euphorbia arida*	*Poaceae*	*Festuca costata*
	Salsola dealata		*Euphorbia flanaganii*		*Fingerhuthia*
	Salsola glabrescens		*Euphorbia juttae*		*Heteropogon*
	Salsola humifusa		*Amphithalea muraltioides*		*Hyparrhenia hirta*
Amaryllidaceae	*Brunsvigia radulosa*		*Argyrolobium sp.*		*Leptochloa fusca*
	Cyrtanthus huttonii		*Calobota spinescens*		*Melica decumbens*
Anacardiaceae	*Searsia ciliata*		*Cullen tomentosum*		*Melinis repens*
Apiaceae	*Apium graveolens*		*Indigastrum niveum*		*Oropetium*
Apocynaceae	*Asclepias gibba*	*Fabaceae*	*Indigofera alternans*		*Panicum*
	Brachystelma rubellum		*Indigofera hedyantha*		*Panicum*
	Ceropegia multiflora		*Leobordea platycarpa*		*Panicum sp.*
	Gomphocarpus		*Lessertia annularis*		*Panicum*
	Microloma armatum		*Lotononis laxa*		*Pennisetum*
	Pachypodium		*Lotononis pungens*		*Pentameris*
	Stapelia grandiflora		*Medicago sativa*		*Pentameris*
	Stenostelma		*Melolobium calycinum*		*Puccinellia*
Asparagaceae	*Asparagus striatus*		*Melolobium candicans*		*Puccinellia distans*
	Asparagus suaveolens		*Rhynchosia adenodes*		*Setaria*
Asphodelaceae	*Bulbine frutescens*	*Funariaceae*	*Goniomitrium africanum*		*Sorghum*

Family	Species	Family	Species	Family	Species
	Osteospermum		*Hibiscus pusillus*	*Ricciaceae*	*Riccia albornata*
	Osteospermum		*Malva parviflora*		*Riccia nigrella*
	Osteospermum		*Radyera urens*	*Rubiaceae*	*Nenax microphylla*
	Othonna pavonia	*Melianthaceae*	*Melianthus comosus*	*Ruscaceae*	*Sansevieria aethiopica*
	Pegolettia retrofracta		*Melianthus dregeanus*	*Santalaceae*	*Osyris lanceolata*
	Pentzia calcarea		*Disa pulchra*		*Thesium congestum*
	Pentzia elegans	*Orchidaceae*	*Orthochilus foliosus*	*Sapindaceae*	*Allophylus decipiens*
	Pentzia globosa		*Satyrium longicauda*		*Aptosimum*
	Pentzia incana		*Satyrium*		*Aptosimum spinescens*
	Pentzia lanata	*Oxalidaceae*	*Oxalis depressa*		*Chaenostoma*
	Pentzia quinquefida	*Pedaliaceae*	*Pterodiscus luridus*		*Chaenostoma*
	Pentzia sp.		*Sesamum capense*		*Hebenstretia dura*
	Pentzia spinescens	*Peraceae*	*Clutia thunbergii*		*Jamesbrittenia*
	Phymaspermum	*Phyllanthacea*	*Phyllanthus*		*Jamesbrittenia filicaulis*
	Phymaspermum	*Pittosporacea*	*Pittosporum viridiflorum*		*Limosella africana*
	Printzia huttoni	*Plantaginacea*	*Plantago major*	*Scrophulariaceae*	*Limosella sp.*
	Pteronia erythrochaeta		*Alloteropsis semialata*		*Manulea fragrans*
	Pteronia glauca		*Aristida adscensionis*		*Nemesia linearis*
	Pteronia glaucescens		*Aristida congesta*		*Nemesia sp.*
	Pteronia sordida		*Aristida congesta*		*Peliostomum*
	Schistostephium		*Aristida diffusa*		*Peliostomum*
	Senecio isatideus		*Aristida diffusa*		*Selago albida*
	Senecio leptophyllus		*Aristida vestita*		*Selago geniculata*
	Senecio niveus		*Brachiaria eruciformis*		*Selago paniculata*
	Heliotropium ciliatum	*Poaceae*	*Cenchrus ciliaris*		*Selago saxatilis*
Boraginaceae	*Heliotropium*		*Chloris virgata*		*Zaluzianskya karrooica*
	Heliotropium lineare		*Cymbopogon pospischilii*		*Lycium horridum*
	Lithospermum		*Cynodon incompletus*	*Solanaceae*	*Lycium pumilum*
	Erucastrum strigosum		*Cynodon polevansii*		*Solanum humile*
Brassicaceae	*Heliophila minima*		*Digitaria eriantha*		*Solanum retroflexum*
	Rorippa fluviatilis		*Digitaria sp.*	*Tecophilaeac*	*Cyanella lutea*
Bryaceae	*Bryum argenteum*		*Elionurus muticus*	*Thymelaeace*	*Lasiosiphon*
	Bryum sp.		*Enneapogon desvauxii*	*Verbenaceae*	*Chascanum*
Campanulace	*Wahlenbergia nodosa*		*Enneapogon scaber*		*Roepera*
Caryophyllac	*Dianthus micropetalus*		*Enneapogon scoparius*	*Zygophyllace*	*Tetraena microcarpa*
eae	*Spergularia bocconei*		*Eragrostis barrelieri*	*ae*	*Tribulus terrestris*
Colchicaceae	Colchicum asteroides				

APPENDIX 3.2: Potential protected flora species

Potential protected floral species that have been recorded by the Northern Cape Conservation Act.

Family	Species	Family	Species
Aizoaceae	*Chasmatophyllum maninum*	*Fabaceae*	*Lessertia annularis*
	Delosperma sp.		*Pelargonium aestivale*
	Galenia pubescens	*Geraniaceae*	*Pelargonium althaeoides*
	Galenia sarcophylla		*Pelargonium pseudofumarioides*
	Galenia secunda		*Pelargonium tragacanthoides*
	Mesembryanthemum coriarium	*Hyacinthaceae*	*Daubenya comata*
	Oscularia deltoides		*Lachenalia ensifolia*
	Ruschia sp.		*Ornithogalum nanodes*
	Tetragonia fruticosa		*Gladiolus dalenii*
Amaryllidaceae	*Brunsvigia radulosa*	*Iridaceae*	*Gladiolus ecklonii*
	Cyrtanthus huttonii		*Gladiolus permeabilis*
Apiaceae	*Apium graveolens*		*Moraea falcifolia*
	Asclepias gibba		*Moraea pallida*
	Brachystelma rubellum		*Syringodea concolor*
	Ceropegia multiflora	*Orchidaceae*	*Disa pulchra*
	Gomphocarpus fruticosus		*Orthochilus foliosus*
Apocynaceae	*Microloma armatum*		*Satyrium longicauda*
	Pachypodium succulentum		*Satyrium membranaceum*
	Stapelia grandiflora	*Oxalidaceae*	*Oxalis depressa*
	Stenostelma eustegioides	*Scrophulariaceae*	*Jamesbrittenia aurantiaca*
Caryophyllaceae	*Dianthus micropetalus*		*Jamesbrittenia filicaulis*
	Adromischus caryophyllaceus		*Manulea fragrans*
Crassulaceae	*Crassula corallina*		*Nemesia linearis*
	Tylecodon ventricosus	*Tecophilaeaceae*	*Cyanella lutea*
	Euphorbia arida		
Euphorbiaceae	*Euphorbia flanaganii*		
	Euphorbia juttae		

APPENDIX 4: POTENTIAL FAUNAL SPECIES

APPENDIX 4.1: POTENTIAL AVIFAUNA SPECIES

Common name	Scientific name	Status
Long-tailed Widowbird	*Euplectes progne*	LC
Laughing Dove	*Streptopelia senegalensis*	LC
Blacksmith Lapwing	*Vanellus armatus*	LC
Southern Red Bishop	*Euplectes orix*	LC
Hadeda Ibis	*Bostrychia hagedash*	LC
Southern Masked-Weaver	*Ploceus velatus*	LC
Common Fisca	*Lanius collaris*	LC
Egyptian Goose	*Alopochen aegyptiacus*	LC
Yellow-billed Duck	*Anas undulata*	LC
Cape Sparrow	*Passer melanurus*	LC
Cape Longclaw	*Macronyx capensis*	LC
African Stonechat	*Saxicola torquatus*	LC
Red-knobbed Coot	*Fulica cristata*	LC

Cape Turtle-Dove	*Streptopelia capicola*	LC
Swainson's Spurfow	*Pternistis swainsonii*	LC
Black-headed Heron	*Ardea melanocephala*	LC
Black-shouldered Kite	*Elanus caeruleus*	LC
African Pipit	*Anthus cinnamomeus*	LC
Helmeted Guineafowl	*Numida meleagris*	LC
South African Cliff-Swallow	*Hirundo spilodera*	LC
Reed Cormorant	*Phalacrocorax africanus*	LC
Yellow-crowned Bishop	*Euplectes afer*	LC
Cattle Egret	*Bubulcus ibis*	LC
Speckled Pigeon	*Columba guinea*	LC
Spur-winged Goose	*Plectropterus gambensis*	LC
Little Grebe	*Tachybaptus ruficollis*	LC
Greater Striped Swallow	*Hirundo cucullata*	LC
Levaillant's Cisticola	*Cisticola tinniens*	LC
Red-billed Quelea	*Quelea quelea*	LC
African Sacred Ibis	*Threskiornis aethiopicus*	LC
Barn Swallow	*Hirundo rustica*	LC
Black-throated Canary	*Crithagra atrogularis*	LC
Red-capped Lark	*Calandrella cinerea*	LC
Cape Wagtail	*Motacilla capensis*	LC
Common Myna	*Acridotheres tristis*	LC
White-rumped Swift	*Apus caffer*	LC
Zitting Cisticola	*Cisticola juncidis*	LC
Red-eyed Dove	*Streptopelia semitorquata*	LC
Fan-tailed Widowbird	*Euplectes axillaris*	LC
White-throated Swallow	*Hirundo albigularis*	LC
Common Moorhen	*Gallinula chloropus*	LC
African Spoonbill	*Platalea alba*	LC
Pin-tailed Whydah	*Vidua macroura*	LC
Amur Falcon	*Falco amurensis*	LC
Red-billed Teal	*Anas erythrorhyncha*	LC
House Sparrow	*Passer domesticus*	LC
Glossy Ibis	*Plegadis falcinellus*	LC
Crowned Lapwing	*Vanellus coronatus*	LC

Spotted Thick-knee	*Burhinus capensis*	LC
Common Waxbill	*Estrilda astrild*	LC
Common Quail	*Coturnix coturnix*	LC
Grey Heron	*Ardea cinerea*	LC
White-winged Widowbird	*Euplectes albonotatus*	LC
Little Swift	*Apus affinis*	LC
Three-banded Plover	*Charadrius tricollaris*	LC
Speckled Mousebird	*Colius striatus*	LC
Rock Dove	*Columba livia*	LC
Pink-billed Lark	*Spizocorys conirostris*	LC
Southern Pochard	*Netta erythrophthalma*	LC
Southern Grey-headed Sparrow	*Passer diffusus*	LC
Yellow-billed Egret	*Egretta intermedia*	LC
African Quailfinch	*Ortygospiza atricollis*	LC
Cape Shoveler	*Anas smithii*	LC
Cape Robin-Chat	*Cossypha caffra*	LC
African Darter	*Anhinga rufa*	LC
Little Egret	*Egretta garzetta*	LC
Blue Korhaan	*Eupodotis caerulescens*	NT
Whiskered Tern	*Chlidonias hybrida*	LC
Brown-throated Martin	*Riparia paludicola*	LC
Common Greenshank	*Tringa nebularia*	LC
Pied Crow	*Corvus albus*	LC
Wood Sandpiper	*Tringa glareola*	LC
Black-winged Stilt	*Himantopus himantopus*	LC
Ruff Ruff	*Philomachus pugnax*	LC
Black-chested Prinia	*Prinia flavicans*	LC
Cloud Cisticola	*Cisticola textrix*	LC
Yellow Canary	*Crithagra flaviventris*	LC
White-faced Duck	*Dendrocygna viduata*	LC
Lesser Swamp-Warbler	*Acrocephalus gracilirostris*	LC
Cape Crow	*Corvus capensis*	LC
White-breasted Cormorant	*Phalacrocorax carbo*	LC
Diderick Cuckoo	*Chrysococcyx caprius*	LC
African Snipe	*Gallinago nigripennis*	LC

Greater Kestre	*Falco rupicoloides*	LC
Common Sandpiper	*Actitis hypoleucos*	LC
Karoo Thrush	*Turdus smithi*	LC
African Palm-Swift	*Cypsiurus parvus*	LC
Black-crowned Night-Heron	*Nycticorax nycticorax*	LC
African Black Duck	*Anas sparsa*	LC
Pale-crowned Cisticola	*Cisticola cinnamomeus*	LC
Red-headed Finch	*Amadina erythrocephala*	LC
Greater Flamingo	*Phoenicopterus ruber*	NT
Grey-winged Francolin	*Scleroptila africanus*	LC
Hamerkop Hamerkop	*Scopus umbretta*	LC
Yellow-fronted Canary	*Crithagra mozambicus*	LC
Pallid Harrier	*Circus macrourus*	NT
Maccoa Duck	*Oxyura maccoa*	LC
Secretarybird Secretarybird	*Sagittarius serpentarius*	NT
Red-footed Falcon	*Falco vespertinus*	LC
Mountain Wheatear	*Oenanthe monticola*	LC
Black-winged Pratincole	*Glareola nordmanni*	NT
Lesser Grey Shrike	*Lanius minor*	LC

APPENDIX 4.2 POTENTIAL AMPHIBIANS SPECIES

Family	Scientific Name	Common Name	Data Source	Status
Brevicepitidae	*Breviceps adspersus*	Bushveld Rain Frog	FrogMAP, GBIF	LC
Bufonidae	*Poyntonophrynus*	Southern Pygmy Toad	FrogMAP	LC
	Vandijkophrynus	Karoo Toad	FrogMAP, GBIF	LC
	Amietophrynus	Marbled Toad	GBIF	LC
	Amietophrynus rangeri	Raucous Toad	GBIF	LC
Hyperoliidae	*Kassina senegalensis*	Bubbling Kassina	FrogMAP, GBIF	LC
Pipidae	*Xenopus laevis*	African Clawed Frog	GBIF	LC
Pyxicephalidae	*Amietia fuscigula*	Cape River Frog	FrogMAP	LC
	Cacosternum boettgeri	Common Caco	FrogMAP, GBIF	LC
	Pyxicephalus	Giant Bull Frog	FrogMAP	NT
	Tomopterna tandyi	Tandy's Sand Frog	FrogMAP, GBIF	LC
	Strongylopus grayii	Gray's Grass Frog	GBIF	LC
	Tomopterna cryptotis	Striped Pyxie	GBIF	LC

APPENDIX 4.3 POTENTIAL INVERTEBRATES SPECIES

Family	Scientific Name	Common Name	Data Source	Status
Carabidae	*Anthia thoracica*	Gewone Oogpister	GBIF	NE
	Pseudagrion newtoni	Harlequin Sprite	GBIF	VU
	Africallagma glaucum	Swamp Bluet	OdonataMAP	LC
	Africallagma	Sapphire Bluet	GBIF	LC
	Pseudagrion caffrum	Springwater Sprite	GBIF	LC
Coenagrionidae	*Pseudagrion vaalense*	Vaal Sprite	GBIF	LC
	Pseudagrion citricola	Yellow-Faced Sprite	GBIF	LC
Crambidae	*Loxostege frustalis*		LepiMAP, GBIF	NE
Ctenizidae	*Stasimopus unispinosus*		GBIF	NE
Cyrtaucheniidae	*Ancylotrypa pusilla*		GBIF	NE
Daesiidae	*Biton schreineri*		GBIF	NE
Eupterotidae	*Rhabdosia vaninia*		LepiMAP	NE
	Drassodes tesselatus		GBIF	NE
	Theuma schreineri		GBIF	NE
Gnaphosidae	*Zelotes fuligineus*		GBIF	NE
	Zelotes invidus		GBIF	NE
	Notogomphus	Yellowjack Longlegs	GBIF	LC
Gomphidae	*Ceratogomphus pictus*	Common Thorntail	GBIF	LC
	Spialia sataspes	Boland sandman	LepiMAP	LC
	Spialia agylla	Grassveld Sandman	GBIF	LC
	Metisella malgacha	Grassveld Sylph	GBIF	LC
	Kedestes lepenula	Chequered Ranger	GBIF	LC
	Kedestes barberae	Freckled Ranger	GBIF	LC
	Gomalia elma	Green-marbled Skipper	GBIF	LC
	Eretis umbra	Small Marbled Elf	GBIF	LC
	Spialia spio	Mountain Sandman	GBIF	LC
	Spialia nanus	Dwarf Sandman	GBIF	LC
Hesperiidae	*Spialia mafa*	Mafa Sandman	GBIF	LC
	Spialia diomus	Common Sandman	GBIF	LC
	Spialia asterodia	Star Sandman	GBIF	LC
	Galeosoma schreineri		GBIF	NE
	Gorgyrella schreineri		GBIF	NE
	Crocothemis erythraea	Broad Scarlet	OdonataMAP	LC
	Sympetrum	Red-veined Darter or	OdonataMAP	LC
Libellulidae	*Trithemis arteriosa*	Red-veined Dropwing	OdonataMAP	LC
	Acisoma panorpoides	Grizzled Pintail	GBIF	LC
Liocranidae	*Rhaeboctesis*		GBIF	NE
	Argyraspodes	Warrior silver-spotted	LepiMAP, GBIF	LC
	Chrysoritis chrysaor	Burnished opal	LepiMAP, GBIF	LC
	Tylopaedia sardonyx	King Copper	GBIF	LC
	Trimenia macmasteri	McMaster's Silver-	GBIF	LC
	Trimenia argyroplaga	Large Silver-spotted	GBIF	LC
	Thestor protumnus	Boland Skolly	GBIF	LC
	Thestor basutus	Basuto Skolly	GBIF	LC
	Oraidium barberae	Dwarf Blue	GBIF	LC
	Lycaena clarki	Eastern Sorrel Copper	GBIF	LC
	Leptotes brevidentatus	Short-toothed Zebra	GBIF	LC
Lycaenidae	*Lepidochrysops patricia*		GBIF	LC
	Lepidochrysops ortygia	Koppie Blue	GBIF	LC

	Lepidochrysops letsea	Free State Blue	GBIF	LC
	Iolaus bowkeri		GBIF	LC

APPENDIX 4.4 POTENTIAL MAMMALS

Family	Scientific Name	Common Name	Data	Status	Liklihood
Bathyergidae	*Cryptomys*	African Mole Rat	GBIF	LC	High
	Redunca fulvorufula	Southern Mountain	GBIF	EN	High
	Syncerus caffer	African Buffalo	GBIF	LC	Low
	Pelea capreolus	Grey Rhebok	GBIF	NT	High
	Oryx gazella	Gemsbok	MammalMAP	LC	Low
	Raphicerus	Steenbok	MammalMAP	LC	High
	Antidorcas	Springbok	GBIF	LC	Low
	Tragelaphus	Greater Kudu	GBIF	LC	High
	Sylvicapra grimmia	Common Duiker	GBIF	LC	High
Bovidae	*Alcelaphus*	Bubal Hartebeest	GBIF	LC	Low
	Damaliscus	Bontebok	GBIF	LC	Low
	Connochaetes gnou	Black Wildebeest	GBIF	LC	Low
	Otocyon megalotis	Bat-eared Fox	MammalMAP	LC	High
	Vulpes chama	Cape Fox	GBIF	LC	High
Cercopithecidae	*Chlorocebus*	Vervet Monkey	GBIF	LC	High
Erinaceidae	*Atelerix frontalis*	South African	GBIF	NT	High
	Felis nigripes	Black-footed Cat	MammalMAP	VU	High
Felidae	*Leptailurus serval*	Serval	GBIF	LC	High
	Felis catus	Domestic Cat	MammalMAP	INT	High
Gliridae	*Graphiurus ocularis*	Spectacled	GBIF	NT	High
	Cynictis penicillata	Yellow Mongoose	MammalMAP	LC	High
Herpestidae	*Suricata suricatta*	Meerkat	GBIF	LC	High
	Atilax paludinosus	Marsh Mongoose	GBIF	LC	High
Hyaenidae	*Proteles cristata*	Aardwolf	MammalMAP	LC	High
Hystricidae	*Hystrix*	Cape Porcupine	MammalMAP	LC	High
	Bunolagus	Riverine Rabbit	GBIF	CR	High
	Lepus saxatilis	Scrub Hare	MammalMAP	LC	High
	Lepus capensis	Cape Hare	GBIF	LC	High
Leporidae	*Pronolagus*	Hewitt's Red Rock	GBIF	LC	High
	Elephantulus	Cape Elephant	GBIF	LC	High
	Elephantulus	Eastern Rock	GBIF	LC	High
	Macroscelides	Round-Eared	GBIF	LC	High
Macroscelididae	*Elephantulus*	Western Rock	GBIF	LC	High

Muridae	*Otomys auratus*	Vlei Rat	GBIF	NT	High
	Otomys sloggetti	Slogget's Vlei Rat	GBIF	LC	Low
	Aethomys ineptus	Tete Veld	GBIF	LC	Low

APPENDIX 4.5 POTENTIAL REPTILES

Family	Scientific Name	Common Name	Data Source	Status
Agamidae	*Agama aculeata*	Common Ground Agama	ReptileMAP	LC
	Agama atra	Southern Rock Agama	GBIF	LC
Cordylidae	*Karusasaurus polyzonus*	Karoo Girdled Lizard	ReptileMAP	LC
Elapidae	*Aspidelaps lubricus*	Cape Coral Snake	GBIF	LC
Gekkonidae	*Chondrodactylus*	Bibron's Thick-toed Gecko	GBIF	LC
	Pachydactylus	Common Banded Gecko	GBIF	LC
Lacertidae	*Pedioplanis*	Namaqua Sand Lizard	ReptileMAP	LC
	Nucras holubi	Holub's Sandveld Lizard	GBIF	LC
Lamprophiidae	*Lycophidion capense*	Cape Wolf Snake	ReptileMAP	LC
	Psammophylax	Rhombic Skaapsteker	GBIF	LC
	Psammophis trinasalis	Fork-marked Sand Snake	GBIF	LC
	Lamprophis aurora	Aurora House Snake	GBIF	LC
	Duberria lutrix	Common Slug-Eater	GBIF	LC
Pelomedusidae	*Pelomedusa subrufa*	Marsh Terrapin	GBIF	LC
Testudinidae	*Trachylepis sulcata*	Western Rock Skink	Observed	LC
	Acontias gracilicauda	Thin-tailed Legless Skink	GBIF	LC
	Homopus boulengeri	Karoo Padloper	GBIF	NT (EN*)
	Psammobates tentorius	Tent Tortoise	GBIF	LC
	Homopus areolatus	Parrot-Beaked Tortoise	GBIF	LC
	Stigmochelys pardalis	Leopard Tortoise	GBIF,	LC
	Homopus femoralis	Greater Padloper	GBIF	LC
	Psammobates	Serrated Tortoise	GBIF	NE
Varanidae	*Varanus albigularis*	Rock Monitor	ReptileMAP	LC

APPENDIX 5: CV'S OF THE TEAM

1. MILAMBO FREDDY TSHIALA

Email: mftshiala@gmail.com
Tel/Cell: 0836691702
Total Years of Experience: 16
Education:

Qualification	Institution	Completed
Doctor of Philosophy in Environment and Society	University of Pretoria	2014
Master's Degree in Environment and Society at	University of Pretoria	2006
BSC (Honours Degree) in Agronomy	University of Kongo	2000
Occupational health and safety, NQF Level 5	NOSA (Pty) Ltd	2015
Applying SHE principles and Procedures	NOSA (Pty) Ltd	2015
Construction Regulations and Training Course	NOSA (Pty) Ltd	2015
Introduction to OHSACT	NOSA (Pty) Ltd	2014
Wetlands Management: Introduction and Delineation	University of Free State	2013
Horticultural Management Training	University of Pretoria	2006
Learning ArcGis	University of Pretoria	2004

Membership of Relevant Professional:

Membership	Professional Organisations
Registration Number 1519/2018	SACPCMP
Registration Number 4000021/18	SACNASP

Membership of Professional Associations:

Membership	Professional Associations
Registration Number 5358	IAIAsa Membership

Countries of Work Experience:

South Africa and DR Congo

Languages:

Language	Speaking	Reading	Writing
English	Excellent	Excellent	Excellent
French	Excellent	Excellent	Excellent

WORKS EXPERIENCE

PERIOD	PROJECT NAME	SCOPE	RESPONSIBILITIES
August 2018	Ecological assessment for the proposed development in Borakalalo Nature Reserve, North West	Ecological Assessment	Field work Plant and animal identification Report writing
March 2017	Ecological assessment for the proposed upgrade of the National route Ne section 34	Ecological Assessment	Field work Plant and animal identification Report writing

	(Piet retief to Ermelo): Link and grade-separation scheme for road P97/2 and road D803 for Kangra mine coal haulage at Panbult, Mpumalanga proposed road expansion, Panbult		
September 2016	Proposed construction of an 18km long pipeline with an internal diameter of 2100 for the remainder of B16 pipeline starting from Zuikerbosch Pumping Station to Slangfontein with associated cross connections and end connections	Ecological Assessment	Environmental Assessment Practitioner and Public Participation Compile Environmental Impact Assessment Engage with client and authorities Social Impact Assessment
July 2018	Construction for Ekurhuleni township automotive aftermarket hubs in Labore Brakpan	Agricultural Study	Field investigation; Agricultural potential analysis, Soils Analysis, Report writing
September 2016	Agricultural Potential Study for the Proposed Construction of an 18km long pipeline with an internal diameter of 2100 for the remainder of B16 pipeline starting from Zuikerbosch Pumping Station to Slangfontein with associated cross connections and end connections.	Agricultural Study	Field investigation; Agricultural potential analysis, Soils Analysis, Report writing
September 2016	Ecological Assessment For the Proposed Construction of an 18km long pipeline with an internal diameter of 2100 for the remainder of B16 pipeline starting from Zuikerbosch Pumping Station to Slangfontein with associated cross connections and end connections.	Flora and Fauna Assessment	Field work Plant and animal identification Report writing
March 2015	Illiondale Wetland Rehabilitation Project in Ekurhuleni Municipality. (Quotation No.: KEQ. ERM. 03.39).	Flora and Fauna Assessment	Field work Plant and animal identification Report writing

July 2014	The Soutpansberg Drive Wetland Rehabilitation Project in Ekurhuleni Municipality.	Flora and Fauna Assessment	Field work Plant and animal identification Report writing
July 2013	Proposed Construction and Establishment of Beef Feedlot and Associated Infrastructures on Portion 2, 8, 9, 11 and 15 of the Kleinwater Farm Project, Mpumalanga Province.	Flora and Fauna Assessment	Field work Plant and animal identification Report writing
September 2013	Proposed Expansion and Construction of Poultry Houses for Broiler Production for Farm Puntlyf Bronkhorspruit Project, Gauteng Province.	Flora and Fauna Assessment	Field work Plant and animal identification Report writing
September 2017	Proposed N2 Panbult Interchange upgrade for South African National Roads Agency Limited (SANRAL) Project at Panbult Siding in Mpumalanga Province.	Wetland Assessment and Delineation Report	Site visit; Delineation and plant identification; Report writing Project manager
May 2013	Proposed township situated on portion 27 and 28 of the farm Hartherley 331-JR at Mamelodi, City of Tshwane Municipality.	Wetland Assessment and Delineation Report	Site visit; Delineation and plant identification; Report writing Project manager
March 2015	Investigation on the Nature and Extent of Invasive Alien Plant Infestations on Rand Water Sites: Rietvlei Site.	Invasive Alien Plant Specialist	Field investigation IAPs identification Scientific Report Writing
March 2015	Investigation on the Nature and Extent of Invasive Alien Plant Infestations on Rand Water Sites: Zwartkopjes Site (Mapleton, Palmiet and Eikenhof).	Invasive Alien Plant Specialist	Field investigation IAPs identification Scientific Report Writing

REFERENCES

Name	Company Name	Position	Contact No	Email Address
Joshua Olokun	Environet Engineering	Director	073 406 8051	molokun@gmail.com
Thokozani Masilela	Rand Water	Environmental Assessor	011 724 9369	tmasilel@randwater.co.za
Palesa Mathibeli	Lyma Consulting	Director	0824486243	Palesa_mathibeli@yahoo.com

2. **Nonkanyiso Zungu**

CURRICULUM VITAE

Female, South African
ID-82030905700088
Cell-084 800 0187

Profile Summary

Nonkanyiso Zungu is a Professional Natural Scientist (Pr.Sci.Nat) with 16 years' experience in the environmental field, including GIS. She is currently a Ph.D. candidate at the University of Cape Town doing research on climate change effects on freshwater ecology. She obtained her master's degree in Environmental Management from the University of Pretoria with a specialty in Water Resource Management. She has extensive experience in water resource management, waste management, and obtaining environmental authorizations (air, water, waste) across sectors that include: Power generation, infrastructure (Construction), transportation (rail), waste disposal, water purification & sewage works. The projects she has undertaken include Environmental Impact Assessments, Basic Assessments, Environmental Feasibility Studies, Environmental scoping studies, Environmental legal compliance audits, Waste management licenses, Water use licenses, and Baseline risk assessments.

Nonkanyiso Zungu is a Health & Safety and Environmental (SHE) auditor and is knowledgeable on internal integrated SHEQ auditing. She has experience in the development and implementation of ISO 14001: 2004 management system and undertaking internal audits. Nonkanyiso is also a wetland specialist with experience in wetland delineation, determination of present ecological status, ecological importance and sensitivity evaluations, and wetland rehabilitation planning using packages that include Wet-Health, Wet-Ecoservices, and Wet-Rehab Evaluate.

Tertiary Education:

Qualification: Ph.D. Ecology, University of Cape Town, Year: 2017-Current

Qualification: MSc Environmental Management, University of Pretoria, Year: 2011

Qualification: BSc Honours (Ecology),University of KwaZulu-Natal, Year 2005

Qualification: BSc Biological Science, University of KwaZulu-Natal Year: 2003

Professional Registration

- South African Council for Natural Scientific Professions (SACNASP, Pr. Nat. Sci. (Practice no. 400194/10): Ecological Science
- Member of the Gauteng Wetland Task Group
- Member of WISA (Gauteng Region)

Short Courses

- ISO 14001 IMPLEMENTATION AND INTERNAL AUDITING
- ISO 18001 IMPLEMENTATION AND INTERNAL AUDITING
- ISO 9001 IMPLEMENTATION AND INTERNAL AUDITING

- LEAD AUDITING (SAATCA)
- INCIDENT AND ACCIDENT INVESTIGATIONS
- QUALIFIED WETLAND ASSESSMENT PRACTITIONER (WET-HEALTH; WET IHI, SPATSIM)
- ESRI GIS MAPPING, ARCMAP 10

Key Skills

- ESRI GIS MAPPING, ARCMAP 10
- ISO 14001: 2004 internal auditing
- Legal compliance auditing
- Wetland delineation and assessment
- Environmental Impact Assessment
- Waste Management Licence Applications
- Water Use Licence Applications
- Basic Assessments
- Feasibility Studies (Fatal flaw analysis)

Employment History

2014 – Current Sazi Environmental Consulting cc
2011– 2014 Sebata Group of Companies (Pty) Ltd
2009 – 2011 Department of Water Affairs
2007 – 2009 Wetland Consulting Services (Pty) Ltd
2005 – 2006 University of KwaZulu-Natal (Maluti Transfontier Conservation Program)
2004 – 2005 University of KwaZulu-Natal (Welgevonden Elephant Program)

WORKS EXPERIENCES

WETLANDS			
PERIOD	**PROJECT NAMES**	**SCOPE**	**clients**
2018	Natalspruit river rehabilitation	Wetland delineation, Wetland PES and EIS description, Wetland classification, Rehabilitation	Company: Silver Horns Contact: Thabo Munyai Tel: 076 126 8387
2018	Brakpan automotive hub wetland assessment	Wetland delineation, Wetland PES and EIS description, Wetland classification, Rehabilitation	Company: Vungandze Projects Contact Person: Khosi Mngomezulu Tel: 083 256 1292
2018	K2 and K3 pipeline	Wetland delineation,	Company: Rand Water

	wetland assessment	Wetland PES and EIS description, Wetland classification, Rehabilitation	Contact Person: Nomkhosi Mohlahlo Tel: 011 724 9191
2018	Desktop wetland assessment on portion 10 on Reserve 16 of Farm no 15638 in Ngwavuma, KwaZulu Natal Province, South Africa	Desktop study	Company: Beyond Greening Environmental Services Pty (Ltd) Contact Person: Nonkululeko Khumalo Tel: 072 172 8374
2017	Lanseria business park wetland delineation and assessment report	Wetland delineation, Wetland PES and EIS description, Wetland classification, Rehabilitation	Company: Arengo 6 Contact Person: Kagiso Mohlamme Tel: 072 591 5237
ECOLOGICAL ASSESSMENT (FAUNA AND FLORA)			
2018	K2 and K3 pipeline ecological assessment	Flora and fauna assessment, Sensitivity areas	Company: Rand Water Contact: Nomkhosi Mohlahlo Tel: 011 724 9191
2018	Brakpan automotive hub ecological assessment	Flora and fauna assessment, Sensitivity areas	Company: Vungandze Projects Contact Person: Khosi Mngomezulu Tel: 083 256 1292
2017	Amandebult Section biodiversity assessment	Flora and fauna assessment, Sensitivity areas	Company: Phuka tsa Nong Contact: Kelebogile Mogajane Tel: 083 478 5753
2017	Leliefontein biodiversity assessment	Flora and fauna assessment, Sensitivity areas	Company: Ndlelenhle Mining and consulting Contact: Abraham Maphoso Tel: 082 088 3283

3. DIVHANI MULAUDZI

CURRICULUM VITAE

Proposed Position: Environmental Manager

Name of Firm: Plantago Lanceolata Pty Ltd

Name of Staff: Divhani Mulaudzi

Nationality: South African

Total Years of Experience: 6

SACNASP Reg: 100122/13

Education:

Qualification	Institution	Date obtained
B Sc BDC	University of Venda	22-05-2010
BscHons Botany	University of Limpopo	15-June 2011
Environmental Law Certificate	Eskom Academy	16 January 2012
Cert. Rehabilitation Planning and Management	Lapalala Wilderness School	08 August 2008
Certificate in Risk Assessment and management	DEKRA	January 2015
Certificate in Accident and incident investigation	DEKRA	January 2015

Membership of Professional Associations:

Membership	Professional Associations
Professional 100122/13	SACNASP

Other Training: Certificate in vegetation survey; Lapalala Wilderness School and Environmental Law Eskom

Countries of Work Experience & Key Qualifications: South Africa

Languages:

Language	Speaking	Reading	Writing
English	Well	Well	Well
Afrikaans	Poor	Poor	Poor
Tshivenda	Excellent	Excellent	Excellent

Employment Record:

From: 02 April 2010 To: 28 February 2014
Employer: Shumani SHE Specialists, Polokwane Head Office
Positions held: Environmental manager on development projects

From: 03 March 2014 To: Date
Employer: Plantago Lanceolata Pty Ltd
Positions held: Director Ecology Resource Management and Environmental

Year	*Project*	*Location:*	*Value:*	*Role / Company*
2016	EIA, WULA, and Hydrology studies for proposed Tlakgameng primary school North west	North West province	Unknown	Coordinator environmental
2016	Environmental Management Plans for 5 proposed business hives Ekurhuleni Region	Gauteng province	Unknown	Coordinator environmental
2015	Water Use Licensing for Smit mine Ermelo	Mpumalanga province	Unknown	EAP/project manager
2015	Rehabilitation plan Paulshof powerline	Paulshof Gauteng	Unknown	Rehab specialists
2015	Rehabilitation plan Ivory park powerline	Ivory park Gauteng	Unknown	Rehab specialists
2015	EIA Retail, shopping complex and skills development centre	Limpopo Mohodi Ga Manthata	Unknown	EAP and Project manager
2015	Rehabilitation plan Klippoortjie pump station, Ekurhuleni Municipality	Germiston	Unknown	Rehab specialists
2015	IWWMP and Section 27 motivations development for Smit mine	Ermelo	Unknown	Project coordinator
2015	Aquatic study Smit mine	Ermelo	Unknown	Ecologist
2015	Wetland study Paulshof powerline	Gauteng	Unknown	Ecologist
2015	Aquatic study Ivory Park 11kv powerline	Ivory park	Unknown	Ecologist
2014	Biodiversity and Impact Assessment for a mining project	Piet Retief	Unknown value	Environmental Manager
2012	Ecological Impact Assessment De Hoop Dam	Groblersdal	Unknown	Ecologist
2013	Environmental Monitoring and Legal Compliance	Thohoyandou-Sibasa	Unknown	Environmental Control Officer
2012	Environmental Baseline Assessment and Report for solar development project	Phalaborwa	Unknown	Environmental Assessment Practitioner
2015	Environmental Management Plan for a license testing ground	North West	Unknown	Environmental Assessment Practitioner
2014	Environmental Management Plan for a Mankweng sports facility	Mankweng, Limpopo Province	Unknown	Environmental Assessment Practitioner
2011/12/13/14	Various EIA and EMP for Eskom 132kV powerlines	North West, Limpopo, Gauteng, and Mpumalanga Province	Unknown	Environmental Assessment Practitioner
2013	Water Use License for a greater Tubatse Municipality	Burgersfort, Mpumalanga	Unknown	Environmental Assessment Practitioner
2011,12, 13,14,15	Various Environmental Management Plans for roads	Limpopo and Mpumalanga province	Unknown	Environmental Assessment Practitioner
2011, 12,13,14, 15	Various Environmental Management Plan and EIA for town developments	Limpopo, North west and Mpumalanga Province	Unknown	Environmental Assessment Practitioner
2011	Mining permit for various borrow pits	Limpopo, North West, Mpumalanga	Unknown	Environmental Assessment Practitioner

		Province		
2014	Mining permits and prospecting Rights for mines	Limpopo Province	Unknown	Environmental Assessment Practitioner
2014	EIA for Town Establishments, Oil, petrol, Diesel and Petrol depot	Matoks, Makgato Limpopo Province	Unknown	Environmental Assessment Practitioner
2012,13	Environmental Management Plan for water Reticulation project	Mankweng, Limpopo Province	Unknown	Environmental Assessment Practitioner
2015	Water Use License and Water Registrations for De Hoop Dam Project	Mpumalanga/Limpopo Province	Unknown	Environmental Assessment Practitioner

References:

Name: **Mr Given Maedza**
Company: Beyond 2010
Tele No: 084 5252982
Email : given@beyond2010.co.za

Name: **Mr Mahosi Martin**
Company: Rendeals 4 Consulting Engineers and project managers
Tele No: 011 394 4358

Name: Ms Kuaho Palesa
Company: Eskom Mpumalanga Unit
Tele No: 013 693 3146
Email : kuahop@eskom.co.za

Heritage Impact Assessment

PHASE 1

ARCHAEOLOGICAL IMPACT ASSESSMENT

RELATING TO THE PROPOSED IKOMKHULU'S SOLAR PLANT ESTABLISHMENT ON PORTION 5 OF THE FARM ZOELENS LAAGTE 158 NEAR WINDSORTON, WITHIN DIKGATLONG LOCAL MUNICIPALITY OF THE FRANCES BAARD DISTRICT, NORTHERN CAPE PROVINCE, SOUTH AFRICA.

***Compiled** by:* Millennium Heritage Group (PTY) LTD

For: THOLOANA SUSTANABLE AND ENVIROMENTAL CONSULTANTS

P.O.BOX 67302, Bryston, Gauteng, 2021

Email: vusi@tholoanacunsulting.co.za

14 November 2022

i. Technical and Executive Summaries

Property details	
Province	Northern Cape
Magisterial District	Frances Baard District
Topo-cadastral map	2824
Coordinates	S28.21. 55. 08 and E 24.41.04.01
Closest town	Warrenton and Kimberly
Farm name	Portion 5 of Farm Zoelens laagte 158

Development criteria in terms of Section 38 (1) of the NHR Act 25 of 1999	**Yes**	**No**
Construction of road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length	Yes	
Construction of bridge or similar structure exceeding 50m in length		No
Development exceeding 5000 sqm	Yes	
Development involving three or more existing erven or subdivisions		No
Development involving three or more erven or divisions that have been consolidated within past five years		No
Rezoning of site exceeding 10 000 sqm		No
Any other development category, public open space, squares, parks, recreation grounds		No

Development	
Description of development	Solar Plant establishment
Project name	Ikomkhulu Solar Energy Facility
Developer	Ikomkhulu Solar (PTY) LTD
Heritage consultant	Millennium Heritage Group (Pty) Ltd
Purpose of the study	Heritage Impact Assessment to identity and assess significance of sites (if any) to be impacted by the proposed development

Land use	
Previous land use	Cattle Ranch and diamonds mine
Current land use	Cattle Ranch and diamonds mine

ii. Executive Summary

This report provides the results of an Archaeological Impact Assessment (AIA) study conducted for the proposed Ikomkhulu Solar Energy Facility and associated infrastructure on Portion 5 of the farm Zoelens laagte 158 near Windsorton, Northern Cape Province.

As part of the application process and good corporate citizenship, archaeological impact assessment study was conducted, and the report form part of an appendix for the broader Basic Assessment (BA) study which investigate the impact of the proposed development on the receiving environment including heritage resources. As part of Basic Assessments (BA), the applicant is required by law to obtain Environmental Authorization (EA) in line with the Environmental Impact Assessment (EIA) Regulation published in Government Notice R 982 of 4 December 2014 under Section 24(5) of the National Environmental Management Act No. 107 of 1998 (NEMA) as amended in 2017. An application for Basic Assessments has been lodged with the Department of Environment and Nature Conservation. As part of the application process, Tholoana Consulting requested Millennium Heritage Group (Pty) Ltd, an independent heritage consulting company to assess the heritage sensitivity of the area. A multi-stepped methodology was used to address the terms of reference. To begin with, a desktop study was carried out to identify any known heritage sites and their significance in the surrounding environment. This involved consulting contract archaeology and paleontological reports filed on SAHRIS, research and academic publications. Finally, the study was guided by the National Heritage Resources Act of 1999 and SAHRA Minimum Standards for impact assessment.

Based on this study, the following conclusions were reached:

- The proposed development is scheduled to take place on both disturbed and vacant land dominated shallow gravel sandy and loam soils covered by natural vegetation and diverse grass species.

    - Ground truthing of the area proposed found no important cultural heritage resource, archaeological materials nor graves
- Although no archaeological remains were found, it is possible that some significant features may be buried beneath the ground. Should buried archaeological materials and burials be encountered during the process of development, the following must apply:
- Work must stop immediately

  A professional archaeologist or nearest heritage authority must be contacted.

Based on this assessment which found no archaeological resources in this area we recommend that the heritage authorities approve the project as planned.

iii. ACKNOWLEDGEMENTS:

CLIENT NAME: Tholoana Sustainable and Environmental Consultants

CONTACT PERSON: Vusi Simon Hlatshwayo

Cell: 0740879994

CONSULTANT: Millennium Heritage Group (PTY) LTD

REPORT AUTHOR: Dr. Eric Ndivhuho Mathoho

Declaration of Independence and CV

I Eric Ndivhuho Mathoho declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development, application or appeal in respect of which I am appointed other than fair remuneration for work performed about the activity, application or appeal. There are no circumstances that compromise the objectivity of me performing such work.

Signed:

Dr. Eric N Mathoho,
ASAPA Member, Archaeologist and Heritage Expert.

TABLE OF CONTENTS

CONTENT PAGE

Table of figures

1. INTRODUCTION

Ikomkhulu Solar (PTY) LTD seeks to generate solar photovoltaic (PV) electricity created from a proposed Solar Energy Facility (SEF) near Windsorton. The preferred site is situated on Portion 5 of the farm Zoelens laagte 158 which is positioned roughly 48 kilometers North of Kimberly and further north of the Vaal River Bank, within the Frances Baard District Municipality of the Northern Cape Province, South Africa (see Fig 1). The general landscape feature of the proposed study area includes slightly undulating and flat plains which is currently dominated by shallow sandy and loam soils with the vast area still covered by natural vegetation, huge surface disturbances dominated by open, shallow excavations and soil mounds represent evidence of previous diamond mining activities. These evidence of mining activities are scattered on the vast farm land, however that entire area is still used as cattle ranch. The proposed area earmarked for the establishment of Solar Energy Facility and associated infrastructure covers roughly 400 hectares of disturbed (Diamond Mining activities) and vacant land.

Figure 1: Study area map adapted from Google Earth program.

The objective of this project is to produce Solar Photovoltaics, while recognizing the international concerns about climate change and the importance of providing power to the local community. Generally, Solar power energy had zero emission released into the atmospheres. Electricity generation from solar power is a very important energy source in the move to clean energy production. The proposed development entails the establishment of an integrated Solar PV and

Hydro power plant, which will generate 100MW of energy to feed into the national grid to increase capacity for electricity supply within the Magareng Municipality. The development is planned together with the municipality as part of initiatives aiming to curb the current challenges of electricity supply.

This study was commissioned in terms of EIA Regulations promulgated on 4 December 2014, read with Section 44 of the National Environmental Management Act (Act 107 of 1998), as the proposed Solar Energy facility establishment falls within the ambit of the listed Activities. Table 1 below provides listed activities in details and the description of the proposed project.

Detailed description of listed activities associated with the project	
Listed activity as described in GN R.327 and 324.	**Description of project activity that triggers listed activity**
Listing Notice 1 – GN R.327: Activity 9: "The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water— (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more;	The proposed Solar Farm includes associated infrastructure i.e. pipes for bulk water supply from the borehole, which feeds into two smart water storage tanks. The tanks forms part of the integrated Solar PV infrastructure as an additional energy storage systems during the low and high demand for electricity.
Listing Notice 1 – GN R.327: Activity 12 : "The development of— (iii) Infrastructure or structures with a physical footprint of 100 square metres or more. **Where such development occurs** (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —	The infrastructure or structures associated with the proposed development includes but not limited to: • Smart tanks for water storage. • Solar Panels • Control room The infrastructure is located in close proximity to the Vaal river, based on the previous delineation, the proposed solar farm occurs within 32 metres of the delineated 1 100 year flood line, however due to the previous anthropogenic activities that took place i.e. mining activities, the proposed development has low to none impacts to the previously delineated sensitive areas, thus the sensitive areas have been largely impacted on, this includes the drainage lines in close proximity to the development footprint, which can be deemed as non-functional to the existing watercourse (Vaal River).
Listing Notice 1 – GN R.327: Activity 67: Phased activities for all activities— **(i)** listed in this Notice, which commenced on or after the effective date of this Notice or similarly listed in any of the previous NEMA notices, which commenced on or after the effective date of such previous NEMA Notices;	The proposed development will be phased, wherein it will commence with the first phase of 50MW, followed by the second phase of 50MW. Other activities to be faced are the different technologies i.e. the Solar PV will form part of the first phase, then integrated with the Hydro technology as part of the second phase.
Listing Notice 2 - GN R.325 - Activity 1: "The development of facilities or infrastructure for the generation of	The proposed development entails the establishment of an integrated Solar PV and Hydro power plant, which will

Detailed description of listed activities associated with the project	
Listed activity as described in GN R.327 and 324.	**Description of project activity that triggers listed activity**
electricity from a renewable resource where the electricity output is 20 megawatts or more"	generate 100MW of energy to feed into the national grid to increase capacity for electricity supply within the Magareng Municipality. The development is planned together with the municipality as part of initiatives aiming to curb the current challenges of electricity supply. The estimated energy to be generated from the proposed development is approximately 270 million kilowatt hours per year over a 20year period, which can supply approximately 33 000 households.
Listing Notice 2 – GN R.325; 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"	The land where the development will be located is currently vacant, however it cannot be classified as a greenfield as it has been previously disturbed by mining activities, there are however certain sections within the property which were not impacted on by the mining activities i.e. the North-Eastern section of the property. The estimated land required for the proposed development is approximately 200Ha (2Ha per 1MW) to produce the targeted 100MW, including the associated infrastructure i.e. substation, invertor and the control room, the physical footprint can be estimated to approximately 220 Ha.

Therefore, pre-development Environmental Impact Assessment is a prerequisite, subject to approval by the Northern Cape Department of Environment and Nature Conservation. To ensure that the proposed solar power plant and associated infrastructure meets the environmental requirements in line with the National Environmental Management Act (Act 107 of 1998), Tholoana Consulting, appointed Millennium Heritage Group (PTY) LTD to undertake an Archaeological Impact Assessment (AIA) for the proposed project.

To comply with relevant legislation, the applicant (Ikomkhulu Solar (PTY) LTD) requires information on the heritage resources that occur within or near the proposed study site and their heritage significance. The objective of the study is to document the presence of archaeological and historical sites of significance to inform and provide guidance on the proposed development activities. Apart from contributing towards the preservation of the heritage resources, the study provides information and awareness of the types of archaeological and heritage sites that occur within the proposed study area. The document enables the developer to align their functions and responsibilities to advance proposed activities and at the same time minimizing potential impact on archaeological and heritage sites. This study was conducted in line with the National Heritage Resources Act of 1999 (Act No. 25 of 1999). The Act protects heritage resources through formal and general protection. The Act provide that certain developmental activities require consents from relevant heritage resources authorities such as Northern Cape Heritage Resources Authorities

(NCHRA) and South African Heritage Resources Agency (SAHRA). In addition to heritage legislation, the South African Heritage Resources Agency has developed minimum standards used in impact assessment, while these local standards, are operational they are strengthened by the International Council of Monuments and Sites (ICOMOS) published guideline for assessing impacts. The Burra Charter of 1999, requires a cautious approach to the management of sites; it sets out firmly that the cultural significance of heritage places must guide all decisions. The National Heritage Resources Act (NHRA - Act No. 25 of 1999) protects all structures and features older than 60 years (Section, 34), archaeological sites and materials (Section 35) and graves and burial sites (Section, 36). To comply with the legislation, the applicant requires information on the heritage resources, that occur in the area proposed for development and their significance. This will enable the Applicant to take pro-active measures to limit the adverse effects that the development could have on such heritage resources.

2. RELEVANT LEGISLATION

Two sets of legislation are relevant for the purposes of this study in as far as they contain provisions for the protection of tangible and intangible heritage resources including burials and burial grounds.

2.1. The National Heritage Resource Act (25 of 1999)

This Act established the South African Heritage Resource Agency (SAHRA) as the prime custodian of the heritage resources and makes provision for the undertaking of heritage resources impact assessment for various categories of development as determined by section 38. It also provides for the grading of heritage resources (Section, 7) and the implementation of a three-tier level of responsibly and functions from heritage resources to be undertaken by the State, Provincial and Local authorities, depending on the grade of heritage resources (Section, 8)

In terms of the National Heritage Resource Act 25, (1999) the following is of relevance:

Historical remains

Section 34 (1) No person may alter or demolish any structure or part of a structure, which is older than 60 years without a permit issued by the relevant Provincial Heritage Resources Authority.

Archaeological remains

Section 35(3) Any person who discovers archaeological and paleontological materials and meteorites during development or agricultural activity must immediately report the find to the responsible heritage resource authority or the nearest local authority or museum.

Section 35(4) No person may, without a permit issued by the responsible heritage resources authority-

- destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site or any meteorite;
- destroy, damage, excavate, remove from its original position, collect or own any archaeological or paleontological material or object or any meteorite;
- trade in, sell for private gain, export or attempt to export from republic any category of archaeological or paleontological material or object or any meteorite; or
- bring onto or use at an archaeological or paleontological site any excavation equipment or any equipment which assist with the detection or recovery of metal or archaeological material or object or such equipment for the recovery of meteorites.

Section 35(5) When the responsible heritage resource authority has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or paleontological site is underway, and where no application for a permit has been submitted and no heritage resource management procedures in terms of section 38 has been followed, it may

- serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order
- carry out an investigation for obtaining information on whether an archaeological or paleontological site exists and whether mitigation is necessary;
- if mitigation is deemed by the heritage resources authority to be necessary, assist the person on whom the order has been served under paragraph (a) to apply for a permit as required in subsection (4); and
- recover the cost of such investigation from the owner or occupier of the land on which it is believed an archaeological or paleontological site is located or from the person proposing to undertake the development if no application for a permit is received within two weeks of the order being served.

Subsection 35(6) the responsible heritage resource authority may, after consultation with the owner of the land on which an archaeological or paleontological site or meteorite is situated; serve a notice on the owner or any other controlling authority, to prevent activities within a specified distance from such site or meteorite.

Burial grounds and graves

Section 36 (3) No person may, without a permit issued by SAHRA or a provincial heritage resources authority:

(i) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or

(ii) bring onto or use at a burial ground or grave any excavation equipment, or any equipment which assists in detection or recovery of metals.

Subsection 36 (6) Subject to the provision of any person who during development or any other activity discover the location of a grave, the existence of which was previously unknown, must immediately cease such activity and report the discovery to the responsible heritage resource authority which must, in co-operation with the South African Police service and in accordance with regulation of the responsible heritage resource authority-

(I) carry out an investigation for obtaining information on whether such grave is protected in terms of this act or is of significance to any community; and

if such grave is protected or is of significance, assist any person who or community which is a direct descendant to decide for the exhumation and re-interment of the contents of such grave or, in the absence of such person or community, make any such arrangement as it deems fit.

Cultural Resource Management

Section **38(1)** Subject to the provisions of subsection (7), (8) and (9), any person who intends to undertake a development*…

- must at the very earliest stages of initiating such development notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

development means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in a change to the nature, appearance or physical nature of a place, or influence its stability and future well-being, including:

(i) Construction, alteration, demolition, removal or change of use of a place or a structure at a place;

(ii) Any change to the natural or existing condition or topography of land, and

(iii) Any removal or destruction of trees, or removal of vegetation or topsoil;

place means a site, area or region, a building or other structure

structure means any building, works, device or other facility made by people and which is fixed to the ground.

2.2. The Human Tissue Act (65 of 1983)

This act protects graves younger than 60 years, these falls under the jurisdiction of the National Department of Health and the Provincial Health Department. Approval for the exhumation and reburial must be obtained from the relevant provincial MEC as well as relevant Local Authorities.

3. TERMS OF REFERENCE

The terms of references for the study were to undertake an Archaeological Impact Assessment relating to the proposed Solar Energy Facility and associated infrastructure project and submit a specialist report, which addresses the following:

- Executive summary
- Scope of work undertaken
- Methodology used to obtain supporting information
- Overview of relevant legislation
- Results of all investigations
- Interpretation of information
- Assessment of impact
- Recommendation on effective management measures
- References

4. TERMINOLOGY

The Heritage Impact Assessment (HIA) referred to in the title of this report includes a survey of heritage resources as outlined in the National Heritage Resources Act,1999(Act No25 of 1999) Heritage resources, (Cultural resources) include all human-made phenomena and intangible products that are result of the human mind. Natural, technological or industrial features may also be part of heritage resources, as places that have made an outstanding contribution to the cultures, traditions and lifestyle of the people or groups of people of South Africa.

The term 'pre –historical' refers to the time before any historical documents were written or any written language developed in a area or region of the world. The historical period and historical remains refer, for the project area, to the first appearance or use of 'modern' Western writing brought South Africa by the first colonist who settled in the Cape in the early 1652 and brought to the other different part of South Africa in the early 1800.
The term 'relatively recent past' refers to the 20th century. Remains from this period are not necessarily older than sixty years and therefore may not qualify as archaeological or historical remains. Some of these remains, however, may be close to sixty years of age and may soon, qualify as heritage resources.

It is not always possible, based on the observation alone, to distinguish clearly between archaeological remains and historical remains or between historical remains and remains from the relatively recent past. Although certain criteria may help to make this distinction possible, these criteria are not always present, or when they are present, they are not always clear enough to interpret with great accuracy. Criteria such as square floors plan (a historical feature) may serve as a guideline. However circular and square floors may occur together on the same site.

The 'term sensitive remains' is sometimes used to distiqiushed graves and cemeteries as well as ideologically significant features such as holy mountains, initiation sites or other sacred places. Graves are not necessarily heritage resources if they date from the recent past and do not have head stones that are older than sixty years. The distinction between 'formal' and 'informal' graves in most instances also refers to graveyards that were used by colonists and by indigenous people. This distinction may be important as different cultural groups may uphold different traditions and values regarding their ancestors. These values should be recognized and honored whenever graveyards are exhumed and relocated.

The term 'Stone Age' refers to the prehistoric past, although Late Stone Age people lived in South Africa well into the historical period. The Stone Age is divided into an Early Stone Age (3Million years to 150 000 thousand years ago) the Middle Stone Age (150 000 years ago to 40 years ago) and the Late Stone Age (40 000 years to 200 years ago).
The term 'Early Iron Age' and Late Iron Age respectively refers to the periods between the first and second millenniums AD.

The 'Late Iron Age' refers to the period between the 17th and the 19th centuries and therefore includes the historical period.

Mining heritage sites refers to old, abandoned mining activities, underground or on the surface, which may date from the pre-historical, historical or relatively recent past.
The term 'study area' or 'project area' refers to the area where the developers wants to focus its development activities (refer to plan)

Phase I studies refer to survey using various sources of data to establish the presence of all possible types of heritage resources in each area.
Phase II studies include in-depth cultural heritage studies such as archaeological mapping, excavating and sometimes laboratory work. Phase II work may include documenting of rock art, engravings or historical sites and dwellings; the sampling of archaeological sites or shipwrecks; extended excavation of archaeological sites; the exhumation of bodies and the relocation of grave yards, etc. Phase II work may require the input of specialist and require the co-operation and the approval of SAHRA.

5. METHODOLOGY

Source of information

i. Desktop studies

A desktop study was performed to gain information on the heritage resources in the area. The desktop studies also involved a review of HIA reports (Morris 2003; Rossouw,2016) conducted within the Windsorton region. The Windsorton landscape hosts significant tangible and intangible heritage encompassing Stone Age, well represented by rock gongs, engravings and rock art. Several stone artifacts have been reported to occur from river gravel and mining areas (see, Morris 2003; Rossouw,2016). Iron Age and historical sites were acknowledged by Morris (2003) and Rossouw (2016). Based on a desktop study no archaeological sites have been identified on the property.

ii. Field surveys

To identify sites on the ground and assess their significance, a dedicated field survey was performed to the site for the proposed solar plant and associated infrastructure establishment. The fieldwork was performed on the 12 November 2022, the process followed systematic inspections of predetermined linear transects which resulted in the maximum coverage of the entire site. The sampling method selected was the stratified random technique where the study area was taken as strata with random field walking around them. Standard archaeological observation practices were followed; visual inspection was supplemented by relevant written source, and oral traditions with local communities and the farm owner. The site was recorded by hand held GPS and plotted on

1:50 000 Topographical and Google Earth maps. The general condition of the terrain was photographed with a Canon 1000D Camera.

Assumption and Limitations

It must be pointed out that heritage resources can be found in the unexpected places, it must also be borne in mind that survey may not detect all the heritage resources in each project area. While some remains may simply be missed during surveys (observations) under tall grass and vegetational concealment, others may occur below the surface of the earth and may be exposed once development (such as the construction of the proposed facilities) commences.

6. ASSESSMENTS CRITERIA

This section describes the evaluation criteria used for determining the significance of archaeological and heritage sites. The significance of archaeological and heritage sites was determined based on the following criteria:

- The unique nature of a site.
- The amount/depth of the archaeological deposit and the range of features (stone walls, activity areas etc.).
- The wider historic, archaeological and geographic context of the site.
- The preservation condition and integrity of the site.
- The potential to answer present research questions.

6.1 Site Significance

The site significance classification standards as prescribed in the guidelines and endorsed by the South African Heritage Resources Agency (2006) and approved by the Association for Southern African Professional Archaeologists (ASAPA) for the Southern African Development Community (SADC) region, were used in determining the site significance for this report.

The classification index is represented in the Table below that show grading and rating systems of heritage resources in South Africa.

FIELD RATING	GRADE	SIGNIFICANCE	RECOMMENDED MITIGATION

National Significance (NS)	Grade 1	-	Conservation; National Site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; Provincial Site nomination
Local Significance (LS)	Grade 3A	High Significance	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High Significance	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)	Grade 4A	High / Medium Significance	Mitigation before destruction
Generally Protected B (GP.B)	Grade 4B	Medium Significance	Recording before destruction
Generally Protected C (GP.C)	Grade 4C	Low Significance	Destruction

6.2 Impact Rating

VERY HIGH

These impacts would be considered by society as constituting a major and usually permanent change to the (natural and/or cultural) environment, and usually result in severe or very severe effects, or beneficial or very beneficial effects.

Example: The loss of a species would be viewed by informed society as being of VERY HIGH significance.

Example: The establishment of a large amount of infrastructure in a rural area, which previously had very few services, would be regarded by the affected parties as resulting in benefits with VERY HIGH significance.

HIGH

These impacts will usually result in long term effects on the social and /or natural environment. Impacts rated as HIGH will need to be considered by society as constituting an important and

usually long-term change to the (natural and/or social) environment. Society would probably view these impacts in a serious light.

Example: The loss of a diverse vegetation type, which is common elsewhere, would have a significance rating of HIGH over the long term, as the area could be rehabilitated.

Example: The change to soil conditions will impact the natural system, and the impact on affected parties (e.g. farmers) would be HIGH.

MODERATE

These impacts will usually result in medium- to long-term effects on the social and/or natural environment. Impacts rated as MODERATE will need to be considered by the public or the specialist as constituting a unimportant and usually short-term change to the (natural and/or social) environment. These impacts are real, but not substantial.

Example: The loss of a sparse, open vegetation type of low diversity may be regarded as MODERATELY significant.

Example: The provision of a clinic in a rural area would result in a benefit of MODERATE significance.

LOW

These impacts will usually result in medium to short term effects on the social and/or natural environment. Impacts rated as LOW will need to be considered by society as constituting an important and usually medium-term change to the (natural and/or social) environment. These impacts are not substantial and are likely to have little real effect.

Example: The temporary changes in the water table of a wetland habitat, as these systems are adapted to fluctuating water levels.

Example: The increased earning potential of people employed because of a development would only result in benefits of LOW significance to people living some distance away.

NO SIGNIFICANCE

There are no primary or secondary effects at all that are important to scientists or the public.

Example: A change to the geology of a certain formation may be regarded as severe from a geological perspective, but is of NO SIGNIFICANCE in the overall context.

6.3 Certainty

DEFINITE: More than 90% sure of a fact. Substantial supportive data exist to verify the assessment.

PROBABLE: Over 70% sure of a fact, or of the likelihood of an impact occurring.

POSSIBLE: Only over 40% sure of a fact, or of the likelihood of an impact occurring.

UNSURE: Less than 40% sure of a fact, or of the likelihood of an impact occurring.

6.4 Duration

SHORT TERM : 0 – 5 years

MEDIUM: 6 – 20 years

LONG TERM: more than 20 years

DEMOLISHED: site will be demolished or is already demolished

6.5 Mitigation

Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be classified as follows:

- ✓ **A** – No further action necessary
- ✓ **B** – Mapping of the site and controlled sampling required
- ✓ **C** – Preserve site, or extensive data collection and mapping required; and
- ✓ **D** – Preserve site

7. Historical background a brief synthesis of the archaeology and heritage of the study area.

7.1.1. The Stone Age Period

A general account of the nature of the Stone Age can be provided. Conventionally speaking, the Stone Age period has been divided into the Early Stone Age (ESA) (3.5 million and 250 000 BP), the Middle Stone Age (MSA) (250 000 – 25000 BP) and the Later Stone Age (25000 – 2000 BP) (Phillipson 2005). Early Stone Age stone tool assemblages are made up of the earlier Oldwan and later Acheulian types. The Oldwan tools were very crude and were used for chopping and butchering. These were replaced by Acheulian ESA tools dominated by hand axes and cleavers which are remarkably standardized (Wadley, 2007; Sharon, 2009). Evidence presented from Makapansgat caves shows that the first tool making hominids belong to either an early species of the Homo or an immediate ancestor which is yet to be discovered here in South Africa (Phillipson 2005; Esterhuysen, 2007). Both the Oldwan and Acheulian industries are well represented in the archaeology of Northern Cape as shown by studies conducted around the Vaal River (Kuman et al. 2005; Sumner and Kuman 2014).

The Middle Stone Age dates to between 250 000 ago and 25 000 years ago. In general, Middle Stone Age tools are characterized by a size reduction in tools such as hand axes, cleavers, and flake and blade industries. The period is marked by the emergence of modern humans and was accompanied by change in technology, behavior, physical appearance, art, and symbolism (Phillipson 2005). A variety of MSA tools includes blades, flakes, scraper and pointed tools that may have been hafted onto shafts or handles and used as pear heads. Surface scatters of these flake and blade industries occur widespread across southern Africa (Klein 2000; Thompson & Marean, 2008). Residue analyses on some of the stone tools indicate that these tools were certainly used as spear heads (Wadley, 2007). From about 25 000 BP, stone tool assemblages generally attributed to the Later Stone Age emerged. This period is marked by a reduction in stone tool sizes. Typical stone tools include microliths and bladelets. Later Stone Age stone tools were recovered in the Northern Cape Province. Vertebrate fossils were also identified in the deposits including those associated with the Rietputs Formation (Helgren 1977). More recently, Gibbon (2009) recorded the first open-air EIA Acheulean sites in Windsorton. Most of these were recovered in alluvial deposits of the lower Vaal River basin deeply buried in alluvial sands and gravels exposed by the diamond mining activities. Early EIA Acheulean lithic assemblage recorded at Rietputs 15 had similar affinities with those at Sterkfontein and Swartkrans hence the Rietputs 15 assemblage forms part the oldest Acheulean artefacts in Southern Africa (Kuman & Gibbon 2018).

Several EIA Acheulean hand axes and associated lithic that were once preserved within the subsurface gravels were recovered scattered on spoil heaps and backfilled areas from the diamond mining area at Farm Rietputs 15 without context (see Rossouw 2016). Later Stone Age (LSA) sites have been also recorded along the lower Vaal River valley including rock art engraving around Nazareth Warrenton, and Four Streams. Similarly, to ESA, secluded LSA lithics were recorded occasionally around Baskop and further east towards the Vaal River. Rossouw (2016), recorded three rock gongs at Farm Rietputs 15 along the northern rim of Baskop. Archaeological records depict the area as generally rich in Stone, and Iron Age settlements including those dating to the historical period (Kuman & Gibbon 2016). Early Stone Age (ESA) research by C. van Riet Lowe and The Abbé Breuil (van Riet Lowe 1945) was largely focused on the Windsorton ‘young’ gravels deposits close to the Vaal River where early humans are thought to have lived. Here they collected hand axes, core-axes, and cleavers (Cooke 1949; Helgren 1978; Leader 2009; Rossouw 2016) from the dumps of the diamond miners who first established the town of Windsorton (Leader 2009:1).

This period is also associated with the development of rock art whose distribution is known across southern Africa (Deacon and Deacon 1999; Phillipson 2005).

7.1.2. Historiography of the study area

The town of Windsorton is commonly known as Chaib in Khoekhoen language, which translates to mean the 'place of the kudu'. It was founded in 1869 as a diamond diggers camp and was administered by a village management board (https://www.south-africa-info.co.za). The town started as Hebron, a mission station, but when diamonds were discovered, the area was flooded with prospectors and the town became a diggers' camp. The missionaries were sent packing and the town of Windsorton took root in the diggers' camp. Eventually, the town was renamed after P F (Peter Ford) Windsor, the original owner of the land, who was instrumental in its development. Today, many mining companies have claims in the region and regularly dig massive pits to expose these gravels, to acquire diamonds (https://www.south-africa-info.co.za; Leader 2009).

During the late 19th century, it is believed that Windsorton formed part of the area that was ruled by Chief Galeshewe, who repeatedly clashed with the Cape Colony government (Küsel 2015). Galeshewe led an uprising in 1897 and was consequently arrested. Because of his activism, his land was later confiscated by the government (https://www.south-africa-info.co.za). In 1886, before the construction of the irrigation scheme, Cecil John Rhodes wanted to divert the water from the Harts River to the diamond fields at Kimberley. He was granted land for this venture but could not raise the necessary funds, and the government was not willing to fund the project (Küsel 2015). Eventually, Rhode's dream was fulfilled when the then government, initiated the Vaal harts Water Scheme began in 1934. Water was diverted from the Vaal harts Main Canal, to serve the North Canal, Klipdam-Barkly Canal, and Taung Canal. Today, the canal system consists of a total of 1,176 km of concrete-coated canals which provide irrigation water to a total of 39,820 ha of scheduled land, industrial water to six towns and other industrial water users, and domestic and livestock water, for primary use, to various properties.

Despite Windsorton being part of the diamond concessions that have a legacy of vandalism from mining activities for more than a century, the area is layered with rich heritage resources that span from the deep past to the recent past. The peopling of Bantu agropastoral communities in Windsorton was recorded mostly during the Late Iron Age and historical epochs of the 18th and early 19th centuries where remnants of stone-walled settlements of Tswana communities were identified (Humphreys 1976; Rossouw 2016). On the rocky outcrop near the edge of Farm Rietputs 15, Rossouw identified a large stone-walled Tswana settlement covering an approximately 9ha area, which the locals suspect to have been continuously inhabited until the late 1960s. Rossouw (2016) identified more Tswana settlements with similar stone-walled structures on the western slopes of Baskop, however, he could not establish their distribution due to dense vegetation that covered large parts of the lower slopes around the mountain. Numerous rectangular stone

foundations dating to the historical period were also recorded at Farm Rietputs 15 adjacent to the northern slope of Baskop. This included an ashy midden with scatters of European glassware, ungulate bones, and ceramics (Rossouw 2016). Marked and unmarked graveyards dating to the recent past were also recorded by Rossouw (see Table 1). The formal graves had formal head markers and may probably be of the previous owners of Farm Rietputs 15. The informal graves are suspected to belong to the previous farm workers, and a section of these was destroyed by earlier mining activities.

8. 1. SITE LOCATION AND THE SURROUNDING ENVIRONMENT

Portion 5 of the farm Zoelens laagte 158 is located roughly 48 kilometers' northwest of Kimberly, near Windsorton in the Northern Cape Province. The area is located 4 kilometers south of Windsorton, further north of the Vaal River Bank, within the Frances Baard District Municipality of the Northern Cape Province, South Africa. In general, the topography of the study area is dominated by slightly undulating with the existence of flat plains dominated by shallow gravel sandy and loam soils. Undulating hills dominated rocky outcrops occurs some distance across the Vaal River towards the north eastern.

The general vast study area is still covered by natural vegetation, while the area is currently used as cattle ranch farm. Huge surface disturbances occurred dominated by open, shallow excavations and soil and gravel mounds which represent evidence of diamond mining activities geo-referenced scatted throughout the property. The proposed area covers roughly 400 hectares of disturbed and vacant land, positioned on the following Global System Co-ordinates (GPS) S28.21. 55. 08 and E 24.41.04.01. Geology and soils of the study area is dominated by highly fragmented Ecca and dwyka group sediments and Karroo dolerites as well as Ventersdorp supergroup lavas (Allanridge formation). However, Koppies, plateau and small escarpments are dominated by dolerites sills. These dolerite sills cover alternating layers of mud and sandstones of the sedimentary origin.

Windsorton is an agricultural town situated in the Vaalharts Irrigation Scheme - one of the largest irrigation schemes in the world covering 369.50 square kilometers on the banks of the Vaal River in the Northern Cape province of South Africa. The Vaal River extends from the mountains in Mpumalanga in the East. Over the last 20 million years, the river channel has migrated across the floodplain eventually finding its current path (De Wit et al. 2000; Leader 2009). During this process, it has laid down billions of tons of alluvial sands and gravel. It is these same gravels that contain the diamonds that have made South Africa famous. The geology of the Windsorton area is characterised, by dolerite inselbergs (koppies) of the Karoo Supergroup including the Ventersdorp Supergroup, Dwyka tillites, and shales (Gibbon 2009). The dolerite dykes within the area of the

proposed development are not paleontologically significant. However, Stone Age quarry sites are usually found at the foot of dolerite hills where hornfels outcrops occur. Similarly, dolerite is usually associated with engraving sites. The area and adjacent environs are also characterised by layers of 'young' and 'old' gravels (De Wit *et al*. 2000; Gibbon 2009). The Rietputs and Riverton Formations and the other 'young' gravel deposits occur at elevations of 12 to 14 m above river level (De Wit *et al*. 2000). These are followed by the 'old' gravel deposits which occur at elevations of 21 to 60 m above the river level and these are conventionally thought to be reworked clasts from pre-existing fluvial deposits (Helgren 1979; Gibbon 2009). The young' deposits such as Rietputs Formation from the site of Rietputs 15 (named after the farm) were dated between 1.57+/-0.22Ma and ca 1.26+/-0.10Ma (Gibbon et al. 2009). These are made up of a complex valley fill that includes sand and coarse gravel covered by sporadic palaeosols, and fine alluvium (Helgren 1979; Gibbon 2009). The Riverton Formation is associated with the late Pleistocene and Holocene epochs, it is made up of fine-grained sand and silts. As noted by Helgren (1979) these are made up of several terraces that make up the Vaal River floodplain. As noted by Gibbon et al. (2009), there are no fossils present in the gravels investigated at Rietputs 15 hence the area proposed to host the Moa and Ikomkhulu Solar Plant is regarded as paleontologically insignificant.

As a desert landscape, Windsorton is characterised by rugged terrain with a diverse range of flora and fauna. The scenery consists mainly of sand with grasses and sometimes shrubs, coastal plains, craggy sharp mountains of volcanic rock, and the lushness of the Vaal River. The climate of Windsorton is semi-arid, it is characterized by severe summer temperatures which have been recorded to reach approximately 32 °C in January (https://www.south-africa-info.co.za). On the contrary, nights are cool and bring with them heavy dew. Water is scarce hence life depends on moisture from the early morning fog. During winter, temperatures drop to more temperate levels. Rainfall in Windsorton varies from 5 mm per annum in the east to 168 mm per annum.

Generally prominent soils form on the surface of the study area encompasses, Stoney Mispah and gravel-rich Glenrosa derived from Jurassic dolerite, calcrete rich soils occur further north of the gravel access road which divide the study area into two sections of the property. A closed shrubby thornveld with potions of well-developed grass species cover exist on the flat plains, the shrubs are dominated by *Acacia, negrescens, A. tortilis, A. Karroo.* Other important plant taxa include*, A. hetercantha, Grewia flava, Rhus lancea and Ficus indica.* Very few isolated tall trees exist dominated by *Acacia species* (Ackocks, 1975; Mucina & Rutherford, 2006). Overall, ground truthing of the study area found no important cultural heritage resource, archaeological materials nor graves.

8.2. PROJECT DESCRIPTION

Ikomkhulu Solar (PTY)LTD proposes to construct an alternating current Photovoltaic (PV) Solar Energy Facility (SEF), for the argumentation of power energy into the National grid in a quest to increase Northern Cape Province power capacity particularly the Magareng Municipality. The proposed PV facility would consist of the following:

1. A solar farm, comprising of numerous rows of PV modules mounted on steel tracking mounts and footings (concrete or driven into the ground) with associated support infrastructure, including inverters, generally both first and second phase will generate 100 MWac;
2. Internal access roads for servicing and maintenance of the site;
3. Temporary equipment laydown areas for use during construction;
4. Buildings, including a connection building, control building, guard cabin;
5. Weather stations within the fenced perimeter of the site; and
6. Perimeter fencing
7. Substation and/or switchyard located at the solar farm, to convert the power from solar farm voltage to transmission voltage
8. Overhead transmission line/s, to transmit power from the solar farm to the national grid.

Associated infrastructure/services:

The following infrastructure/services will be required for the proposed development:

- Water supply: a borehole will be used as the main source for water supply for drinking, other domestic use, this can be supplemented by the additional rain water harvesting measures to be integrated with the water use system.
- Electricity: The electricity required for the operations of the proposed development will be supplied internally from the generated solar energy.
- Roads: Internal roads will form part of the development, specifications on the type of roads will be determined, it is however a recommendation that the roads should be paved.

Sewerage: There are no sewer services on site, as such septic tank systems will be used as this would only be for the employees, visitors to the site, including normal household sewage. Technologies such as Bio-rock septic systems may be used for the sewage systems, however more research on the type of technologies to be utilized has not been fully explored.

Figure 2: Proposed study area adapted from Google earth map.

Figure 3: View of the study area dominated by thornveld shrubs.

Figure 4: Study area dominated by grass cover.

Figure 5: Mining exploration test pit

Figure 6: Exposed surface, evidence of diamond mining activities, note gravel dump.

Figure 7: Previous diamond mine excavations,

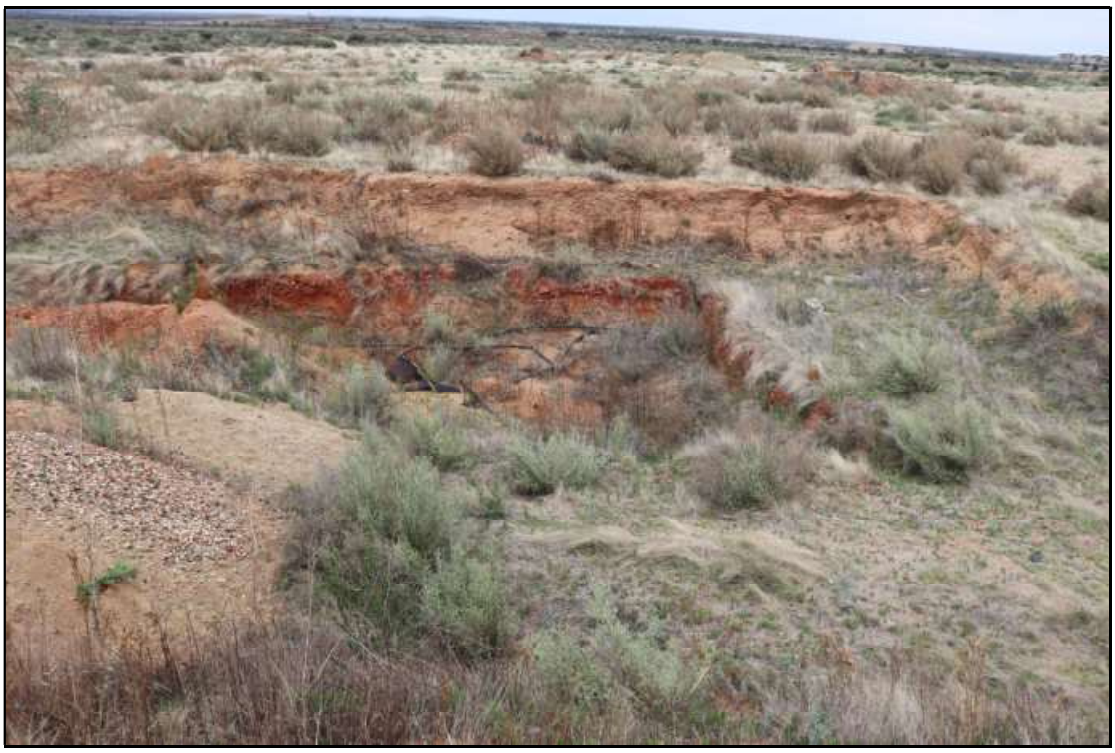

Figure 8: Recent past diamond mine excavations

Figure 9: Transects Snap short adapted from Garmin Montana 650 GPS

9. ASSESSMENT OF SITES AND FINDS

This section contains the results of the heritage sites/finds assessment. The phase 1 Archaeological scoping assessment program as required in terms of the Section 38 of the National Heritage Resource Act (Act 25 of 1999) was done for the proposed solar plant establishment project. No sites were found during the desktop study and the subsequent field survey. There are no primary or secondary effect at all that are important to scientist or the public that will be impacted by the proposed project activities.

Heritage Significance: No significance
Impact: Negative
Impact Significance: High
Certainty: Probable
Duration: Permanent
Mitigation: A

10. CONCLUSION AND RECOMMENDATIONS

In conclusion, and within limitations, ground truthing of the proposed area for the establishment of Solar plant and associated infrastructure found no important cultural heritage resources, archaeological materials or graves. The desktop studies identified the presence of stone age materials and historical sites on nearby farms.

Based on this study, the following conclusions were reached:

- The proposed development is scheduled to take place on disturbed diamond mining areas, while the vast land is currently dominated by natural vegetation and grass cover.

    - Ground truthing of the area proposed for the establishment of the Solar plant and associated infrastructure found no important cultural heritage resource, archaeological materials nor graves
- Although no archaeological remains were found, it is possible that some significant features may be buried beneath the ground. Should buried archaeological materials and burials be encountered during the process of development, the following must apply:
- Work must stop immediately

  A professional archaeologist or nearest heritage authority must be contacted.

Based on this assessment which found no heritage resources in this area we recommend that the heritage authorities approve the project as planned.

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Addendums

Addendum 1: Definitions and Acronyms

Archaeological Material remains resulting from human activities, which are in a state of disuse and are in, or on, land and which are older than 100 years, including artefacts, human and hominid remains, and artificial features and structures.

Chance Finds Archaeological artefacts, features, structures or historical cultural remains such as human burials that are found accidentally in context previously not identified during cultural heritage scoping, screening and assessment studies. Such finds are usually found during earth moving activities such as water pipeline trench excavations.

Cultural Heritage Resources Same as Heritage Resources as defined and used in the South African Heritage Resources Act (Act No. 25 of 1999). Refer to physical cultural properties such as archaeological and paleontological sites; historic and prehistoric places, buildings, structures and material remains; cultural sites such as places of ritual or religious importance and their associated materials; burial sites or *graves* and their associated materials; geological or natural features of cultural importance or scientific significance. Cultural Heritage Resources also include intangible resources such as religion practices, ritual ceremonies, oral histories, memories and indigenous knowledge.

Cultural Significance The complexities of what makes a place, materials or intangible resources of value to society or part of, customarily assessed in terms of aesthetic, historical, scientific/research and social values.

Grave A place of interment (variably referred to as burial), including the contents, headstone or other marker of such a place, and any other structure on or associated with such place. A grave may occur in isolation or in association with others where upon it is referred to as being situated in a cemetery.

Historic Material remains resulting from human activities, which are younger than 100 years, but no longer in use, including artefacts, human remains and artificial features and structures.

***In Situ* material** *Material culture* and surrounding deposits in their original location and context, for example an archaeological site that has not been disturbed by farming.

Late Iron Age this period is associated with the development of complex societies and state systems in southern Africa.

Material culture Buildings, structure, features, tools and other artefacts that constitute the remains from past societies.

Site A distinct spatial cluster of artefacts, structures, organic and environmental remains, as residues of past human activity.

Acronyms:

AIA	Archaeological Impact Assesment
EIA	Environmental Impact Assesment
EIA	Early Iron Age
EMP	Environmental Management Plan
MHG	Millenium Heritage Group (PTY)LTD
NEMA	National Environmental Management Act, 1998 (Act No.107 of 1998)
NHRA	National Heritage Resources Act, 1999 (Act No.25 of 1999)
SAHRA	South African Heritage Resources Agency
ESA	Early Stone Age
MSA	Middle Stone Age
LSA	Late Stone Age
IA	Iron Age
LIA	Late Iron Age
UNESCO	United Nations Educational, Scientific and culturural Organization
WHC	World Heritage Conventions of 1972

ADDENDUM 2: Types and ranges as outlined by the National Heritage Resource Act (Act 25 of 1999)

The National Heritage Act (Act No 25 of 1999, Art 3) outlines the following types and ranges of the heritage resources that qualify as part of the national estate, namely:

(a) Places, buildings structures and equipment of cultural significance;
(b) Places to which oral tradition are attached or which are associated with living heritage;
(c) Historical settlement and townscapes
(d) Landscape and natural features of cultural significance;
(e) Geological sites of scientific or cultural importance
(f) Archaeological and paleontological sites
(g) Graves and burial ground including-
    (I) Ancestral graves
    (II) Royal graves and graves of traditional leaders
    (III) Graves of victim of conflict
    (IV) Graves of individuals designated by the minister by notice in the gazette;
    (V) Historical graves and cemeteries; and
    (VI) Other human remains which are not covered by in terms of the Human Tissue Act,1983(Act No 65 of 1983)
(h) sites of significance relating to the history of slavery in South Africa;
(i) movable objects, including-
    (I) object recovered from soil or waters of South Africa, including archaeological and paleontological objects and material, meteorites and rare geological specimens;
    (II) objects to which oral traditions are attached or which are associated with living heritage
    (III) ethnographic art and objects;
    (IV) military objects;
    (V) objects of decorative or fine art;
    (VI) object of scientific or technological interest; and
    (VII) books, records, documents, photographs, positive and negatives, graphic, film or video material or sound recording, excluding those that are public records as defined in section1(xiv) of the National Archives of South Africa Act,1996(Act No 43 of 1996).

The National Heritage Resource Act (Act No 25 of 1999,Art 3)also distinguishes nine criteria for places and objects to qualify as 'part of the national estate if they have cultural significance or other special value… these criteria are the following:

(a) its importance in the community, or pattern of South Africa's history;
(b) its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
(c) its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
(d) its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
(e) its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;

(f) its importance in demonstrating a high degree of creative or technical achievement at a particular period;
(g) its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons
(h) Its strong or special association with the life or work of a person, group or organization of importance in the history of South Africa
(i) Sites of significance relating to the history of slavery in South Africa.

Wetland Assessment

Maanakana Projects
and Consulting (Pty) Ltd

WETLAND ASSESSMENT AND DELINEATION REPORT IN SUPPORT OF THE PROPOSED IKOMKHULU SOLAR PLANT PROJECT AT PORTION 5 OF THE FARM VAN ZOELEN'S LAAGTE NO 158, MAGARENG LOCAL MUNICIPALITY, FRANCES BAARD DISTRICT MUNICIPALITY IN THE NORTHERN CAPE PROVINCE.

PREPARED FOR

Ikomkhulu Solar (Pty) Ltd

Prepared by: Maanakana Projects and Consulting (Pty) Ltd

Report Reference No.: 04MPC2022

DECEMBER 2022

DOCUMENT CONTROL AND PROJECT TEAM

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Draft Report Ref. No.	04MPC2022	
Final Report Ref.No.		

DECLARATION

We, Maanakana Projects and Consulting (Pty) Ltd, in our capacity as specialist consultant, hereby declare that we:

- Act as an independent consultant;
- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- Undertake to disclose to the competent authority, any material and/or information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- As a registered member of the South African Council for Natural Scientific Professions, will undertake our profession in accordance with the Code of Conduct of the Council, as well as any other societies to which we are members; and
- Based on information provided to us by the project proponent, and in addition to the information obtained during desktop study, fieldwork investigations have presented the results and conclusion to the best of our professional judgment.

……

Dr. Milambo Freddy Tshiala

EXECUTIVE SUMMARY

i. Introduction

Maanakana Projects and Consulting (Pty) Ltd was appointed by Tholoana Consulting on behalf of Ikomkhulu Solar (Pty) Ltd to conduct a wetland delineation and assessment as part of the environmental assessment and authorization process for the proposed Ikomkhulu Solar Plant Project at Portion 5 of the farm van Zoelen's Laagte No 158, Magareng Local Municipality, Frances Baard District Municipality in the Northern Cape Province.

ii. Approach and Methodology

- The wetlands were delineated according to the Department of Water and Sanitation (DWS) (DWAF, 2005) guidelines and procedures, and assessed based on the WET-Health (Macfarlene et al., 2020) and WET-Eco services scoring systems (Kotze *et al*., 2020).
- Desktop assessment of the site where various data sources were utilized to obtain background information, including 1:50000 Maps, NFEPA (2011) data, and Ecosystem Sensitivity data.
- DEA Screening tool was used to identify sensitive aquatic areas.
- The site visit was undertaken from the 12th of November 2022.
- ArcGIS and Google map used to analyse data.

iii. Wetland Assessment Results

Several HGM unit were observed on-site during the site visit, 2 HGM units were observed on-site and assessed since they will be directly impacted by the proposed development and they have been discussed in detail within this report.

iv. Impact Assessment

An impact assessment, considering the impacts currently observed on the water resources, has been determined and proposed mitigation measures were developed to minimize the impacts, where possible. Several impacts/land uses of the respective wetlands were observed, and this included the presence of alien invasive plants, clearance or disturbance of natural habitat (in a

form of roads and other anthropogenic (mainly Quarry- diamonds, grazing farms, etc) activities), within the study area.

v. Recommendations and Conclusion

This study has reviewed the available literature and assessed the wetlands within the vicinity of the proposed development site in the form of a site visit undertaken on the 12th of November 2022. According to the National Freshwater Ecosystem Priority Areas (NFEPA) data, there are several wetlands identified close to the proposed development sites. Within the study area, 2 HGM units were assessed as they are the once likely to be impacted directly by the development.

In a case where this study is for the Competent Authorities to make a decisive conclusion on an Authorisation or permit, it is the opinion of the Specialist that this development be approved However, all essential mitigation measures and recommendations presented in this report should be adhered to. This will ensure that the water quality and ecology within the proposed development areas as well as the surrounding zone of influence are protected or adequately rehabilitated. This will minimize the deviations from the present state. Particular attention needs to be paid to the location and extent of sensitive aquatic and terrestrial (riparian) habitat to ensure that development-related activities do not unnecessarily encroach into these zones and that the ongoing functionality of these systems is ensured.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF TERMS

Alien vegetation: Plants that do not occur naturally within the area but have been introduced either intentionally or unintentionally. Vegetation species that originate from outside of the borders of the biome -usually international in origin.

Alluvial soil: A deposit of sand, mud, etc. formed by flowing water or the sedimentary matter deposited thus within recent times, especially in the valleys of large rivers.

Biodiversity: The number and variety of living organisms on earth, the millions of plants, animals, and micro-organisms, the genes they contain, the evolutionary history and potential they encompass, and the ecosystems, ecological processes, and landscape of which they are integral parts.

Buffer: A strip of land surrounding a wetland or riparian area in which activities are controlled or restricted, in order to reduce the impact of adjacent land uses on the wetland or riparian area.

Catchment: The area contributing to runoff at a particular point in a river system.

Delineation: the technique of establishing the boundary of an aquatic resource such as a wetland or riparian area.

Drain – In the context of wetlands, refers to a natural or artificial feature such as a ditch or trench created for the purpose of removing surface and sub-surface water from an area (commonly used in agriculture).

Ecological Importance – An expression of the importance of an environmental resource for the maintenance of biological diversity and ecological functioning on local and wider scales.

Ecological Sensitivity – A system's ability to resist disturbance and its capability to recover from disturbance once it has occurred.

Ecoregion: An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterize that region".

Facultative species: Species usually found in wetlands (76%-99% of occurrences) but occasionally found in non-wetlands areas.

Groundwater: Subsurface water in the saturated zone below the water table.

Gulley (or erosion gulley) - A gully (commonly called a "donga") is an erosion landform or feature, created by running water eroding sharply into the soil. Gullies generally resemble small ditches that can be several meters in depth and width. Gullying or gully erosion is the process by which gullies are formed.

Hydromorphic soil: A soil that in its undrained condition is saturated or flooded long enough to develop anaerobic conditions favouring the growth and regeneration of hydrophytic vegetation (vegetation adapted to living in anaerobic soils).

Hydromorphic: A process of greying and mottling resulting from the intermittent or permanent presence of excess water in the soil profile

Indigenous vegetation: Vegetation occurring naturally within a defined area.

NFEPA – National Freshwater Ecosystem Priority Areas, identified to meet national freshwater conservation targets (CSIR, 2010).

Obligate species: Species are almost always found in wetlands (>99% of occurrences).

PES – Present Ecological State, referring to the current state or condition of an environmental resource in terms of its characteristics and reflecting the change from its reference condition.

Perennial: Flows all year round.

Ramsar: The Ramsar Convention (The Convention on Wetlands of International Importance, especially as Waterfowl Habitat) is an international treaty for the conservation and sustainable utilization of wetlands, i.e., to stem the progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value. It is named after the city of Ramsar in Iran, where the Convention was signed in 1971.

Reserve - The quantity and quality of water needed to sustain basic human needs and ecosystems (e.g. estuaries, rivers, lakes, groundwater, and wetlands) to ensure ecologically sustainable development and utilization of a water resource. The Ecological Reserve pertains specifically to aquatic ecosystems.

Seasonal zone of wetness: The zone of a wetland that lies between the Temporary and Permanent zones and is characterized by saturation from three to ten months of the year, within 50cm of the surface.

Temporary zone of wetness: The outer zone of a wetland is characterized by saturation within 50cm of the surface for less than three months of the year.

1 INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

Maanakana Projects and Consulting (Pty) Ltd was appointed by Tholoana Consulting on behalf of Ikomkhulu Solar (Pty) Ltd to conduct a wetland delineation and assessment as part of the environmental assessment and authorization process for the proposed Ikomkhulu Solar Plant Project at Portion 5 of the farm van Zoelen's Laagte No 158, Magareng Local Municipality, Frances Baard District Municipality in the Northern Cape Province.

To identify all freshwater ecosystems that may potentially be impacted by the activities associated with the proposed infrastructure, a 500 m "zone of investigation" around the study area, in accordance with Government Notice (GN) 509 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) (NWA) was used as a guide in which to assess possible sensitivities of the receiving environment. This 500 m "zone of investigation" will henceforth be referred to as the investigation area. The National Water Act, 1998 (Act No. 36 of 1998, NWA), wetlands are referred to as areas that are transitional between aquatic and terrestrial environments, where the water table is usually at or near the surface, where the land is periodically covered with shallow water, and which land in normal circumstances will support vegetation typically adapted to life in saturated soils. Wetlands are classified as water resources, and as such are protected and should not be subject to pollution or damage.

The purpose of this report is to define the ecology of the proposed developments in terms of freshwater resource characteristics, mapping of the resources, discuss key ecological drivers and defining areas of increased Ecological Importance and Sensitivity (EIS), and to define the Present Ecological State (PES) of the freshwater resources associated with the proposed developments. It is a further objective of this study to provide current impacts on the wetlands and provide mitigation measures.

This Wetland Assessment was conducted as a specialist study and was done in accordance with requirements of appendix 6 as per the National Environmental Management Act (Act 107 of 1998) (NEMA): Environmental Impact Assessment (EIA) Regulations (2017).

1.2 PROJECT DESCRIPTION

The proposed Ikomkhulu Solar Plant project entails the construction of Solar Photovoltaic (PV) power plant to feed into the National Grid (Eskom), at Portion 5 of the Farm Van Zoelen's Laagte No 158, where the size of the property is approximately 642.4385 Ha, however the footprint for the plant is approximately 400Ha. The site area falls within ward 4, Dikgatlong Local Municipality, Frances Baard District Municipality in the Northern Cape Province, country South Africa.

SOLAR PLANT SETUP

- Solar PV panels which receive the energy from the sun, from which the Direct Current (DC) energy goes through a combiner box, which combines the outputs of the different strings of PV modules to the inverter. Batteries are used for the storage of energy before the conversion takes place using the inverter.
- The energy from the sun in the form of DC is converted (factor in the stored energy from the batteries) to Alternating Current energy (electricity), by the invertor. The next phase is the smart transformer station facility which consists of equipment with controls for switching (this mainly comprises of various facilities for operational controls, including operational offices and protection of the current) from which it goes to the substation (Eskom), then transferred to the Eskom grid line for distribution. Refer to Figure 1-1: Typical Solar Plant, below,

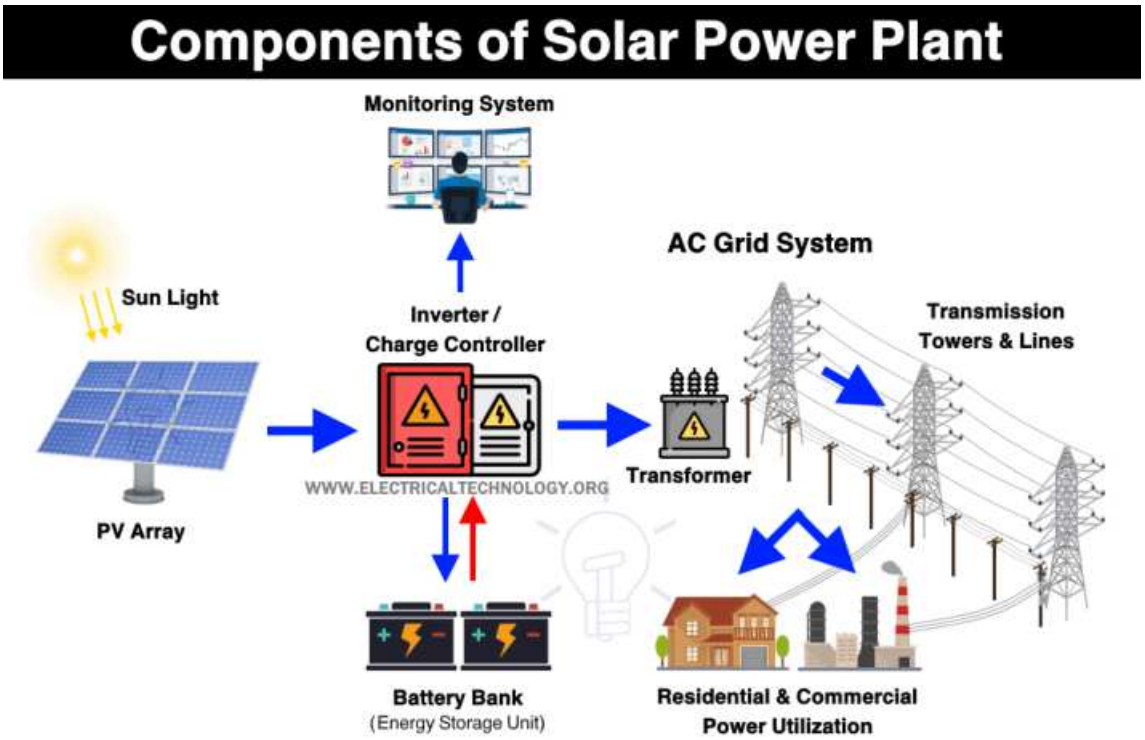


Figure 1-2: Typical Solar Plant

- Other key features for the solar plant, includes but not limited to Materials and equipment storage areas, security areas (access control). Refer to Figure 1-3: to the typical setup below.

Figure 1-3: Typical layout for the operations and maintenance centre

INSTALLATION PARAMETERS

- Mounting: The proposed system for mounting the solar panels is the fixed tilt systems, which are rack mounted at 30 degrees for capturing the energy from the sun. As compared to the single axis tracking systems the fixed tilt mountings has the following

advantages and disadvantages, although best suited for the proposed development on the basis of the energy from the sun (Location setting):

o Less weight and cost.

o The only disadvantage is the less energy production.

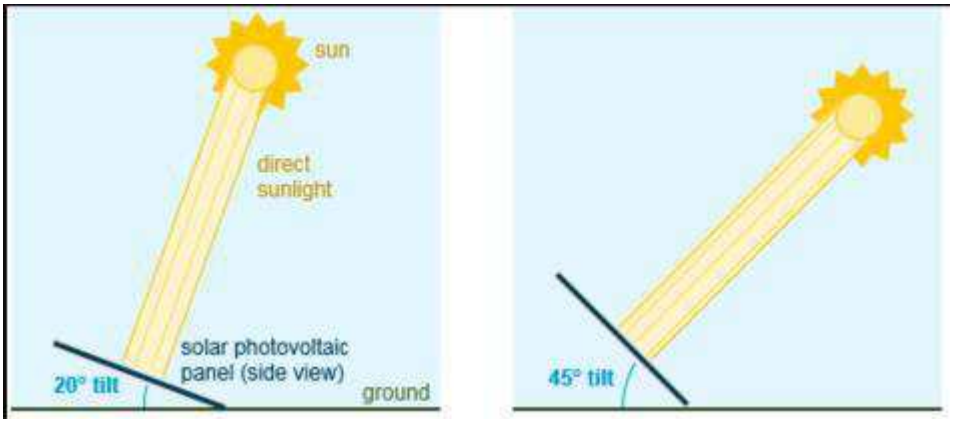


Figure 1-4: Example of a fixed tilt mountings

- PV Panels: There are generally two types of panel system in the market, which are monocrystalline and polycrystalline solar panels. The difference between the two panels is mainly the materials i.e. the silicon ratio. Other than the silicon ratio, other factors includes but not limited to availability on the market, maintenance costs and the amount of energy the panel can produce. The polycrystalline panels are the preferred option for the proposed development, as they would supplement the type of mounting proposed in order to get more energy and do not degrade easily.

OTHER SPECIFICATIONS

- The surface area for the panels is approximately 1.752m2, with an estimated energy output of 250W, each.
- A total number of 628 320 panels is proposed on the land for the proposed development, wherein the total land for consideration is approximately 359 Ha, this will accommodate the associated infrastructure i.e. invertor, the smart tanks (acting as reservoirs), the existing substation and control room.
- The given recommendation as per the feasibility study area for land allocation within the 359Ha is an allocation of 2Ha per MW.

1.3 DETAILS AND EXPERTISE OF THE SPECIALIST

According to Appendix 6, section 1 (1) A specialist report prepared in terms of these Regulations must contain—(a) details of—(i) the specialist who prepared the report; and(ii) the expertise of

that specialist to compile a specialist report including a curriculum vitae;", provided below are the details of the Specialist who prepared this Wetland assessment and delineation Report, as well as the expertise of the individual members of the study team. Table 1 below outlines the Project Team with their details and qualifications.

Table 1: Specialists Details

	SPECALIST NAMES	**COMPANY**
Fieldwork Specialist & Report Writing	Milambo Freddy Tshiala (BSc in Agriculture, MSc & PhD in Environment and Society (Pr.Sci.Nat.: 4000021/18))	Maanakana Projects and Consulting (Pty) Ltd
Report Reviewer	Nonkanyiso Zungu (BSc Hon. Ecology, MSc. Env. Mngt, PhD Candidate) (Pr.Sci.Nat.:400194/10)	Maanakana Projects and Consulting (Pty) Ltd
Contact details	Email: maanakanaprojects@gmail.com	Cell: 0836691702

1.4 TERMS OF REFERENCE AND OBJECTIVES

Specific outcomes in terms of this report are outlined below:

- Determine and ground truth of the wetlands assessed previously on-site and those shown by the NFEPA data (Site assessment undertaken from the 12th of November 2022).
- A wetland delineation was conducted following the guidelines contained in the DWAF (DWS) Guideline document entitled "A Practical Field Procedure for Identification and delineation of wetlands and riparian areas" (DWAF, 2005a).
- Determine the functionality of wetlands, using the Version 2 Wet-EcoServices (Kotze et al. (2020)) assessment for wetlands tool.
- Determine the Present Ecological Status (PES) of identified wetlands within the study area by applying a Level 1B Wet-Health assessment (Macfarlane et al., 2020).
- Determine the Ecological Importance and Sensitivity (EIS) for the identified wetlands by utilizing the methodology described by Rountree (2013).
- Document field and desktop data and classify confirmed wetlands into hydrogeomorphic units.
- Recommendations on management and mitigation measures (including opportunities and constraints) with regards to the development and operation of the proposed development to improve, manage and mitigate impacts on the freshwater ecology of the area will be provided.

1.5 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations are applicable to this report:

- A single season baseline assessment was conducted, thus limiting the amount of biota identified at the site;
- Accuracy of the maps, aquatic ecosystems, routes, and desktop assessments was made using the current 1:50 000 topographical map series of South Africa
- Site assessment was limited to the development area.
- The GPS used for water resource delineations was accurate to within five meters. Therefore, the wetland delineation plotted digitally may be offset by at least five meters to either side.
- The freshwater resource delineations as presented in this report are regarded as the best estimate of the freshwater resource boundaries based on the site conditions at the time of the assessment.
- Aquatic, wetland and riparian ecosystems are dynamic and complex. The effects of natural seasonal and long-term variations in the ecological conditions are therefore largely unknown.
- The study area is also used for residential and commercial purposes, therefore most of the biodiversity distribution has changed over time and has been highly impacted.
- Although background information was gathered, the information provided in this report was mainly derived from what was observed on the study site at the time of the field survey.
- Description of the depth of the regional water table and geohydrological processes falls outside the scope of the current assessment.

1.6 INDEMNITY AND TERMS OF USE OF THIS REPORT

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and Maanakana Projects and Consulting as well as its staff reserve the right to modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field or pertaining to this investigation.

Although Maanakana Projects and Consulting exercises due care and diligence in rendering services and preparing documents, Maanakana Projects and Consulting accepts no liability and the client, by receiving this document, indemnifies Maanakana Projects and Consulting and its directors, managers, agents and employees against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by Maanakana Projects and Consulting and by the use of the information contained in this document.

This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must refer to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

1.7 LEGISLATIVE REQUIREMENTS

The following legislations are important and applicable to the proposed Ikomkhulu Solar Plant Project.

1.7.1 THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA, 1996 (ACT 108 OF 1996)

The Constitution of the Republic of South Africa, 1996 has major implications for environmental management. The main effects are the protection of environmental and property rights, the drastic change brought about by the sections dealing with administrative law such as access to information, just administrative action and broadening of the locus standi of litigants. These aspects provide general and overarching support and are of major significance in the effective implementation of the environmental management principles and structures of the Environment Conservation Act and NEMA. Section 24 in the Bill of Rights of the Constitution specifically states:

"Everyone has the right –

- *To an environment that is not harmful to their health or well-being; and*
- *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -*

- *Prevent pollution and ecological degradation.*
- *Promote conservation; and*
- *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*"

Section 24 of the Constitution therefore places a duty on all spheres of government to take reasonable steps, including making laws, preventing pollution, promoting conservation, and ensuring sustainable development. Undertaking a wetland assessment that supports the environmental impact assessment, cover the sensitivity of aquatic systems and provides mitigation measures where impacts are envisioned.

1.7.2 NATIONAL WATER ACT, 1998

In a South African legal context, the term watercourse is often used rather than the terms wetland, or river. The National Water Act, 1998 (Act No. 36 of 1998) (NWA) includes wetlands and rivers into the definition of the term watercourse (DWAF, 2005).

The NWA defines a riparian habitat as follows: "Riparian habitat includes the physical structure and associated vegetation of the areas associated with a watercourse, which are commonly characterized by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with composition and physical structure distinct from those of adjacent land areas."

The NWA defines a wetland as "land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface and the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil."

If there is any encroachment into wetlands, or within the boundaries of wetlands and/or riparian zones, a Water Use License will be required from DWS under Section 21 of the National Water Act (Act 36 of 1998). Government Notice 1199 is also applicable, that any activity within the 500m boundary of a wetland is excluded in the GA and therefore a water use authorization must be applied for.

1.7.3 NATIONAL **ENVIRONMENTAL MANAGEMENT ACT (NEMA)**

1 (1) **A Specialists' reports must comply with Appendix 6 of Government Notice No. 326 of 07 April 2017 as published under sections 24(5), and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and whereby the following are to be included**:

a) The details of:
    a. The specialist who prepared the report; and
    b. The expertise of that specialist to compile a specialist report including curriculum vitae.
b) A declaration that the specialist is independent in a form as may be specified by the competent authority;
c) An indication of the scope of, and the purpose for which, the report was prepared;
d) The date and season of the site investigation and the relevance of the season to the outcome of the assessment;
e) a description of the methodology adopted in preparing the report or carrying out the specialized process inclusive of equipment and modeling used;
f) details of an assessment of the specifically identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternative;
g) an identification of any areas to be avoided, including buffers;
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;
i) a description of any assumptions made and any uncertainties or gaps in knowledge;
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment or activities;
k) any mitigation measures for inclusion in the EMPr;
l) any conditions for inclusion in the environmental authorization;
m) any monitoring requirements for inclusion in the EMPr or environmental authorization;
n) a reasoned opinion—
        i. (as to) whether the proposed activity, activities or portions thereof should be authorized;
        ii. (ia) regarding the acceptability of the proposed activity or activities; and
        iii. if the opinion is that the proposed activity, activities or portions thereof should be authorized, any avoidance, management, and mitigation

measures that should be included in the EMPr, and where applicable, the closure plan;

o) a description of any consultation process that was undertaken during the course of preparing the specialist report;
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
q) any other information requested by the competent authority.

1.7.4 OTHER LEGAL REGULATORY REQUIREMENTS

In addition to the above, the proponent must also comply with the provisions of the following relevant national legislation, conventions, and regulations applicable to wetlands and riparian zones:

- Convention on Wetlands of International Importance - the Ramsar Convention and the South African Wetlands Conservation Programme (SAWCP).
- National Environment Management Protected Areas Act, 2003 (Act No. 57 of 2003).
- Regulations GN R.543, R.544 and R.545 of 2010, promulgated under NEMA.
- Conservation of Agriculture Resources Act, 1983 (Act 43 of 1983).
- Regulations and Guidelines on Water Use under the NWA.
- South African Water Quality Guidelines under the NWA.
- Environment Conservation Act, 1989 (Act No. 73 of 1989).
- Other Provincial ordinances and municipal by laws

2 BASELINE SITE DISCRIPTION

2.1 SITE DESCRIPTION AND PROPOSED SITE ACTIVITIES

2.2 PROJECT DESCRIPTION

The proposed Ikomkhulu Solar Plant project entails the construction of Solar Photovoltaic (PV) power plant to feed into the National Grid (Eskom), at Portion 5 of the Farm Van Zoelen's Laagte No 158, where the size of the property is approximately 642.4385 Ha. However the footprint for the plant is approximately 400Ha. The site area falls within ward 4, Dikgatlong Local Municipality, Frances Baard District Municipality in the Northern Cape Province, country South Africa. Refer to Figure 2-1, below.

Figure 2-1: Proposed development Locality Map

The development site/land has been surveyed therefore there is a 21-digit Surveyor General (SG) code available for each cadastral land parcel, Table 2 below outlines the property at which the proposed development with be taking place.

Table 2: Proposed development property details

Province	Northern Cape
Local Municipality	Dikgatlong Local Municipality
District Municipality	Frances Baard District Municipality
Ward Number (s)	4
Farm Name and Number	Portion 5 of the Farm Van Zoelen's Laagte No 158
21-digit SG Code	C07000000000015800005
Centre Coordinates	28°21'42.74"S; 24°40'49.50"E

3 METHODOLOGY

3.1 WETLAND DELINEATION

The outer boundary of wetlands was identified and delineated according to the Department of Water Affairs wetland delineation manual '*A Practical Field Procedure for Identification and Delineation of Wetland and Riparian Areas*' (DWAF, 2005a). The guidelines state that a wetland delineation procedure must identify the outer edge of the temporary zone of the wetland, which marks the boundary between the wetland and adjacent terrestrial areas and is that part of the wetland that remains flooded or saturated close to the soil surface for only a few weeks in the year, but long enough to develop anaerobic conditions and determine the nature of the plants growing in the soil.

The guidelines list four indicators to be used for the finding of the outer edge of a wetland. These are:

1. Terrain unit indicator
   - A practical index is used for identifying those parts of the landscape where wetlands are likely to occur based on the general topography of the area.
   - The terrain unit indicator does not only identify valley bottom wetlands but also wetlands on steep and mild slopes in the crest, mid slope, and foot slope positions.

2. Wetland vegetation indicator
   - Vegetation in an untransformed state is a useful guide in finding the boundary of a wetland as plant communities generally undergo distinct changes in species composition as one proceeds along the wetness gradient from the center of a wetland towards adjacent terrestrial areas. An example of criteria used to classify wetland vegetation and inform the delineation of wetland zones is provided in

Table 3 below and it was adapted from Macfarlane et al., 2007 and DWAF, 2005a.

- Although vegetation is the key component of the definition of a wetland in the National Water Act (No 36 of 1998), it is often the case that wetland areas have been disturbed in the past. This alters the type of vegetation currently growing in the wetland because vegetation communities are dynamic and react rapidly to external factors. The delineation guidelines, therefore, place greater emphasis on soil wetness indicators, as these are more permanent indicators of wetland presence.

Table 3: Criteria used to inform the delineation of wetland habitat based on wetland vegetation

Vegetation	Temporary wetness zone	Seasonal wetness zone	Permanent wetness zone
Herbaceous	Mixture of non-wetland species and hydrophilic plant species restricted to wetland areas	Hydrophilic sedges and grasses restricted to wetland areas	Emergent plants including reeds and bulrushes; floating or submerged aquatic plants
Woody	Mixture of non-wetland and hydrophilic|species restricted to wetland areas	Hydrophilic woody species restricted to wetland areas	Hydrophilic woody species restricted to wetland areas with morphological adaptations to prolonged wetness (e.g.: prop roots)
SYMBOL	**HYDRIC STATUS**	**DESCRIPTION/OCCURRENCE**	
ow	Obligate wetland species	Almost always grow in wetlands (>90% occurrence)	
fw	Facultative wetland species	Usually grow in wetlands (67-99% occurrence) but occasionally found in non-wetland areas	
f	Facultative species	Equally likely to grow in wetlands (34-66% occurrence) and non-wetland areas	
fd	Facultative dry-land species	Usually grow in non-wetland areas but sometimes grow in wetlands (1-34% occurrence)	
d	Dryland species	Almost always grow in drylands	

3. Soil wetness indicator

- According to the wetland definition used in the National Water Act (NWA, 1998), vegetation is the primary indicator that must be present under normal circumstances. However, in practice, the soil wetness indicator (informed by investigating the top 50cm of wetland topsoil) tends to be the most important, and the other three indicators are used to refine the assessment. The reason for this is that vegetation responds relatively quickly to changes in soil moisture and may be transformed by local impacts; whereas the soil morphological indicators are far more permanent and will retain the signs of frequent saturation (wetland conditions) long after a wetland has been transformed/drained (DWAF, 2005a). Thus, the on-site assessment of wetland indicators focused largely on using soil wetness indicators,

determined through soil sampling with a soil auger, with vegetation and topography being a secondary indicator. A Munsell Soil Colour Chart was used to ascertain soil colour values including hue, colour value, and matrix chroma as well as a degree of mottling to inform the identification of wetland (hydric) soils. An example of soil criteria used to assess the presence of wetland soils is provided below in Table 4.

Table 4: Soil criteria used to inform wetland delineation using soil wetness as an indicator

Soil depth	Temporary wetness zone	Seasonal wetness zone	Permanent wetness zone
0 – 10cm	**Matrix chroma**: 1- 3 (Grey matrix <10%) **Mottles**: Few/None high chroma mottles **Organic Matter**: Low **Sulphidic**: No	**Matrix chroma**: 0- 2 (Grey matrix >10%) **Mottles**: Many low chroma mottles **Organic Matter**: Medium **Sulphidic**: Seldom	**Matrix chroma**: 0- 1 (Prominent grey matrix) **Mottles**: Few/None high chroma mottles **Organic Matter**: High **Sulphidic**: Often
30 – 50cm	**Matrix chroma**: 0 – 2 **Mottles**: Few/Many	As Above	As Above

3.1.1 DESKTOP STUDY

Wetland identification were done at a desktop level prior to the site survey. NFEPA (2011) and other spatial data was used.

3.1.2 FIELD SURVEY

The types of vegetation present were used as a guideline for interpreting current moisture levels and likely degree of disturbance. Soil forms were identified and separated into terrestrial soils forms and hydric soils forms (although several soil forms have to be utilized with caution as several soil forms could exhibit a high degree of variation with regards to hydric properties). Specific attention was given to the following redoximorphic features used to identify and delineate wetlands, as discussed by Richardson and Vepraskas (2001):

- A reduced matrix- Identified as having relative grey colours with a low chroma of less than or equal to 4 (Soil Classification working group, 1991). This is due to the presence of Fe^{2+} (the absence of Fe^{3+}), meaning that the soil has been reduced for significant periods.
- Redox depletions- Bodies of soil with a low chroma grey colour, indicating that the Fe and Mn oxides in the soil have been stripped out. Redox depletions occur in the form of iron depletion and clay depletions. In structured soils, soil peds indicative of redox depletions have a low chroma on their surfaces, while the matrix of the ped has a

higher chroma. In structure fewer soils, grey mottles are indicative of iron depletion. Clay depletions occur when silicate clay minerals are decomposed, and the elementary chemical components are removed by leaching. These areas then contain less iron, manganese, and clay than the adjacent soils.

- Redox concentrations- An accumulation of iron and manganese oxides that occur as Fe-Mn concretions, mottles, and pore linings. Fe-Mn concretions that are indicative of hydric soils are firm to extremely firm irregularly shaped bodies with diffuse boundaries. Mottles are soft bodies of irregular shape within a soil matrix, recognized as blotches or spots of high chroma (usually red or yellow for iron and black for manganese). Pore linings are zones of Fe and Mn accumulation along the route of plant roots. They can occur as coatings on a pore surface or impregnations of the matrix adjacent to the pore (Vepraskas, 1995).

3.2 WETLAND CLASSIFICATION

For this study, wetlands were classified according to HGM (hydrogeomorphic) type (Level 4A classification level) using the National Wetland Classification System which was developed for the South African National Biodiversity Institute (SANBI, 2009) as outlined in Table 5 below.

Table 5: Wetland classification (based on SANBI, 2009)

LEVEL 3	LEVEL 4A	
Landscape Setting	**HGM Type**	**Description**
SLOPE	Channel (river)	*Areas of channelled flow including rivers and streams where water is largely confined to a main channel during low flows. Flood waters may over top the banks of the channel and spread onto an adjacent floodplain*
	Hillslope seep	*Wetlands on slopes formed mainly by the discharge of sub-surface water.*
VALLEY FLOOR	Channel (river)	*River channels in a valley floor setting.*
	Channelled valley-bottom wetland	*Valley floors with one or more well-defined stream channels, but lacking characteristic floodplain features.*
	Unchannelled valley-bottom wetland	*Valley floors with no clearly defined stream channel.*
	Floodplain wetland	*Valley floors with a well-defined stream channel, gently sloped and characterised by floodplain features such as oxbows and natural levees.*
	Depression	*Basin-shaped areas that allow for the accumulation of surface water, an outlet may be absent (e.g. pans).*
	Valleyhead seep	*Seeps located at the head of a valley, often the source of streams.*
PLAIN	Channel (river)	*River channels in a plain landscape setting.*
	Floodplain wetland	*Floodplain wetlands as above but in a plain landscape setting.*
	Unchannelled valley-bottom wetland	*Unchannelled valley bottom type wetlands as above but in a plain landscape setting.*
	Depression	*Depression type wetlands as above but in a plain landscape setting.*
	Flat	*Extensive areas characterised by level, gently undulating or uniformly sloping land with a very gentle gradient.*
BENCH (HILLTOP / SADDLE / SHELF)	Depression	*Depression wetlands located on a bench.*
	Flat	*Flat wetlands located on a bench.*

3.2.1 DESCRIBING THE HYDROGEOMORPHIC TYPE OF A WETLAND

Wetlands were classified according to HGM (hydrogeomorphic) type which is defined based on geomorphic setting (e.g. hillslope or valley bottom), water source (surface water dominated, or sub-surface water dominated), and how water flows through the wetland unit (diffusely or channeled). Each wetland unit distinguished based on hydro-geomorphic type were assessed individually. Figure 3-1 below indicates the wetland hydro-geomorphic setting of inland wetlands in South Africa.

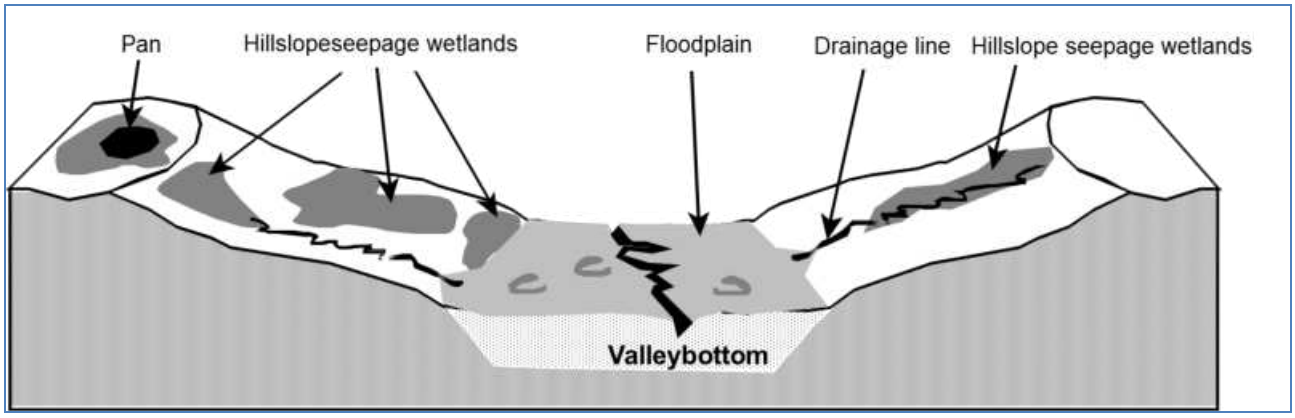


Figure 3-1: Wetland hydro-geomorphic setting

Since the importance of wetland goods and benefits is dictated not only by the supply (benefit availability) of a particular good/benefit but also on the need or demand (user requirement) for such a benefit, the overall importance of the ecosystem service or benefit is ultimately derived from a combination of supply and demand scores. For example, a wetland may supply a particular service relatively freely; however, this service may not be in great demand, limiting the importance of the benefit to society.

3.2.2 FUNCTIONAL ASSESSMENT

The functionality of wetlands was determined through a combination of the wetland's present ecological state and the ecosystem services that the wetland provides. These were assessed using WET-Health (McFarlane *et al*., 2020) and WET-Eco services (Kotze *et al*., 2020), where the Level 1B wetland assessment tool was deployed. Wetland "health" and wetland ecosystem services have a generic relationship, where a wetland that is near its pristine, non-impacted state, should provide a higher amount of ecosystem services compared to a wetland that has been heavily degraded and therefore has lost its ability to provide these ecosystem services. The tools are therefore meant to complement each other (Figure 3-2).

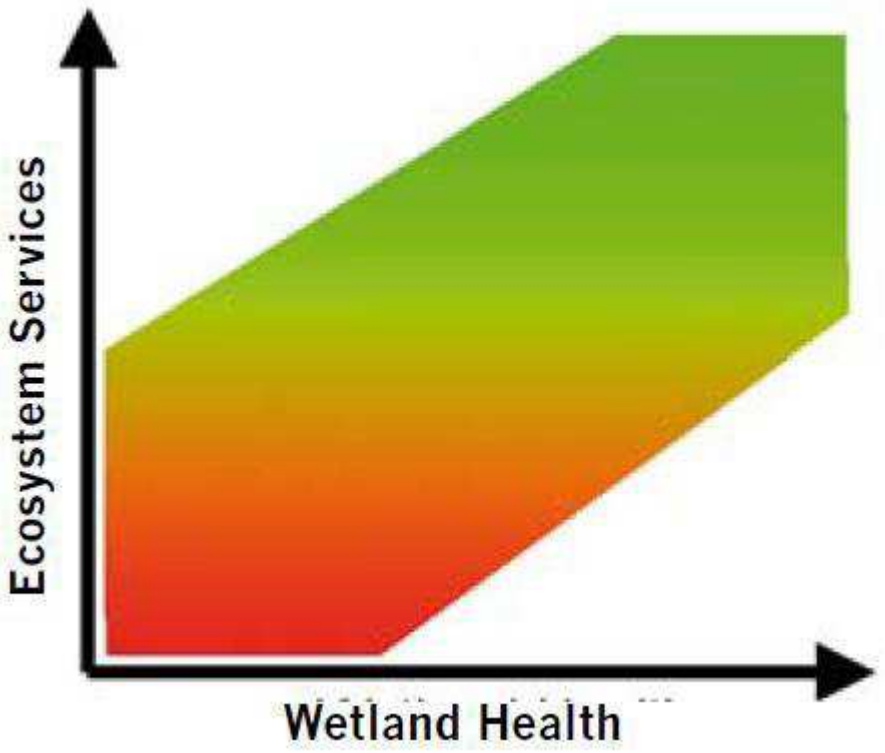


Figure 3-2: The relationship between wetland health and delivery of goods and services (Macfarlane *et al*., 2009).

3.2.3 WETLAND HEALTH ASSESSMENT

The ecological state of a wetland can be defined according to the wetland's reference condition, which is the state of the wetland before anthropogenic influences. This is in line with the ecosystem integrity definition of Anderson (1991) where the reference condition is an un-impacted condition in which ecosystems show little or no influence of human actions. The assessment is based on the approach where the impacts that underpin wetland ecosystems are quantified.

An assessment tool known as WET-Health (Macfarlane *et al*., 2020) was used for the present ecological state (PES) assessment, where the Level 1B wetland assessment tool was used. WET-Health examines the present ecological status "Health" of a wetland by determining the degree of deviation from the natural reference condition for three components, namely: hydrology, geomorphology, water quality, and vegetation (Kotze *et al*., 2020). The hydrological component examines the quantity and timing of water inputs and the pattern of water flow through the wetland, geomorphology examines sedimentary inputs and

outputs and geomorphic indicators of these, while vegetation examines the relative abundance of plant functional groups (Kotze *et al*., 2020).

These three components are assessed separately to avoid double-counting, although it is recognized that they are closely interlinked in that geomorphological integrity affects hydrological integrity, and both affect vegetation, which may, in turn, have feedback effects on the wetland system (Kotze *et al*., 2020). Once classified according to the wetland's HGM unit, the ecological condition of the wetland is determined by separately assessing the spatial extent, intensity, and magnitude of human modifications on each HGM unit (Macfarlane *et al*., 2008).

The spatial extent refers to the proportion of the wetland and/or its catchment affected by a given activity. The intensity refers to the degree to which wetland characteristics have been altered within the affected area and is informed by several predetermined criteria that are rated and aggregated in an algorithm to obtain an intensity score. A procedure is then followed whereby the results from different modules can be integrated into a single score that can be used to categorize the overall present ecological condition of a wetland (Macfarlane *et al*., 2008), and are shown in Table 6 below.
The formula is as follows:
Overall health rating = [(Hydrology*3) + (Geomorphology*2) + (Vegetation*2)] / 7

Table 6: Health categories used by WET-Health for describing the integrity of wetlands

HEALTH CATEGORY	DESCRIPTION	Min Score
A	Unmodified, natural.	0 – 0.9
B	Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1 – 1.9
C	Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact.	2 – 3.9
D	Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred.	4 – 5.9
E	The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.	6 – 7.9

F	Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8 – 10

3.3 WETLAND ECOLOGICAL IMPORTANCE AND SENSITIVITY (EIS)

The Ecological Importance and Sensitivity was determined by utilizing a rapid scoring system (Table 7). The system has been developed to provide a scoring approach for assessing the Ecological, Hydrological Functions, and Direct Human Benefits of importance and sensitivity of wetlands. These scoring assessments for these three aspects of wetland importance and sensitivity have been based on the requirements of the NWA, the original Ecological Importance and Sensitivity assessments developed for riverine assessments, and the work conducted by Kotze *et al.,* (2020) on the assessment of wetland ecological goods and services from the WET-EcoServices tool (Rountree et al., 2013). The maximum score for these components was taken as the importance rating for the wetland which is rated using Table 7 below and using the average as your EIS.

Table 7: Example of the scoring sheet for Ecological Importance and sensitivity

Ecological Importance	**Score (0-4)**	***Confidence (1-5)***
Biodiversity support		
Presence of Red Data species		
Populations of unique species		
Migration/breeding/feeding sites		
Landscape-scale		
Protection status of the wetland		
Protection status of the vegetation type		
Regional context of the ecological integrity		
Size and rarity of the wetland type/s present		
Diversity of habitat types		
The sensitivity of the wetland		
Sensitivity to changes in floods		
Sensitivity to changes in low flows/dry season		
Sensitivity to changes in water quality		

Table 8: Ecological Importance and Sensitivity rating table

ECOLOGICAL IMPORTANCE AND SENSITIVITY CATEGORIES	RANGE OF EIS SCORE
Very high: Wetlands that are considered ecologically important and sensitive on a **national or even international** level. The biodiversity of these systems is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major rivers.	>3 and +4
High: Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these systems may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.	>2 and <=3
Moderate: Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these systems is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.	>1 and <=2
Low/marginal: Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these systems is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major rivers.	>0 and <=1

3.4 IMPACT ASSESSMENT

The information gained from the functional integrity and EIS assessments were used to inform an assessment of the likelihood and significance of potential impacts associated with the proposed mining activities. The following methodology (Table 9) has been adopted from the DWS's Operational Guideline, 2010 entitled "*Operational Guideline: Integrated Water and Waste Management Plan*".

Table 9: Ranking scales for impact assessment

DURATION (D)	MAGNITUDE (M)

5 – Permanent 4 - Long term (ceases with operational life) 3 - Medium-term (5-15 years) 2 - Short term (0-5 years) 1 – Immediate	10 - Very high/do not know 8 - High 6 - Moderate 4 - Low 2 – Minor
SCALE (S)	**PROBABILITY (P)**
5 – International 4 - National 3 - Regional 2 - Local 1 - Site 0 – None	5 - Definite/do not know 4 - Highly probable 3 - Medium probability 2 - low probability 1- Improbable 0 – None
SIGNIFICANCE POINTS (SP) = (D+M+S) X P	
HIGH (H) = >60 POINTS	
MODERATE (M) = 30-60 POINTS	
LOW (L) = <30 POINTS	
NO SIGNIFICANCE = 0	
POSITIVE IMPACT	

The maximum value of significance points is 100. Environmental effects could therefore be rated as either high (H), moderate (M), or low (L) significance.

3.5 BUFFER ZONES

A buffer zone is defined as a strip of land surrounding a wetland or riparian area in which activities are controlled or restricted (DWAF, 2005). A development has several impacts on the surrounding environment and a wetland. The development changes habitats, the

ecological environment, infiltration rate, amount of runoff, and runoff intensity of the site, and therefore the water regime of the entire site. An increased volume of stormwater runoff, peak discharges, and frequency and severity of flooding is therefore often characteristic of transformed catchments.

Buffer zones have been shown to perform a wide range of functions and have therefore been widely proposed as a standard measure to protect water resources and their associated biodiversity. These include (i) maintaining basic hydrological processes; (ii) reducing impacts on water resources from upstream activities and adjoining land uses; (iii) providing habitat for various aspects of biodiversity. A brief description of each of the functions and associated services are outlined in Table 10 below.

Table 10: Generic functions of buffer zones relevant to the study site (adapted from Macfarlane et al, 2010)

Primary Role	**Buffer Functions**
Reducing impacts from upstream activities and adjoining land uses	Sediment removal: Surface roughness provided by vegetation, or litter, reduces the velocity of overland flow, enhancing the settling of particles. Buffer zones can, therefore, act as effective sediment traps, removing sediment from runoff water from adjoining lands thus reducing the sediment load of surface waters.
	Removal of toxics: Buffer zones can remove toxic pollutants, such as hydrocarbons that would otherwise affect the quality of water resources and thus their suitability for aquatic biota and human use.
	Nutrient removal: Wetland vegetation and vegetation in terrestrial buffer zones may significantly reduce the number of nutrients (N & P), entering a water body reducing the potential for excessive outbreaks of microalgae that can harm both freshwater and estuarine environments.
	Removal of pathogens: By slowing water contaminated with fecal material, buffer zones encourage the deposition of pathogens, which soon die when exposed to the elements.

Buffer zones are therefore proposed as a standard mitigation measure to reduce impacts of land uses / activities planned adjacent to water resources. This must, however, be considered in conjunction with other mitigation measures.

Local government policies require that protective buffer zones be calculated from the outer edge of the temporary zone of a wetland and the riparian zone of a river (KZN DAEA, 2002; CoCT, 2008; GDACE, 2009). An understanding of the origin of the water that results in the wetland/riparian conditions should ideally form the basis of refining this generic buffer zone through an analysis of empirical data.

4 RESULTS AND DISCUSSIONS

4.1 DRAINAGE AND QUATERNARY CATCHMENTS

South Africa is divided into 9 Water Management Areas (WMA) (Revised National Water Resource Strategy, 2012), managed by their water boards. Each of the WMAs is made up of quaternary catchments which relate to the drainage regions of South Africa, ranging from A to X (excluding O). These drainage regions are subdivided into four known divisions based on size. For example, the letter A represents the primary drainage catchment; A2 for example will represent the secondary catchment; A21 represents the tertiary catchment and A21D would represent the quaternary catchment which is the lowest subdivision in the Water Resources of South Africa, 2012 manual. Each of the quaternary catchments has associated hydrological parameters (DWS, 2016).

The study area is situated in the lower Vaal Catchment within C91D quaternary catchment, with Vaal being the main river system in the area (Figure 4-1).

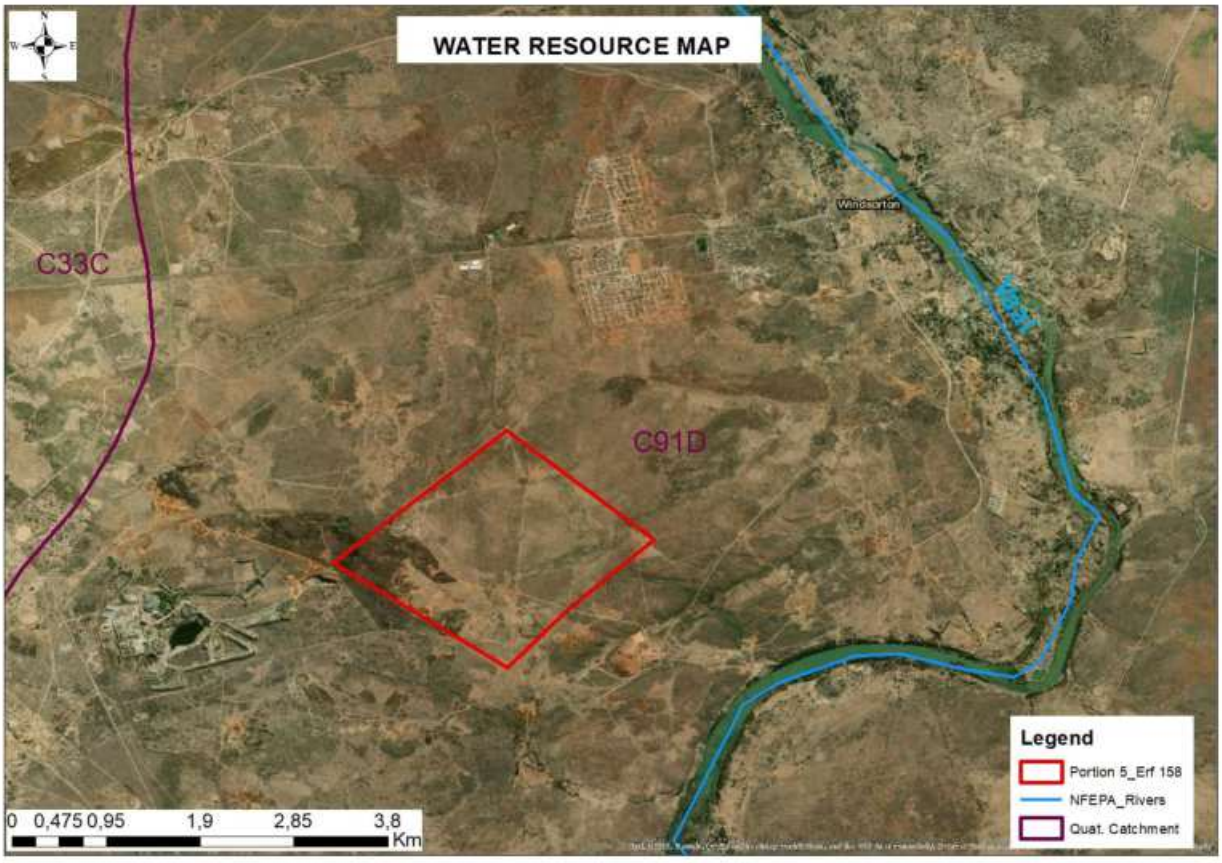


Figure 4-1: Study Area Water Resources Map

4.2 NATIONAL FRESHWATER ECOSYSTEM PRIORITY AREAS (NFEPA)

Based on current outputs of the NFEPA project (Nel et al., 2011), there are several FEPA wetlands or wetland clusters located within the study area and several kilometers from the study area's catchment (Figure 4-2). The National Freshwater Ecosystem Priority Areas, more specifically, the NFEPA project aims to:

- Identify Freshwater Ecosystem Priority Areas (hereafter referred to as "FEPAs") to meet national biodiversity goals for freshwater ecosystems; and
- Develop a basis for enabling effective implementation of measures to protect FEPAs, including free-flowing rivers.

The first aim uses systematic biodiversity planning to identify priorities for conserving South Africa's freshwater biodiversity, within the context of equitable social and economic development. The second aim comprises a national and sub-national component. The national component aims to align DWS and DEA policy mechanisms and tools for managing and conserving freshwater ecosystems. The sub-national component aims to use three case study areas to demonstrate how NFEPA products should be applied to influence land and water resource decision-making processes at a sub-national level (Driver et al., 2011). The project further aims to maximize synergies and alignment with other national-level initiatives such as the National Biodiversity Assessment (NBA) and the Cross-Sector Policy Objectives for Inland Water Conservation.

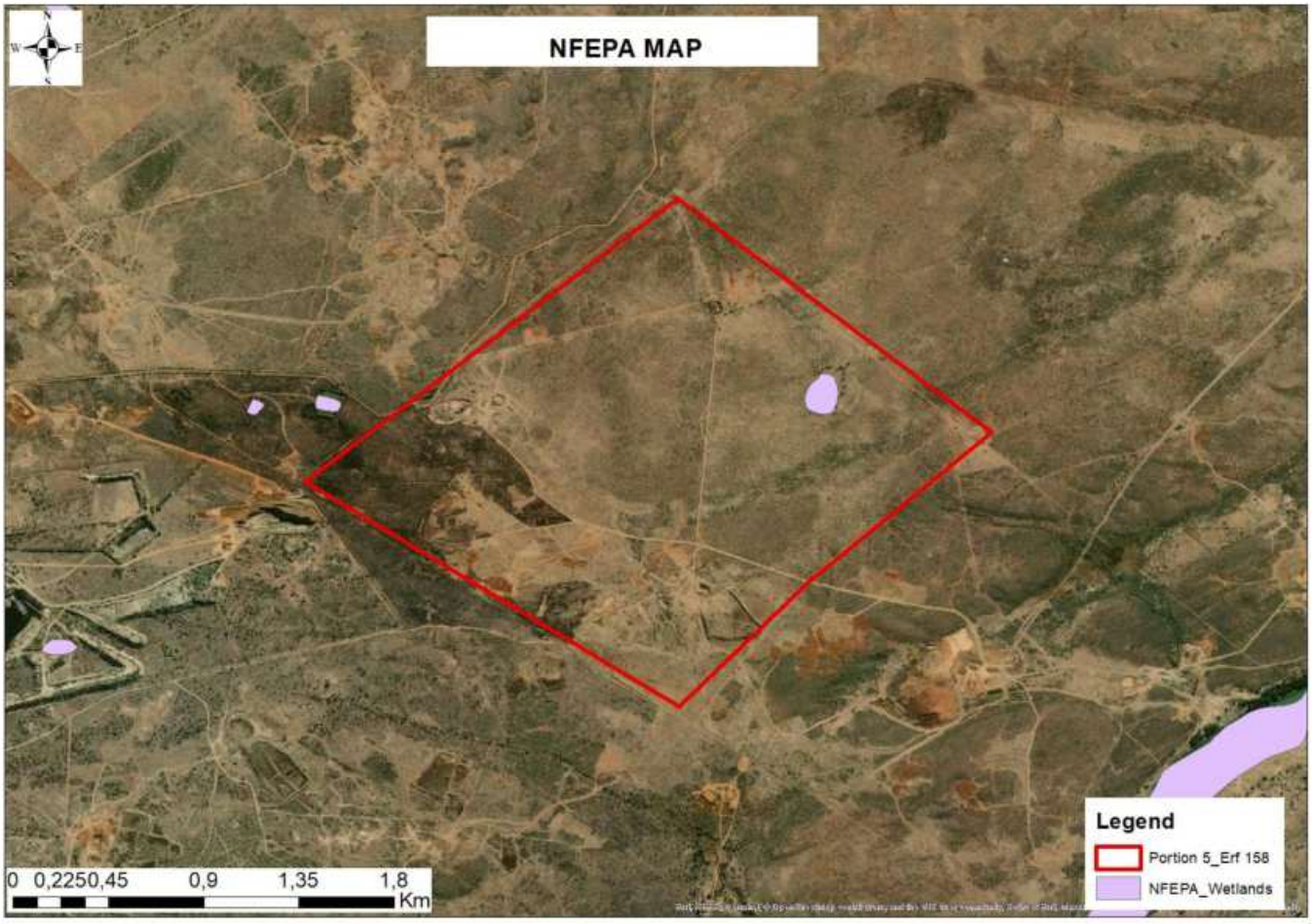


Figure 4-2: NFEPA (2011) map of wetlands within and around the study area

4.3 WETLAND EDGE DELINEATION

The edge of the wetland was delineated on the 12th of November 2022. To cover a representative area of the wetlands in the study area, several transect surveys were necessary. Areas in between these transects were also traversed by foot and spot surveys contributed to a more complete survey. Some wetland areas defined on the NFEPA (2011) layers data were found to be consistent with what was observed on site. Figure 4-3 below shows the delineated wetland.

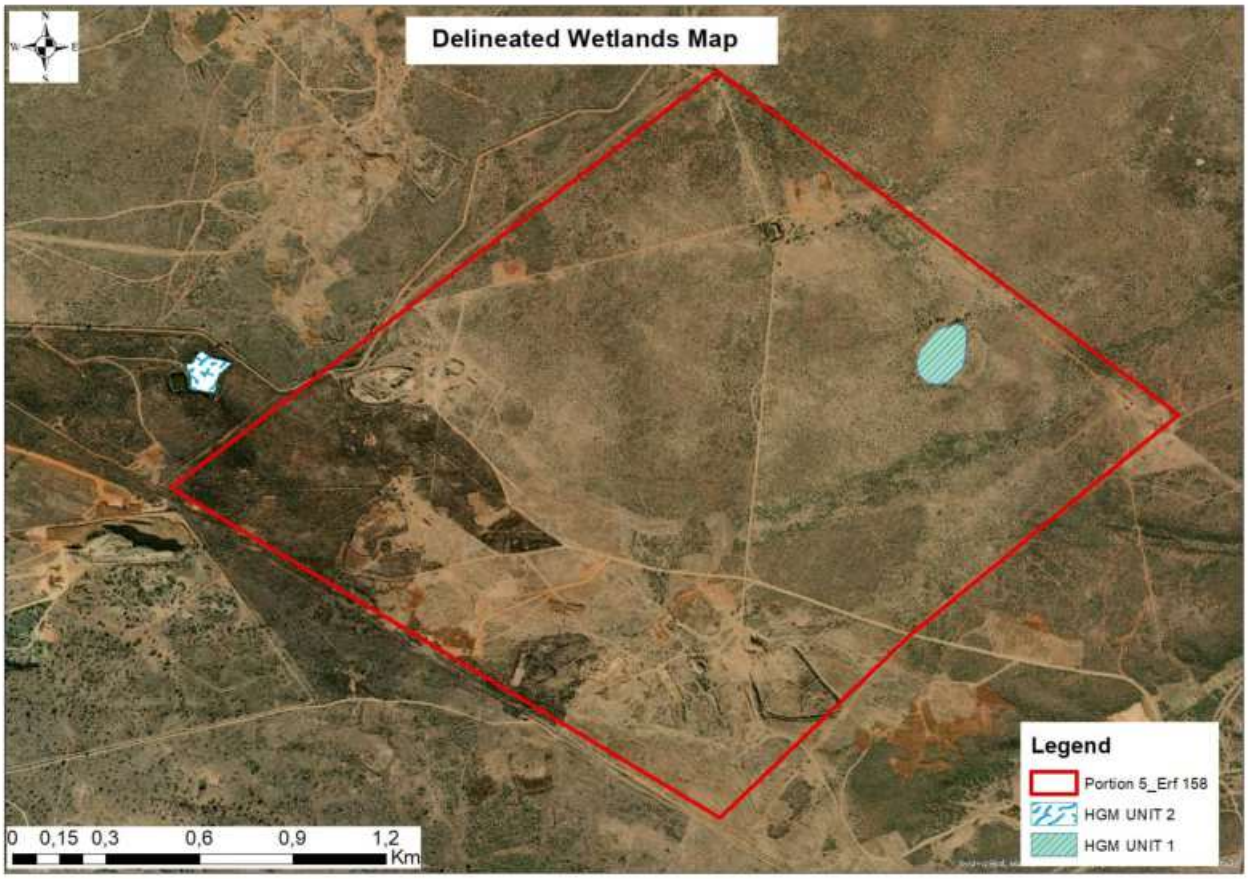


Figure 4-3: Delineated wetland within the study area

The following section shows the results of the wetland delineation and discusses the respective wetland hydrology as well as the functional assessment of the hydrogeomorphic (HGM) affected by the proposed development. This section further discusses the impacts observed within the wetland and its vicinity.

For this report and to suitably quantifying and assess the wetland system observed during the site assessment, namely:

- Depression Wetland (HGM unit 1)
- Flat Wetland (HGM unit 2)

The HGM units were delineated based on all four of the criteria listed in the delineation guidelines (Macfarlane, et.al., 2020), i.e. hydrology, geomorphology, vegetation, and water quality.

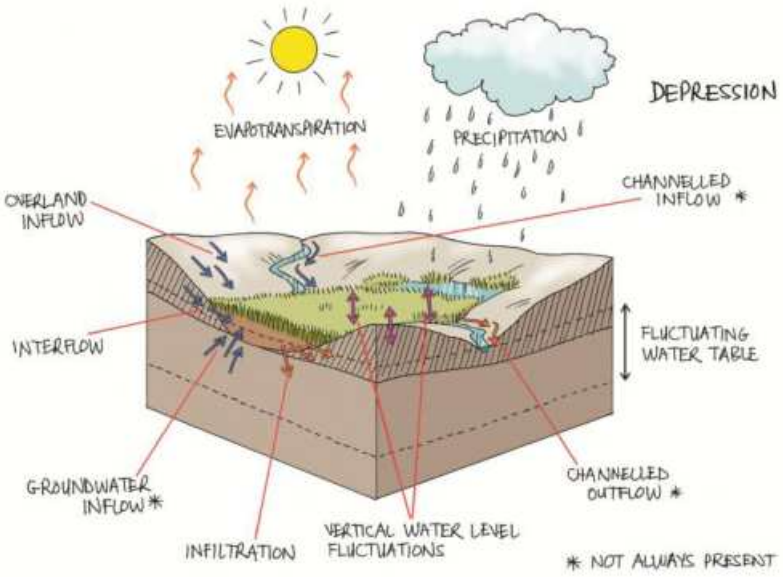
4.4 CLASSIFICATION OF HGM UNIT 1; DEPRESSION WETLAND

According to Kotze et al. (2007), a depression wetland (also known as a Pan wetland), is an inland aquatic ecosystem with closed or near closed elevation contours, which increases in depth from the perimeter to a central area of greatest depth, and within which water typically accumulates. Dominant water sources are precipitation, groundwater discharge, interflow and (diffuse or concentrated) overflow. Depressions may be flat-bottomed or round-bottomed and may have any combination on inlets and outlets or lack them completely. An important point to note when delineating depressions is that the extent of the wetland goes beyond the body of water which may be present within the deeper parts of the depression. The Wetland classification of HGM 1 as per the SANBI guideline (Ollis, et al., 2013) has been outlined in Table 11 below. Table 12 below shows the wetland classification according to Brinson, 1993; Kotze, 1999; and Marneweck and Batchelor, 2002.

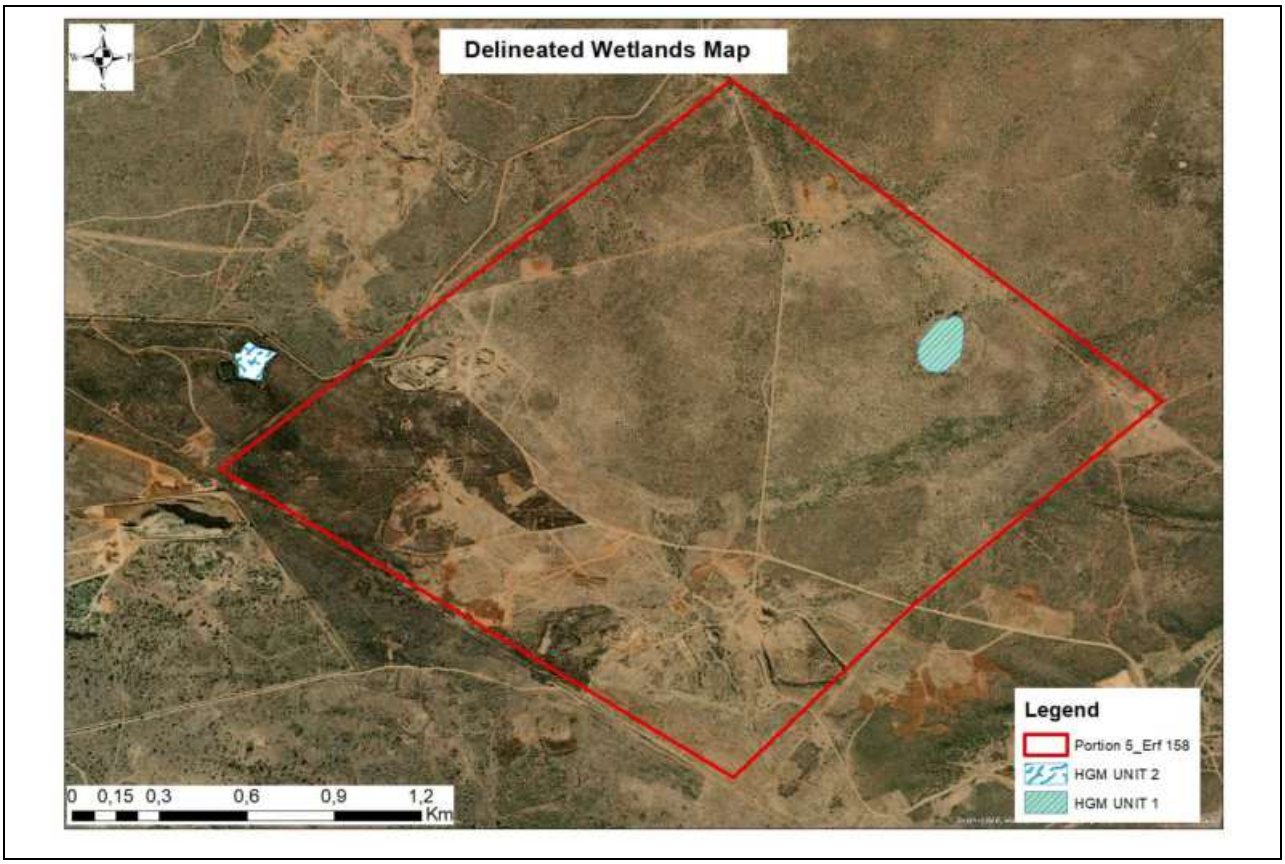
Table 11: HGM 1 Wetland classification as per SANBI guideline (Ollis, et al., 2013)

Wetland Name	Level 1	Level 2		Level 3	Level 4		
	System	DWS Ecoregion/s	NFEPA Wet Veg Group/s	Landscape Unit	4A (HGM)	4B	4C
HGM 1 (Depression wetland)	Inland	Bushveld	Eastern Kalahari Bushveld Group 3	Bench	Bench Depression	(N/A)	(N/A)

Table 12: HGM unit 1 classification as per Brinson, 1993; Kotze, 1999; and Marneweck and Batchelor, 2002



Depression Wetland — an inland aquatic ecosystem with closed or near closed elevation contours, which increases in depth from the perimeter to a central area of greatest depth, and within which water typically accumulates. Dominant water sources are precipitation, groundwater discharge, interflow and (diffuse or concentrated) overflow. Depressions may be flat-bottomed or round-bottomed and may have any combination on inlets and outlets or lack them completely. An important point to note when delineating depressions is that the extent of the wetland goes beyond the body of water which may be present within the deeper parts of the depression.



4.4.1 WET-HEALTH ASSESSMENT ON HGM UNIT 1

Table 13 below show the PES summary as calculated using the WET-Health Level 1B version 2 (Macfarlane, et.al., 2020) for the HGM Unit 1.

Table 13: PES summary for HGM unit 1

WET-Health Level 1B assessment: PES Summary				
Wetland name	HGM unit 1: UVB 01			
Assessment Unit	1			
HGM type	Unchannelled VB wetland			
Wetland area (Ha)	2.0 Ha			
PES Assessment	Hydrology	Geomorphology	Water Quality	Vegetation
Impact Score	5.5	3.9	5.2	6.4
PES Score (%)	45%	61%	48%	36%
Ecological Category	D	C	D	E

Trajectory of change				
Confidence (revised results)	Not rated	Not rated	Not rated	Not rated
Combined Impact Score	5.3			
Combined PES Score (%)	47%			
Combined Ecological Category	**D**			
Hectare Equivalents	0.9 Ha			

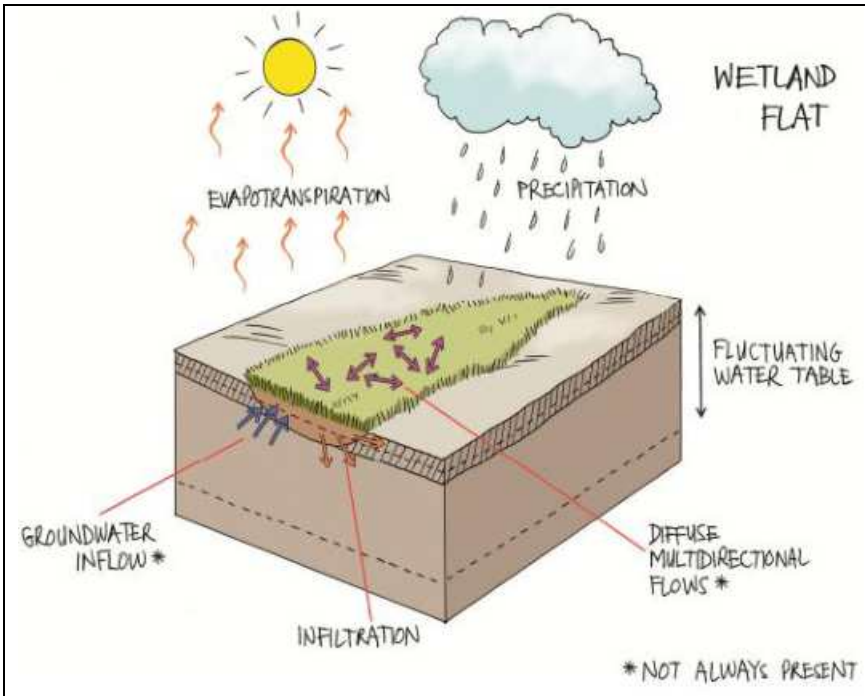
4.5 CLASSIFICATION OF HGM UNIT 2; FLAT WETLAND

According to Kotze et al. (2007) Wetlands flat often appear as irregularly shaped wetland areas which are not linked to a stream. They are often level or near-level areas where waterlogging occurs and can be differentiated from depressions by their lack of defined margins. The Wetland classification of HGM 2 as per the SANBI guideline (Ollis, et al., 2013) has been outlined in Table 14 below. Table 15 below shows the wetland classification according to Brinson, 1993; Kotze, 1999; and Marneweck and Batchelor, 2002.

Table 14: HGM 2 Wetland classification as per SANBI guideline (Ollis, et al., 2013)

Wetland Name	Level 1	Level 2		Level 3	Level 4		
	System	DWS Ecoregion/s	NFEPA Wet Veg Group/s	Landscape Unit	4A (HGM)	4B	4C
HGM 2 (Flat wetland)	Inland	Bushveld	Eastern Kalahari Bushveld Group 3	Bench	Flat	(N/A)	(N/A)

Table 15: HGM unit 2 classification as per Brinson, 1993; Kotze, 1999; and Marneweck and Batchelor, 2002

	Flat—Wetlands flat often appear as irregularly shaped wetland areas which are not linked to a stream. They are often level or near-level areas where waterlogging occurs and can be differentiated from depressions by their lack of defined margins.
 	

4.5.1 WET-HEALTH ASSESSMENT ON HGM UNIT 2

Table 16 below show the PES summary as calculated using the WET-Health Level 1B version 2 (Macfarlane, et.al., 2020) for the HGM Unit 2.

Table 16: PES summary for HGM unit 2

WET-Health Level 1B assessment: PES Summary				
Wetland name	**HGM unit 2: Flat**			
Assessment Unit	**2**			
HGM type	Flat			
Wetland area (Ha)	0.6 Ha			
PES Assessment	**Hydrology**	**Geomorphology**	**Water Quality**	**Vegetation**
Impact Score	5.7	4.9	5.2	6.7
PES Score (%)	43%	51%	48%	33%

Ecological Category	D	D	D	E
Trajectory of change				
Confidence (revised results)	Not rated	Not rated	Not rated	Not rated
Combined Impact Score	5.6			
Combined PES Score (%)	44%			
Combined Ecological Category	D			
Hectare Equivalents	0.3 Ha			

4.6 WETLAND ECOLOGICAL IMPORTANCE AND SENSITIVITY (EIS) OF HGM UNITS

The HGM units have been assessed to have Very Low to Moderate ecologically functioning and this was based on the following reasons:

- The were no presence of red data species;
- No population of unique species where observed on-site or known to be there;
- The wetland is not situated within a protected area or RAMSAR site;
- No vulnerable vegetation was observed or known to be present on that site;
- The wetland is not rare;
- No one uses this wetland for recreational, tourism, or research purposes; and
- The biodiversity of this system is not highly sensitive to flow and habitat modifications and it plays a small role in moderating the quantity and quality of water of major rivers.

Table 17 below outlines the scoring for Ecological Importance and sensitivity and Figure 7 the spider diagram showing the Ecosystem Score for the HGM Unit 1.

Table 17: Ecosystem Services Score for the assessed HGM Units

ECOSYSTEM SERVICE		Supply	Demand	Importance Score	Importance
REGULATING AND SUPPORTING SERVICES	Flood attenuation	0.0	0.0	0.0	Very Low
	Stream flow regulation	0.0	0.0	0.0	Very Low
	Sediment trapping	0.5	0.0	0.0	Very Low
	Erosion control	0.6	0.3	0.0	Very Low
	Phosphate assimilation	0.3	0.0	0.0	Very Low

	Nitrate assimilation	0.4	0.0	0.0	Very Low
	Toxicant assimilation	0.5	0.0	0.0	Very Low
	Carbon storage	1.5	2.7	1.3	Moderately Low
	Biodiversity maintenance	0.8	0.0	0.0	Very Low
PROVISIONING SERVICES	Water for human use	0.0	0.0	0.0	Very Low
	Harvestable resources	0.5	0.0	0.0	Very Low
	Food for livestock	1.0	0.3	0.0	Very Low
	Cultivated foods	3.7	0.0	2.2	Moderate
CULTURAL SERVICES	Tourism and Recreation	2.0	0.0	0.5	Very Low
	Education and Research	0.0	0.0	0.0	Very Low
	Cultural and Spiritual	0.0	0.0	0.0	Very Low

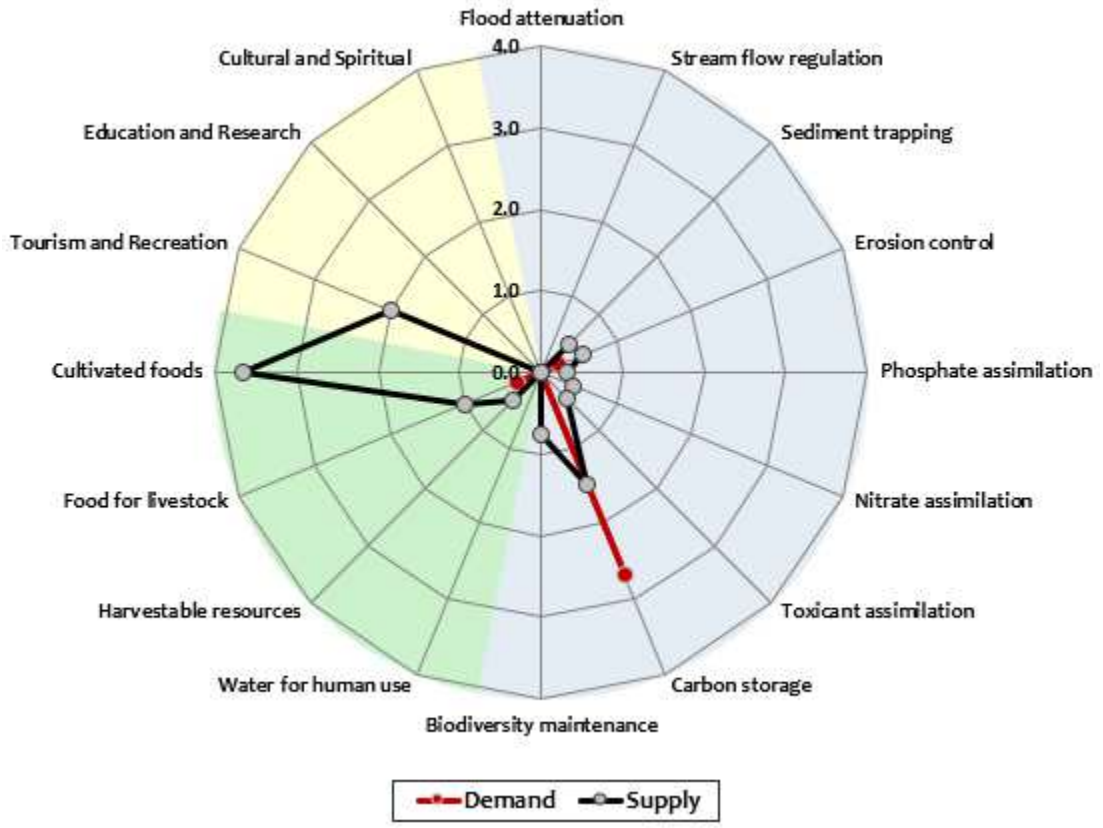


Figure 4-4: Ecological score for the assessed HGM units in a Spider diagram

5 BUFFER ZONE

Definitions of buffer zones vary depending on their purpose. In the context of this report, buffer zones have been defined as a strip of land with a use, function, or zoning specifically designed to protect one area of land against impacts from another. The main function of buffer zones is to act as a barrier between activities such as human developments and sensitive aquatic environments thereby protecting them from adverse negative impacts. Aquatic buffer zones are typically defined from the edge of the identified aquatic resource, extending outward, ending at the interface with another land use. Buffers would therefore typically be applied from the delineated edge of a wetland, river, or estuary (Macfarlane and Bredin, 2017). A document titled; "Preliminary Guideline for the Determination of Buffer Zones for Rivers, Wetlands, and Estuaries" by Macfarlane, et.al., (2014), was used to decide the buffer zone for the study area.

For the study area, likely, a buffer of >50 m may adequately fulfil several functions and values such as promoting bank stability and affecting stream microclimate. A larger buffer may, however, be necessary to adequately cater for biotic requirements. A decrease in the buffer

width from 100 m to 32 m will have an impact on the buffer's ability to fulfil functions such as flood attenuation, general wildlife habitat, connectivity, habitat for semi-aquatic species, etc. In assessing a range of buffer widths, a width of a 100 m is recommended for the wetlands in the study area. This 100 m width should cater to most buffer functions as mentioned above (Figure 8). This buffer zone is largely based on biotic requirements and does not cater for geo-hydrological impacts. Any activities proposed within the wetland or riparian boundaries, including rehabilitation, must be authorized by the DWS in terms of Section 21 (c) & (i) of the National Water Act (Act 36 of 1998).

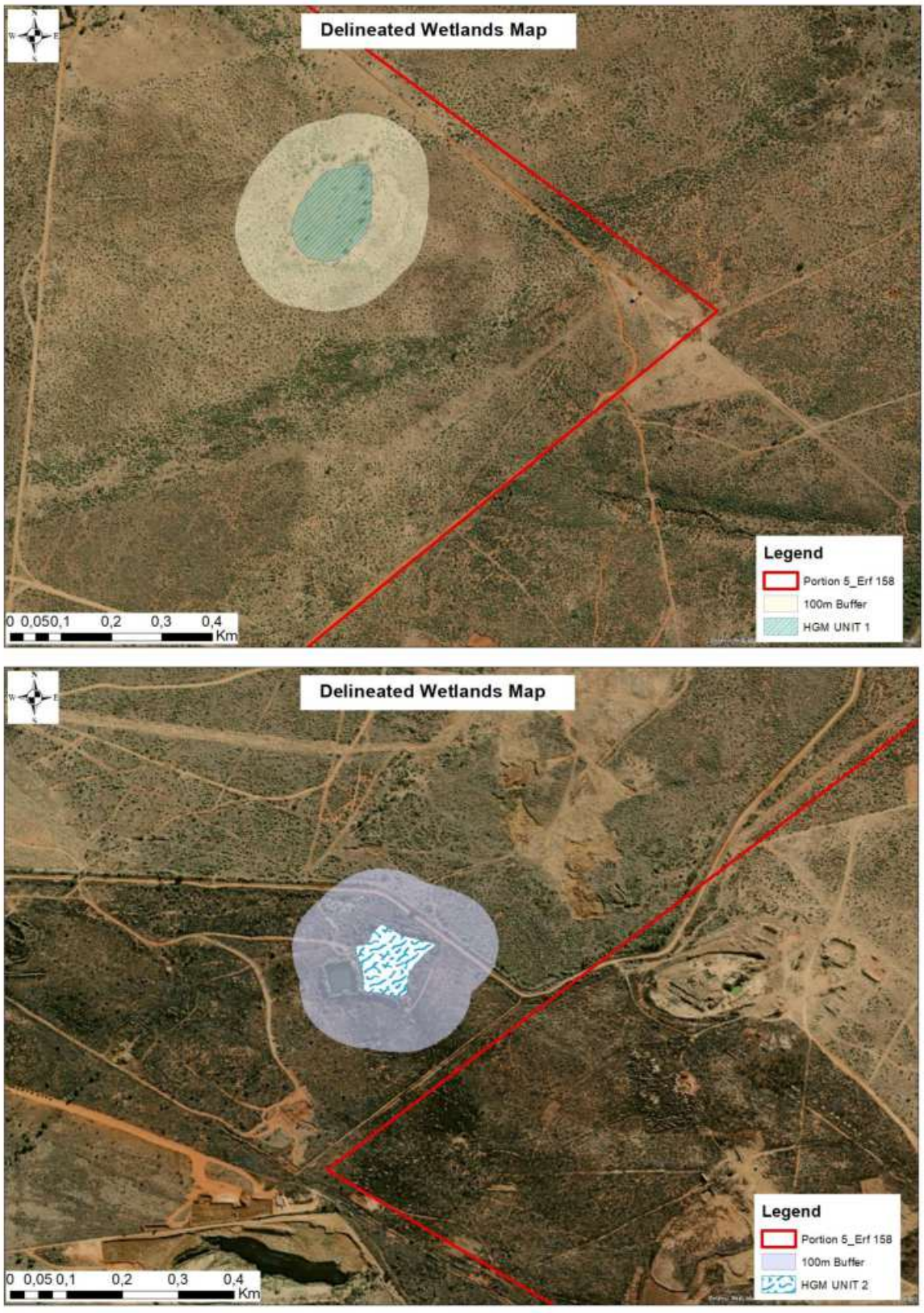


Figure 5-1: Assessed HGM units 32m Buffer Zone Map

6 IMPACT ASSESSMENT

This section presents the significance of potential impacts on the wetland ecology associated with the proposed construction of 8 broilers chicken houses. In addition, it also indicates the required mitigation measures needed to minimise the impacts and presents an assessment of the significance of the impacts, taking into consideration the available mitigation measures and assuming that they are fully implemented.

6.1 Impact Analyses

Following the assessment of the wetlands around the proposed construction, a mitigation measures were compiled to serve as guidance throughout the various phases of the proposed development. The points below summarise the factors considered in the development of mitigation measures:

- All construction rubble must be cleared immediately and concrete as well as cement(if used) may not be allowed to enter the wetlands;
- Alien vegetation species that encroached in the wetlands following the proposed construction activities should be eradicated. In addition, ongoing alien vegetation control program must be implemented if any encroachment occurs within the wetlands;
- In case where the flow of water will have to be diverted, sandbags can be used to temporarily divert flow and prevent erosion along the channel banks;
- Edge effects (impacts on areas beyond the proposed construction footprint due to ineffective care and management) that might occur following the proposed construction activities need to be managed and where necessary, affected areas must be rehabilitated. It must be ensured that the banks of the wetlands channel are stable and suitably vegetated with no bare exposed soils remaining, and
- Any areas where active erosion is observed, as well as areas cleared for the construction and implementation of the proposed development must be immediately rehabilitated following the proposed construction activities (re-shaping of slopes, re-vegetation with indigenous species where necessary, etc.) in such a way as to ensure that the hydrology and geomorphological characteristics of the area are reinstated to condition which is as natural as possible.

6.2 Impact discussion

The DWS 2016 risk assessment matrix was utilised to determine the class within which the proposed project development falls, which will then guide authorities in decision making. The assessment was undertaken based on the assumption that mitigation measures are

implemented and summarises activities and the level of impacts that are anticipated to occur on the wetland post implementation of mitigation measures.

The main activity that could affect the wetland will be earthworks/excavations undertaken during the construction phase. During site preparation, vegetation clearing will result in patches of bare areas that are prone to erosion and proliferation of alien vegetation species. This might further lead to loss of biodiversity maintenance and assimilation abilities of the wetland. The proposed development activities will lower the PES of the wetlands, however with best practise construction method this impacts significance can be reduced.

The table below summarises the results obtained from the application of the DWS risk assessment matrix and present activities, impacts, significance and risk ratings. Table 18 presents risk assessment results for the wetland near by the proposed development project.

Table 18: Risk Assessment Matrix for the wetland within the proposed project

Phases	Activity	Aspect	Impact	Risk Rating
Construction	Potential spills and leaks from vehicles delivering construction material	Refuelling of vehicles within the wetlands during delivery of construction material.	• Vegetation disturbance. • Contamination of soils and water within the wetlands	**L**
		Leaks from hazardous material containers.	• Contamination of soil and water within the wetland	
		Indiscriminate movement of vehicles within the wetland.	• Soil compaction leading to increased runoff • Sedimentation of the wetlands • Vegetation disturbance	
	Miscellaneous activities by construction personnel	Illegal trapping or hunting of faunal species.	• Possible migration of wetland faunal species as a result of habitat disturbance	
		Illegal Firewood Collection.	• Loss of floral species	
		Creation of informal fires within the wetland.	• Vegetation disturbance • Temporary loss of faunal and floral habitat	

	Vegetation clearing and disturbance	Site preparation	• Encroachment of alien vegetation species • Alteration of the vegetation communities • Exposed bare areas prone to erosion • Rendering the wetlands unsuitable • to maintain biodiversity • Loss of wetland assimilation abilities	**M**
		Creation of access roads where existing roads cannot be used.		
		Construction of the contractor laydown area.		**M**
	Topsoil stock piling adjacent the wetland	Soil excavations to create trenches within which pipes will be installed	• Alteration of the soil profile • Soil disturbance within the wetland • Runoff from stockpiles resulting in sedimentation of the wetlands and • smothering of the short vegetation	
		Infilling trenches		
		Rehabilitation of disturbed areas		
	In case of Excavations within the wetland	To create trenches within which foundation will be installed	• Disturbance of the interflow and the surface flow • Alteration of wetland channel banks H • Inundation of exposed trenches during rainfall and as a result of improper flow diversion	**H**
	Disposal of waste material such as soil, rocks and concrete within the wetland	Littering and improper disposal of waste	• Pollution of wetland soils and water	**L**
Operational	Operation of the Proposed development within the wetland area.	Indiscriminate driving of vehicles and vegetation trampling within the wetland during maintenance activities	• Vegetation disturbance • Soil and surface water contamination as a result of oils and hydrocarbons from maintenance vehicles • Encroachment of alien vegetation species • Alteration of the vegetation community structure • Soil compaction • Ongoing soil disturbance.	**L**

7 RECOMMENDATION AND CONSIDERATION

Recommendations regarding the protection of the wetlands on the proposed construction of the solar plant are provided below. These are based on the sensitivity analyses.

7.1 Mitigation measures for the current wetland

7.1.1 General measures

- In case there will be a crossing, a methodology plan(method statement) must be approved by an ECO or a wetland specialist.
- Design features to prevent disturbance of the flow patterns and hydrologic regimes critical to conservation of the wetland.
- No stockpile areas (this excludes vegetation blocks removed from the trench) should be located within wetland boundary, or within the associated buffer zone.
- Rehabilitation of disturbed in-stream and riparian habitat must commence immediately after construction is completed. Any material removed from the in-stream or riparian zone must be returned and bedded in their original position as far as practicably possible.
- During the construction, the construction footprint must be kept outside of river/ wetland areas.
- Ensure that construction-related waste and effluent do not affect the wetland areas and associated buffer zones.
- No dumping of waste should take place within the wetland and associated buffer zone. If any spills occur, they should be cleaned up immediately.
- Restrict construction to the drier summer months, if possible, to avoid sedimentation of wetland features in the vicinity of the proposed development.
- Connectivity of the wetland features in the system need to be maintained in order to ensure continuity of the habitats and resources.
- Ensure that all activities impacting on geohydrological resources of the development farm are managed according to the relevant DWS Licensing regulations and groundwater monitoring and management requirements.
- Contractors responsible for the proposed project within the vicinity of the wetland areas must sign a declaration stating that they will adhere to all stipulations of the Environmental Management Plan relating to wetland crossing if there is a need for crossing.

7.1.2 Erosion Control

- Where possible, silt fences / barriers or other relevant measures should be installed along the edge of wetland to prevent soil erosion and ingress of runoff water carrying silt from the catchment of the wetland (i.e. the slopes surrounding the watercourse/ wetland) to enter the water body.

- In sandy wetland where the risk of development of erosion and knick points is high, temporary drainage of water through the wetland can be considered to minimise the risk of erosion.
- Shoring up trench walls, close monitoring of development of head cuts during construction (precursors to donga erosion) and the correct rehabilitation of wetland vegetation after the trench has been backfilled must take place.
- The protection of wetland vegetation from damage through the implementation of measures such as the use of running tracks must be implemented to prevent soil erosion.

7.1.3 Removal of Vegetation

- The vegetation within the footprint of the trench must be removed immediately prior to the onset of excavation.
- An ECO should be used to oversee this process.
- The vegetation must be removed in squares by means of 'turfing', to a depth of approximately 50 cm to ensure that the organic layer and topsoil are removed in an intact state, whilst retaining the root zone of the vegetation and herbaceous vegetation in an intact state.
- The vegetation blocks must be placed on the opposite side of the running track / work platform to the trenchline on a strip of geo-textile membrane. The vegetation blocks should be stockpiled in such a way that the vegetation has sufficient water and sunlight to survive. Care should be taken not to overly wet the vegetation, as this would result in minerals leaching out of the soils and the possible erosion and collapse of the blocks.
- As far as practicable immediately after the backfilling of the trench has been completed, the vegetation blocks must be returned and bedded into their original position of removal, and care must be taken to retain the original order / position of the blocks so as to retain the distribution of vegetation characteristic to each hydrological zone within the wetland as far as possible.

7.1.4 Re-vegetation and prevention of compaction

- Blocks of wetland vegetation and underlying soil along the trench through the wetland must be removed from the footprint of the trench and preserved to be returned into the same location once the trench is backfilled.
- Watercourse/ Wetland soils should not be compacted as this could alter the hydrology of the watercourse/ wetland, restrict plant growth, and lead to erosion within the wetland.

7.1.5 Prevention of pollution

- Access of people and vehicles to watercourse/ wetland along the proposed project must be managed under the supervision of an ECO.
- The placing of silt fences / silt barriers adjacent to the wetland to prevent discharge of silt into the watercourse/ wetland, and the inclusion of buffer zones in which no stockpiles, machinery, chemicals or construction camps must be included to prevent pollution into the watercourse/ wetland.
- Wetland must not be viewed in isolation from the surrounding slopes / catchment, as eroded material or other potential pollutants emanating from the surrounding non-wetland areas adjacent to the wetland boundaries may enter the wetland and cause significant pollution of the wetland.
- A copy of the Basic Assessment Report and associated Environmental Management Plan must be present at the work site for easy reference to specialist recommendations in sensitive areas.
- It is recommended that the construction crew be educated about the sensitivities involved in these areas as well as the potential species they could encounter.

No hazardous materials (such as oil) should be kept within 50 m of the edge of a wetland buffer zone.

8 CONCLUSION

This study has reviewed the available literature and assessed the wetlands within the vicinity of the proposed development site in the form of a site visit undertaken on the 12th of November 2022. According to the National Freshwater Ecosystem Priority Areas (NFEPA) data, there are several wetlands identified close to the proposed development sites. Within the study area, 2 HGM units were assessed as they are the once likely to be impacted directly by the development.

In a case where this study is for the Competent Authorities to make a decisive conclusion on an Authorisation or permit, it is the opinion of the Specialist that this development be approved. However, all essential mitigation measures and recommendations presented in this report should be adhered to. This will ensure that the water quality and ecology within the proposed development areas as well as the surrounding zone of influence are protected or adequately rehabilitated. This will minimize the deviations from the present state. Particular attention needs to be paid to the location and extent of sensitive aquatic and terrestrial (riparian) habitat to ensure that development-related activities do not unnecessarily encroach into these zones and that the ongoing functionality of these systems is ensured.

9 REFERENCES

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- Department of Water Affairs and Forestry (DWAF) (2007). Manual for the assessment of a Wetland Index of Habitat Integrity for South African floodplain and channelled valley bottom wetland types. Report no. N/0000/00/WEI/0407. Resource Quality Services, Department of Water Affairs and Forestry, Pretoria;
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- Ollis, D.J., Snaddon, C.D., Job, N.M. and Mbona, N. (2013). Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems. SANBI Biodiversity Series 22. South African Biodiversity Institute, Pretoria;

» SANBI (2009). Further Development of a Proposed National Wetland Classification System for South Africa. Primary Project Report. Prepared by the Freshwater Consulting Group (FCG) for the South African National Biodiversity Institute (SANBI).
» South African National Biodiversity Institute: BGIS: www.bgis.sanbi.org.

10 APPENDIX A: CV's OF THE PROJECT TEAM

1) CV FOR MILAMBO FREDDY TSHIALA

Email: mftshiala@gmail.com
Tel/Cell: 0836691702
Total Years of Experience: 16
Education:

Qualification	Institution	Completed
Doctor of Philosophy in Environment and Society	University of Pretoria	2014
Master's Degree in Environment and Society at	University of Pretoria	2006
BSC (Honours Degree) in Agronomy	University of Kongo	2000
Occupational health and safety, NQF Level 5	NOSA (Pty) Ltd	2015
Applying SHE principles and Procedures	NOSA (Pty) Ltd	2015
Construction Regulations and Training Course	NOSA (Pty) Ltd	2015
Introduction to OHSACT	NOSA (Pty) Ltd	2014
Wetlands Management: Introduction and Delineation	University of Free State	2013
Horticultural Management Training	University of Pretoria	2006
Learning ArcGis	University of Pretoria	2004

Membership of Relevant Professional:

Membership	Professional Organizations
Registration Number 1519/2018	SACPCMP
Registration Number 4000021/18	SACNASP

Membership of Professional Associations:

Membership	Professional Associations
Registration Number 5358	IAIAsa Membership

Countries of Work Experience:

South Africa and DR Congo

Languages:

Language	Speaking	Reading	Writing
English	Excellent	Excellent	Excellent
French	Excellent	Excellent	Excellent

WORKS EXPERIENCE

PERIOD	PROJECT NAME	SCOPE	RESPONSIBILITIES
August 2018	Ecological Assessment for	Ecological	Field work

	the proposed development in Borakalalo Nature Reserve, North West	Assessment	Plant and animal identification Report writing
March 2017	Ecological Assessment for the proposed upgrade of the National route Ne section 34 (Piet retief to Ermelo): Link and grade-separation scheme for road P97/2 and road D803 for Kangra mine coal haulage at Panbult, Mpumalanga proposed road expansion, Panbult	Ecological Assessment	Field work Plant and animal identification Report writing
September 2016	Proposed Construction of an 18km long pipeline with an internal diameter of 2100 for the remainder of B16 pipeline starting from Zuikerbosch Pumping Station to Slangfontein with associated cross connections and end connections	Ecological Assessment	Environmental Assessment Practitioner and Public Participation Compile Environmental Impact Assessment Engage with client and authorities Social Impact Assessment
July 2018	Construction for Ekurhuleni township automotive aftermarket hubs in Labore Brakpan	Agricultural Study	Field investigation; Agricultural potential analysis, Soils Analysis, Report writing
September 2016	Agricultural Potential Study for the Proposed Construction of an 18km long pipeline with an internal diameter of 2100 for the remainder of B16 pipeline starting from Zuikerbosch Pumping Station to Slangfontein with associated cross connections and end connections.	Agricultural Study	Field investigation; Agricultural potential analysis, Soils Analysis, Report writing
September	Ecological Assessment For	Flora and	Field work

2016	the Proposed Construction of an 18km long pipeline with an internal diameter of 2100 for the remainder of B16 pipeline starting from Zuikerbosch Pumping Station to Slangfontein with associated cross connections and end connections.	Fauna Assessment	Plant and animal identification Report writing
March 2015	Illiondale Wetland Rehabilitation Project in Ekurhuleni Municipality. (Quotation No.: KEQ. ERM. 03.39).	Flora and Fauna Assessment	Field work Plant and animal identification Report writing
July 2014	The Soutpansberg Drive Wetland Rehabilitation Project in Ekurhuleni Municipality.	Flora and Fauna Assessment	Field work Plant and animal identification Report writing
July 2013	Proposed Construction and Establishment of Beef Feedlot and Associated Infrastructures on Portion 2, 8, 9, 11 and 15 of the Kleinwater Farm Project, Mpumalanga Province.	Flora and Fauna Assessment	Field work Plant and animal identification Report writing
September 2013	Proposed Expansion and Construction of Poultry Houses for Broiler Production for Farm Puntlyf Bronkhorspruit Project, Gauteng Province.	Flora and Fauna Assessment	Field work Plant and animal identification Report writing
September 2022	wetland assessment and delineation report for the proposed construction of Kempton Park reservoir zone water supply in Gauteng province, with the city of Ekurhuleni municipality, Gauteng province.	Wetland Assessment	Field work and wetland assessment
September	Proposed N2 Panbult	Wetland	Site visit; Delineation and plant

2017	Interchange upgrade for South African National Roads Agency Limited (SANRAL) Project at Panbult Siding in Mpumalanga Province.	Assessment and Delineation Report	identification; Report writing Project manager
May 2013	Proposed township situated on portion 27 and 28 of the farm Hartherley 331-JR at Mamelodi, City of Tshwane Municipality.	Wetland Assessment and Delineation Report	Site visit; Delineation and plant identification; Report writing Project manager
March 2015	Investigation on the Nature and Extent of Invasive Alien Plant Infestations on Rand Water Sites: Rietvlei Site.	Invasive Alien Plant Specialist	Field investigation IAPs identification Scientific Report Writing
March 2015	Investigation on the Nature and Extent of Invasive Alien Plant Infestations on Rand Water Sites: Zwartkopjes Site (Mapleton, Palmiet and Eikenhof).	Invasive Alien Plant Specialist	Field investigation IAPs identification Scientific Report Writing

REFERENCES

Name	Company Name	Position	Contact No	Email Address
Joshua Olokun	Environet Engineering	Director	073 406 8051	molokun@gmail.com
Thokozani Masilela	Rand Water	Environmental Assessor	011 724 9369	tmasilel@randwater.co.za
Palesa Mathibeli	Lyma Consulting	Director	0824486243	Palesa_mathibeli@yahoo.com

2) CV OF Nonkanyiso Zungu

ID-82030905700088 Female, South African

Cell-084 800 0187

Profile Summary

Nonkanyiso Zungu is a Professional Natural Scientist (Pr.Sci.Nat) with 16 years' experience in the environmental field, including GIS. She is currently a Ph.D. candidate at the University of Cape Town doing research on climate change effects on freshwater ecology. She obtained her master's degree in Environmental Management from the University of Pretoria with a specialty in Water Resource Management. She has extensive experience in water

resource management, waste management, and obtaining environmental authorizations (air, water, waste) across sectors that include: Power generation, infrastructure (Construction), transportation (rail), waste disposal, water purification & sewage works. The projects she has undertaken include Environmental Impact Assessments, Basic Assessments, Environmental Feasibility Studies, Environmental scoping studies, Environmental legal compliance audits, Waste management licenses, Water use licenses, and Baseline risk assessments.

Nonkanyiso Zungu is a Health & Safety and Environmental (SHE) auditor and is knowledgeable on internal integrated SHEQ auditing. She has experience in the development and implementation of ISO 14001: 2004 management system and undertaking internal audits. Nonkanyiso is also a wetland specialist with experience in wetland delineation, determination of present ecological status, ecological importance and sensitivity evaluations, and wetland rehabilitation planning using packages that include Wet-Health, Wet-Ecoservices, and Wet-Rehab Evaluate.

Tertiary Education:

Qualification: Ph.D. Ecology, University of Cape Town, Year: 2017-Current

Qualification: MSc Environmental Management, University of Pretoria, Year: 2011

Qualification: BSc Honours (Ecology),University of KwaZulu-Natal, Year 2005

Qualification: BSc Biological Science, University of KwaZulu-Natal Year: 2003

Professional Registration

- South African Council for Natural Scientific Professions (SACNASP, Pr. Nat. Sci. (Practice no. 400194/10): Ecological Science
- Member of the Gauteng Wetland Task Group
- Member of WISA (Gauteng Region)

Short Courses

- ISO 14001 IMPLEMENTATION AND INTERNAL AUDITING
- ISO 18001 IMPLEMENTATION AND INTERNAL AUDITING
- ISO 9001 IMPLEMENTATION AND INTERNAL AUDITING
- LEAD AUDITING (SAATCA)
- INCIDENT AND ACCIDENT INVESTIGATIONS
- QUALIFIED WETLAND ASSESSMENT PRACTITIONER (WET-HEALTH; WET IHI, SPATSIM)
- ESRI GIS MAPPING, ARCMAP 10

Key Skills

- ESRI GIS MAPPING, ARCMAP 10

- ISO 14001: 2004 internal auditing
- Legal compliance auditing
- Wetland delineation and assessment
- Environmental Impact Assessment
- Waste Management Licence Applications
- Water Use Licence Applications
- Basic Assessments
- Feasibility Studies (Fatal flaw analysis)

Employment History

2014 – Current Sazi Environmental Consulting cc
2011– 2014 Sebata Group of Companies (Pty) Ltd
2009 – 2011 Department of Water Affairs
2007 – 2009 Wetland Consulting Services (Pty) Ltd
2005 – 2006 University of KwaZulu-Natal (Maluti Transfontier Conservation Program)
2004 – 2005 University of KwaZulu-Natal (Welgevonden Elephant Program)

WORKS EXPERIENCES

WETLANDS			
PERIOD	**PROJECT NAMES**	**SCOPE**	**clients**
2018	Natalspruit river rehabilitation	Wetland delineation, Wetland PES and EIS description, Wetland classification, Rehabilitation	Company: Silver Horns Contact: Thabo Munyai Tel: 076 126 8387
2018	Brakpan automotive hub wetland assessment	Wetland delineation, Wetland PES and EIS description, Wetland classification, Rehabilitation	Company: Vungandze Projects Contact Person: Khosi Mngomezulu Tel: 083 256 1292
2018	K2 and K3 pipeline wetland assessment	Wetland delineation, Wetland PES and EIS description, Wetland classification, Rehabilitation	Company: Rand Water Contact Person: Nomkhosi Mohlahlo Tel: 011 724 9191
2018	Desktop wetland assessment on portion 10 on Reserve 16 of Farm no	Desktop study	Company: Beyond Greening Environmental Services Pty (Ltd) Contact

	15638 in Ngwavuma, KwaZulu Natal Province, South Africa		Person: Nonkululeko Khumalo Tel: 072 172 8374
2017	Lanseria business park wetland delineation and assessment report	Wetland delineation, Wetland PES and EIS description, Wetland classification, Rehabilitation	Company: Arengo 6 Contact Person: Kagiso Mohlamme Tel: 072 591 5237
ECOLOGICAL ASSESSMENT (FAUNA AND FLORA)			
2018	K2 and K3 pipeline ecological assessment	Flora and fauna assessment, Sensitivity areas	Company: Rand Water Contact: Nomkhosi Mohlahlo Tel: 011 724 9191
2018	Brakpan automotive hub ecological assessment	Flora and fauna assessment, Sensitivity areas	Company: Vungandze Projects Contact Person: Khosi Mngomezulu Tel: 083 256 1292
2017	Amandebult Section biodiversity assessment	Flora and fauna assessment, Sensitivity areas	Company: Phuka tsa Nong Contact: Kelebogile Mogajane Tel: 083 478 5753
2017	Leliefontein biodiversity assessment	Flora and fauna assessment, Sensitivity areas	Company: Ndlelenhle Mining and consulting Contact: Abraham Maphoso Tel: 082 088 3283

Appendix E: Public Participation

Appendix E1 – Newspaper advert

704 CREDITORS/ DEBTORS

In the estate late JOSEPH ENGELBRECHT
Identity number 651215 5070 087
Unmarried male of
29 Parakiet Street
Pescodia
Kimberley
8301

ESTATE NUMBER 003458/2022

DEBIT AND CREDITORS having claims against the above-mentioned estate must lodge it with the executor concerned within 30 days from date of publication hereof.

A Althea
Le Roux Attorneys
09 Neale Street
Beaconsfield
Kimberley
073 647 3921
Email: althea.mongala@gmail.com

In the estate late PETRUS THOMAS LATEGAN
Identity number 380917 5035 089
a widow of
33 Deyer Place
Beaconsfield
Kimberley
8301

ESTATE NUMBER 1934/2022

DEBIT AND CREDITORS having claims against the above-mentioned estate must lodge it with the executor concerned within 30 days from date of publication hereof.

Althea Le Roux
Attorneys
09 Neale Street
Beaconsfield
Kimberley
073 647 3921
Email: althea.mongala@gmail.com

In the Estate of the late AGNES ELLAINE MAC DONALD,
identity number 530705 0180 086,
of 47 Fourth Street,
Homevale, Kimberley,
8345.

MASTER'S REFERENCE NO:3660/2022

Creditors and debtors in the abovementioned Estate are requested to submit their claims and to pay their debts to the undersigned within 30 (Thirty) days from the date of publication hereof.

HPA VENTER
Duncan & Rothman
Attorneys for Executrix
PO Box 64
Kimberley
8300
Ref: Mr
TAU/tm/MAC63/0001

711 LOST DEED

LOST OR DESTROYED DEED

Notice is hereby given in terms of Regulation 68 of the Deeds Registries Act, 1937, of the intention to apply for the issue of a certified copy of T 526/2006:

Deed of Transfer No. T 526/2006 passed by Sol Plaatje Municipality, in favour of ENGELIEN ELEPIN, Identity number 640304 1271 08 1, Unmarried, in respect of certain Erf 24424 Galeshewe, In extent 434 (Four hundred and Thirty Four) square metre, Situated in the Sol Plaatje Municipality, District Kimberley, Province of the Northern Cape, which has been lost or destroyed.

All interested persons having objection of issue of such copy are hereby required to lodge same in writing with the Registrar of Deeds at Kimberley within two weeks from the date of the publication of this notice.

Dated at Kimberley on this 27 th January 2023.

Van De Wall Inc
DS Corns Office Park, Second Floor
69 Memorial Road, Kimberley, 8300
Tel nr : (053) 830 2900
Email : cmauza@vanwall.co.za
File Ref : E52039/cm

704 CREDITORS/ DEBTORS

In the Estate of the late KEVIN BARON CLAUDE STEYN,
identity number 541010 5040 089,
married in community of property to
Myrtle Aletta Steyn,
identity number 531117 0194 084,
residing at 11 Bede Street, Utility, Kimberley,
who passed away on 24 November 2021.

ESTATE NO: 000980/2022

Creditors and debtors in the above Estate are hereby required to file their claims with and pay their debts to the undermentioned within 30 days from the date of publications hereof.

Dated at Kimberley on 17 January 2023.

MYRTLE STEYN,
Executrix Testamentary
11 Bede Street,
Utility, Kimberley, 8301
Tel: 073 188 3348

In the Estate of the late KHUTSAHALO LYDIA SIBHONA,
identity number 521216 0776 080,
of 728 Bechuana Street,
Galeshewe, Kimberley,
8345.

MASTER'S REFERENCE NO: 184/2021

Creditors and debtors in the abovementioned Estate are requested to submit their claims and to pay their debts to the undersigned within 30 (Thirty) days from the date of publication hereof.

HPA VENTER
Duncan & Rothman
Attorneys for Executrix
PO Box 64
Kimberley
8300
Ref: Mr
TAU/tm/SIB30/0001

In the Estate of the late LAWRENCE WILLIAM HORING,
identity number 760619 5547 085,
major male who died on 24 June 2021 and who resided at 15 Richter Street, Lime Acres.

MASTER'S REFERENCE NO: 002554/2021

All persons having claims against the abovementioned Estate must lodge it with the Executor concerned within 30 days (or as indicated) from date of publication hereof.

F. ENGELBRECT
Authorised Agent
ENGELSMAN MAGABANE INC
johane@engelsman.co.za
9 Bishops Avenue
Labram
Kimberley
HOR12/0001/F. ENGELBRECHT/jvdm

711 LOST DEED

704 CREDITORS/ DEBTORS

In the Estate of the late MARY MAPHEO BRAND,
identity number 810808 1356 084,
of 241 Sello Phiri Street,
Lathi Mabilo Park, Kimberley, 8345.

MASTER'S REFERENCE NO: 2750/2022

Creditors and debtors in the abovementioned estate are requested to submit their claims and to pay their debts to the undersigned within 30 (Thirty) days from the date of publication hereof.

HPA VENTER
Duncan & Rothman
Attorneys for Executrix
PO Box 64
Kimberley
8300
Ref: Mr
TAU/tm/BRA70/0001

In the Estate of the late MOSIME KEOLEBOGILE ROSEMARY
Identity number 760128 0320 084
Date of death 21 May 2021
last address
11 Fink Street
Kathu
Northern Cape
Province

ESTATE NUMBER 001990/2021

All person having claims against the above mentioned estate are required to lodge their claim with the undersigned within 30 days after the date of publication hereof.

Executor / Authorized Agent:
MAKGALE NGWASHENG INC ATTORNEYS
48 Von Wielligh Street
Rustenburg
0300
Tel 014 538 0082
info@mnincattorneys.com

In the Estate of the late UNITY BOOYSEN
identity number 650923 0108 080,
of 4495 Moagi Street,
Vergenoeg, Kimberley,
8345.

MASTER'S REFERENCE NO: 3633/2022

Creditors and debtors in the abovementioned Estate are requested to submit their claims and to pay their debts to the undersigned within 30 (Thirty) dats from the date of publication hereof.

HPA VENTER
Duncan & Rothman
Attorneys for Executrix
PO Box 64
Kimberley
8300
Ref: Mr
TAU/tm/BOO87/0001

705 FIRST/FINAL NOTICES

In die Boedel van wyle CATHERINA PETRONELLA POOLMAN,
identiteitsnommer 410612 0031 084,
wie woonagtig was te Andre Straat 15,
Heuwilsig, Kimberley,
8301, en oorlede is op 1 Junie 2022, getroud.

BOEDELNR: 1908/2022 (KIMBERLEY)

Neem kennis dat die Eerste en Finale Likwidasie- en Distribusierekening in bogemelde Boedel ter insae sal lê by die kantoor van die Meester van die Hoë Hof te Kimberley vir 'n tydperk van 21 (EEN EN TWINTIG) dae vanaf datum van publikasie hiervan.

INVENTUM ESTATES
13A Schmidtsdrift Road,
Rhodesdene,
Kimberley, 8301
Verw: JOEY SCHOEMAN/3219-2021
Tel: 079-509-4773 / (053) 244-0986

705 FIRST/FINAL NOTICES

In die Boedel van wyle HEILA MAGDALENA CLAASSEN,
identiteitsnommer 470312 0030 080,
van 1 Moffastraat,
Griekwastad, 8365,
oorlede op 13 Maart 2020.

BOEDEL NR: 002494/2020

Kennisgewing aan alle belanghebbendes dat die Eerste en Finale Likwidasie en Distribusierekening ter insae sal lê vir 21 dae vanaf 27 Januarie 2023 by die Magistraatskantoor te Hartswater en die Meesterskantoor te Kimberley. Indien geen besware daarteen by die genoemde kantore binne die tydperk ingedien word nie, sal die Eksekuteur voortgaan met betalings soos vervat in die rekening.

FULCRUM ASSET MANAGEMENT
Suite 2A De Vallegebou
DF Malanstraat 1,
Hartswater, 8570
(Verwysing SJ RUDMAN)
E-pos: stephan@fulcrumbb.co.za

In die Boedel van wyle LOUWRENS DE JAGER,
oorlede op 18 Oktober 2018,
identiteitsnommer 410628 5002 086,
Plaas Nooitgedacht,
Ulco, getroud binne gemeenskap van goedere met
Francine Johanna de Jager,
identiteitsnommer 440809 0049 082.

BOEDERLNR: 3911/2018

Kennis geskied hiermee dat die Eerste en Finale Distribusierekening in bogenoemde Boedel ter insae sal lê te die kantoor van die Meester van die Hooggeregshof, Kimberley asook te die Landdroshof, Barkly Wes vir 'n tydperk van 21 dae gereken vanaf 27 Januarie 2023.

DU RANDT ATTORNEYS
Office No 3
Featherbrook Village Shopping Centre
Ruimsig
Roodepoort
1700

In the Estate of the late SEUTLHANG ARTHUR SEBITLOANE,
identity number 521208 5409 080,
363 Phologolo Street,
Mothibistad.

MASTER'S REFERENCE NO: 2914/2013

The First and Final Liquidation and Distribution Account in the above Estate will lie open for inspection at the office of the Master High Court KIMBERLEY and Magistrate Court MOTHIBISTAD for a period of 21 (Twenty-one) days from date of publication.

B.L MOTLHAMME
Motlhamme Attorneys
1st Floor, 4 Jacobus Smit Avenue
Labram
Kimberley, 8301
Ref: BLM/1462

In the Estate of the late WILLEM HERMANUS JAMES,
identity number 570429 5034 088,
a major male married in community of property to
Shirley Valerie James,
identity number 580813 0149 082
in life from 12 Archillies Street, Kimberley,
who died on 15 February 2022.

ESTATE NO: 768/2022

The First and Final Liquidation and Distribution Account in the above Estate will lie for inspection at the offices of the Master of the High Court, SOL PLAATJIE AVENUE, KIMBERLEY for a period of 21 (TWENTY ONE) days from the date of publication hereof.

ENGELSMAN MAGABANE INC
Attorneys for Executor
PO Box 609
Kimberley
8300
annelouise@engelsman.co.za

714 PUBLIC NOTICES

NOTICE OF INTENDED DEVELOPMENT ACTIVITY

Notice is given in terms of Section 24(5) and 44 of the National Environmental Management Act (Act No. 107 of 1998) together with the Spatial Planning and Land Use Management Act (Act 16 of 2013) of intent to carry out the following activity:

Griqua Constructions (Pty) Ltd will submit an application for the development project of a Hotel and Conference facilities on a portion of Portion 58 of the farm Alexander Fontein 123, situated in the Frances Baard district, Northern Cape Province.

The development process includes the above mentioned infrastructure.

A public meeting is preliminary scheduled on **15 February 2023** at Kimberley Library, Sydney Street, 10h00. If said date and time had to change it will be published on this platform.

All interested and/or affected parties are hereby invited to register, provide comments and/or concerns, in writing before **27 February 2023** for the attention of:

LW Consultants
Tel: 072 141 4164
Fax: 086 415 7897
Address: Postnet Suite 26, Private Bag X2 Diamond, 8305
E-mail: lindie@liwico.co.za

The project is in co-operation with Vernon Mostert

714 PUBLIC NOTICES

NOTICE OF DRAFT BASIC ASSESSMENT REPORT(BAR), DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT (EMPr) FOR THE PROPOSED IKOMKHULU SOLAR PLANT AT PORTION 5 FARM ZOELENS LAAGTE 158, WITHIN DIKGATLONG LOCAL MUNICIPALITY, NORTHERN CAPE PROVINCE.
ENVIRONMENTAL AUTHORISATION AND WATER USE LICENCE APPLICATION.
PUBLIC REVIEW NOTICE
DEPARTMENT OF ENVIRONMENT AND NATURE CONSERVATION REF: NC/BA/01/FB/DIK/WIN1/2023

Notice is hereby given in terms of Chapter 6, Regulation 41 of the National Environmental Management Act 107 of 1998 (as amended), EIA Regulations 2014, as amended of an application for intent to conduct a Basic Assessment Report pursuant the environmental authorization for the proposed activity. Additionally, a water use licence application for Section 21 (a), water uses in terms of the National Water Act 36 of 1998.

Project Description: Tholoana Environmental Consulting has been appointed by Ikomkhulu Solar (Pty) Ltd to act as Independent Environmental practitioners for the proposed Ikomkhulu Solar Plant, at portion 5 of Farm Zoelens Laagte 158. The preferred site for the development is approximately 568.7559 hectares, however the footprint of the solar farm is approximately 300 hectares. The proposed project entails construction of a Solar Photovoltaic System plant, wherein the energy received from the sun is transferred to DC energy and converted to AC energy, then transferred to the national grid.

Location: The site for the proposed project activities is at portion 5 of Farm Zoelens Laagte 158, GPS coordinates as follows: 28°21'50.07"S ; 24°41'16.30"E.

Legislation: The proposed project triggers the following legal requirements:

- National Environmental Management Act 107 of 1998, as amended, Environmental Impact Assessment Regulations 2014, as amended:
  - Listing Notice 2 - GN R.325 - 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"
  - Listing Notice 2 – GN R.325; 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— the undertaking of a linear activity; or maintenance purposes undertaken in accordance with a maintenance management plan"
- National Water Act 36 of 1998, water uses
  - Section 21 (a) – "Taking Water from a water resource"
  - Section 21 (c) – "impeding or diverting the flow of water in a watercourse"
  - Section 21 (i) - "altering the bed, banks, course or characteristics of a watercourse"

PUBLIC PARTICIPATION PROCESS:

Interested and Affected Parties (I&AP's) are invited to comment on the Draft Basic Assessment Report and Draft Environmental Management for the proposed Ikomkhulu Solar Plant. The report can be accessed on request from vusi@tholoanaconsulting.co.za, alternatively at the Kimberley Library, Dikgatlong Library and the ward councilor for ward 4 under Dikgatlong Local Municipality. Comments for the report can be sent to Tholoana Environmental Consulting from the publication of this advert on, **or before Monday 27 February 2023,** email or post to the below mentioned Environmental Assessment Practitioners (EAP). For other alternatives kindly contact the EAP, details provided below:

Further detail/information on the proposed Ikomkhulu Solar Plant project can be obtained from the Environmental Assessment Practitioners (EAP) indicated below.

Tholoana Environmental Consulting
P. O Box 1549, HONEYDEW, 2040 - PHONE: 011 704 5071- Cell – 078 6390 199

CONTACT PERSON: Mr. Vusmuzi Hlatshwayo, E-MAIL: vusi@tholoanaconsulting.co.za

THOLOANA

Appendix F: Impact Assessment

Forms Part of the Impact Assessment within the Basic Assessment

Appendix G: Environmental Management Programme (EMPr)

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

FOR

THE PROPOSED IKOMKHULU SOLAR PLANT

Prepared for

IKOMKHULU SOLAR (PTY) LTD

Prepared by

Tholoana Environmental Consulting CC

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JANUARY 2023

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Document title	**:**Draft EMPr: The Proposed Ikomkhulu Solar Plant
Author	**:Name and Surname -** Mr Vusmuzi Hlatshwayo – National Diploma – Environmental Sciences, Tshwane University of Technology. **:Professional registration** - Environmental Assessment Practitioners Association of South Africa (EAPASA) Registration No: 2020/350 **:Contact** - 011 704 5071; Cell No : 078 6390 199; **:E-mail** - vusi@tholoanaconsulting.co.za
Reviewer	**:Name and Surname -** Ms Snowy Makhudu - (National Higher Diploma in Meteorology, Tshwane University of Technology (1991), National Diploma in Meteorology, Tshwane University of Technology (1989), Certificate in Local Government and Development Management, Technikon SA (1997). **:Professional registration** - Environmental Assessment Practitioners Association of South Africa (EAPASA) Registration No: 2016/008 **:Contact** - 011 704 5071; Cell No : 083 640 8070; **:E-mail** - snowy@tholoanaconsulting.co.za

EXPERTISE OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Tholoana Environmental Consulting CC (TEC) brings together a team of dedicated professional scientists, environmental managers and practitioners who have many years of combined experience in environmental services, including services not limited alternative energy sources i.e. Msibi Bio-Plant (tyre pyrolysis) and Environmental Management Plans. TEC provides comprehensive Integrated Environmental Management (IEM) services to a broad range of clients throughout the African continent and other international countries.

TEC has no interest in the aforementioned project or any component that may emerge from the processes of the proposed project.

Details of the Environmental Assessment Practitioner (EAP) who compiled the Draft Environmental Management Programme Report (EMPr) for the proposed Ikomkhulu Solar Plant are outlined below:

- **Mr Vusmuzi Hlatshwayo:** Mr. Vusmuzi Hlatshwayo has a National Diploma in Environmental Sciences obtained from Tshwane University of Technology (TUT) in Pretoria. He is also a full member of the International Association for Impact Assessment (South Africa) (IAIAsa) and the Environmental Assessment Practitioners Association of South Africa (EAPASA) and is an EAP within Tholoana Environmental Consulting. Mr Vusmuzi Hlatshwayo was involved in the following projects: Evaton Estate (Housing Development), Krugersdorp Station Upgrade and Intermodal Facilities, Madiba Heights (mixed-use development), Msibi Bio-Plant (waste management application, and a Basic Environmental Assessment), Maluti-A-Phofung Landfill Site (waste management license application) and Refliwe Hostel Development (EMP), Barry Marais Storm Water and Road Upgrade and Ridge Road Storm Water and Road Upgrade.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

AIA	Archaeological Impact Assessment
BAR	Basic Assessment Report
CLO	Community Liaison Officer
C-PLAN	Conservation Plan
CBA	Critical Biodiversity Area
DENC	Department of Environment and Nature Conservation
DFFE	Department of Forestry, Fisheries and Environment
DWS	Department of Water Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Ecological Support Areas
EMF	Environmental Management Framework
EMPr	Environmental Management Programme as per the EIA Regulations, 2014
IDP	Integrated Development Plan
I&AP	Interested and Affected Party
NFEPA	National Freshwater Priority Area
GHG	Greenhouse Gas
Ha	Hectare
HGM	Hydro-geomorphic
kWh	kilowatt hours
NWA	National Water Act 36 of 1998
PIA	Palaeontological Impact Assessment
PPP	Public Participation Process
PV	Photovoltaic
Rd	Road
SAHRA	South African Heritage Agency
SUDS	Sustainable Urban Drainage Systems
TEC	Tholoana Environmental Consulting CC

DEFINITIONS

Term	Explanation
Chemical Waste	means solid, liquid and gaseous products that are to be discarded and that contain dangerous or polluting chemicals that pose a threat to humans, animals or the environment, when improperly disposed of
Collection	means accumulation of wastes from intermediate storage sites for movement to a primary waste holding area or from several primary waste holding areas to the treatment or final disposal site or both.
Contractor	The principal person or company undertaking the construction of the development. ➢ Appointed by the developer, including subcontractors appointed by the contractor.
Disposal	means the burial, deposit, discharge, abandoning, dumping, placing or release of any waste into, or onto land.
Engineer	A person representing the Developer on site and who is responsible for the technical and contractual implementation of the works to be undertaken. This is usually the engineer, but may be any other person, such as an architect or project manager, authorized by the Developer to fulfil this role.
Environment	The surroundings within which humans exist and that are made up of the land, water and atmosphere of the earth: ➢ micro-organisms, plant and animal life; ➢ any part or combination of the above and the inter-relationships among and between them; and ➢ the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.
Environmental Control Officer	The individual or company appointed by the Developer to ensure the implementation of the EMP and suitable environmental management practices on site for the duration of the construction phase of the Project.

Term	Explanation
General Waste	means waste that does not pose an immediate hazard or threat to health or to the environment, and includes - domestic waste; building and demolition waste; business waste; and inert waste.
Ground Water	subsurface water that fills voids between highly permeable ground strata comprised of sand, gravel, broken rocks, porous rocks, etc. and move under the influence of gravitation.
Hazardous Waste	means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.
Heritage Resources	means any place or object of cultural significance, including all human-made phenomena and intangible products that are the result of the human mind. Natural, technological or industrial features may also be part of heritage resources, as places that have made an outstanding contribution to the cultures, traditions and lifestyles of the people or groups of people of South Africa.
Impact	Refers to a description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.
Incident	An undesired event which may result in a significant environmental impact but can be managed through an internal response.
Mitigation	Measures designed to avoid, reduce or remedy adverse impacts.
Pollution	any change in the environment caused by – substances; radioactive or other waves; or noise, odours, dust or heat emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future.

Term	Explanation
Recycle	A process where waste is reclaimed for further use, this involves the separation of waste from a waste stream for further use and the processing of that separated material as a product or raw material.
Rehabilitation	Rehabilitation is defined as the return of a disturbed area to a state which approximates the state (wherever possible) which it was before disruption.
Safety, Health and Environmental Officer	The SHE officer is a Contractor representative, responsible for the safety, health and environmental aspects on the construction site. The SHE officer will be responsible for the day-to-day monitoring of the EMP and Health and Safety Plan as per the OHSA.
Segregation	means systematic separation of health care waste into designated categories.
Waste	means any substance, whether or not that substance can be reduced, re-used, recycled and recovered – ➢ that is surplus, unwanted, rejected, discarded, abandoned or disposed of; ➢ which the generator has no further use of for the purposes of production; ➢ that must be treated or disposed of; or ➢ that is identified as a waste by the relevant Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but— ▪ a by-product is not considered waste; and ▪ any portion of waste, once re-used, recycled and recovered, ceases to be waste
Waste Disposal Facility	means any site or premise used for the accumulation of waste with the purpose of disposing of that waste at that site or on that premises.

Water Pollution	As defined in the National Water Act, 36 of 1998, water pollution refers to the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it – less fit for any beneficial purpose for which it may reasonably be expected to be used; or harmful or potentially harmful a. to the welfare, health or safety of human beings; b. to any aquatic or non-aquatic organisms; c. to the resource quality; or d. to property.

IMPLEMENTATION OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME (EMP)- UDERTAKING BY THE PROJECT MANAGER-

The Project Manager _____ is responsible for the following

issues during the Construction Phase of the Proposed Ikomkhulu Solar Plant:

- Ensuring that the contractor is aware of all the specifications, legal constraints pertaining to the project specifically with regard to environmental management.
- Any damage to property or the environment must immediately be reported to project manager and the landowners. The damage must be repaired immediately to the owner's written satisfaction.
- No wandering around adjacent properties. Access is limited to the site only.
- The public and all property are to be treated with respect at all times.
- To ensure that all stipulations within the attached EMP are communicated and adhered to by the contractor.
- To ensure that all clean up and rehabilitation or any remedial actions that are required are completed prior to the issuing of a project completion certificate.

UNDERTAKING:

I, _____, the undersigned and duly authorized thereto by the Ikomkhulu Solar (Pty) Ltd hereby undertake to give effect to all aspects as contained in the attached EMP and accept all responsibility therefore.

Signed at _____ on this _____ day of _____ 2023.

_____

SIGNATURE

Witnesses: _____; _____

IMPLEMENTATION OF THE EMP-UNDERTAKING -BY THE CONTRACTOR-

The appointed contractor _____ for the Construction of the Proposed Ikomkhulu Solar Plant is responsible for the following:

- Ensure that the affected landowners are informed about your (the contractors) presence on their property.
- Immediately report any damage to property or the environment to the project manager and the landowner. The damage must be repaired immediately to the owner's written satisfaction.
- No wandering around adjacent properties. Access is limited to the site only.
- The public and all property are to be treated with respect at all times.
- Ensure that all stipulations within the attached EMP are communicated to and adhered to by the employees.
- Monitor the EMP throughout the project by means of site visits and meetings. This should be documented as part of the site meetings minutes.
- Ensure that all clean up and rehabilitation or any remedial actions that are required are completed prior to the issuing of a completion certificate.

UNDERTAKING:

I, _____, the undersigned and duly authorized thereto by Ikomkhulu Solar (Pty) Ltd hereby undertake to give effect to all aspects as contained in the attached Environmental Management Plan and accept all responsibility therefore.

Signed at _____ on this _____ day of _____ 2023.

_____

SIGNATURE

Witnesses:_____;_____

1. INTRODUCTION.

PROJECT OUTLINE :The proposed Ikomkhulu Solar Plant project entails the construction of Solar Photovoltaic (PV) power plant to feed into the National Grid (Eskom), at Portion 5 of the Farm Van Zoelen's Laagte No 158 Barkly Wes Rd, where the size of the property is approximately 642.4385 Hectares (Ha), however the footprint for the plant is approximately 300 Ha. The site area falls within ward 4, Dikgatlong Local Municipality, Frances Baard District Municipality in the Northern Cape Province, country South Africa.

The anticipated construction period for the proposed activities is approximately 10 months. The anticipated energy production for the proposed development during operation is 181 million kilowatt hours (kWh) per year over a 20year period. The energy is capable of supplying 33 000 households. Once the project is complete, it is anticipated that the energy from the plant will be supplied to another stakeholder (ESKOM), which will then undertake its own distribution to its clients.

SOLAR PLANT SETUP: Solar PV panels which receives the energy from the sun, from which the Direct Current (DC) energy goes through a combiner box, which combines the outputs of the different strings of PV modules to the inverter. Batteries are used for the storage of energy before the conversion takes place using the inverter.

The energy from the sun in the form of DC is converted (factor in the stored energy from the batteries) to Alternating Current energy (electricity), by the invertor. The next phase is the smart transformer station facility which consists of equipment with controls for switching (this mainly comprises of various facilities for operational controls, including operational offices and protection of the current) from which it goes to the substation (Eskom-transformer), then transferred to the Eskom grid lines (pylons) for distribution. The full description of the proposed development, including the associated infrastructure is detailed in the Draft Basic Assessment Report.

SITE ACCESS : The study area can be accessed from N12, turning right into R374 from Warrenton, whereas from Kimberly turning left into R 374. Once on R374, the site is approximately 16 Km, through the Windsorton town.

Figure 1 : Access Road

Starting from N12 into R374, the Vaal river leading into the Windsorton town is approximately 10 km, from which passing the Windsorton town, the distance is 3.74 km to a gravel road on the left, opposite to the Kutlwano and Windsorton waterworks (the waterworks is on the right hand side). Once on the left turn (gravel road), the distance to the site approximately 2 km.

2. PURPOSE OF EMPr.

The Draft EMP is compiled as per the requirements detailed in Appendix 4 of the EIA regulations 2014 (as amended) promulgated in terms of the NEMA Act No 107 of 1998 (as amended). The Applicant and the appointed Contractor must ensure that the conditions set out in this document are carried out to ensure sound management of the environmental impacts during the lifecycle of the proposed project activities. In terms of the provisions of the EIA Regulations 2014 (as amended); this document must also be read as a living document that must be amended or updated periodically as and when required.

The draft EMP aims to prevent, reduce or mitigate the negative occupational safety hazards and environmental impacts, while enhancing the beneficial aspects of the project.

It further outlines measures to be followed in order to reduce the social impacts of the project on local residents and adjacent properties. This document specifies environmental management activities for the different parties responsible for various mitigation tasks during the project implementation phases.

The purpose of this document is to outline a programme of action to mitigate and manage the impacts of the proposed project activities on the existing and surrounding environment and ensure that such impacts do not compromise the environment and people working on or around the site.

The draft EMP aims to assist the responsible parties to comply with various legislative provisions pertaining to environmental management. It is a requirement that this draft EMP be viewed as an extension to the Contractual Documentation issued to the Applicant's agents – Contractors, subcontractors, Consulting Engineers for implementation and compliance during various phases of the project.

The draft EMP contains mitigation measures specific to the planning and design, construction, post construction and operational phases of the proposed project.

In summary, the purpose of this draft EMP is to:

- Sketch the background for the project.
- Introduce the structure of the draft EMP, particularly in terms of the contractual application of the environmental specifications.
- Highlight the salient features of the draft EMP.
- Detail the roles of the various parties with respect to the implementation and monitoring of the draft EMP.
- Clarify and streamline the implementation of the Draft EMP; and
- Outline procedures for proactive environmental management and environmental control, in the event of pollution or similar incidents.

The draft EMP considers similar project activities, in line with known environmental impacts associated with the planning and design, construction, pre-construction, operational phases of the proposed development; most importantly the other consideration is given to the receiving environment.

Table 1: Legislation, policies or guidelines are applicable to the proposed project:

Title of legislation, policy or guideline:	Administering authority:	Promulgation Date:
Conservation of Agricultural Resources Act (Act No. 43 of 1983 as amended in 2001)	National and Provincial	27 April 1983
The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996, as amended).	National	18 December 1996
National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended).	National & Provincial	27 November 1998
National Environmental Management: Waste Act, 2008 (Act 59 of 2008, as amended)	National & Provincial	10 March 2009
National Heritage Resources, 1999 (Act No. 25 of 1999)	National & Provincial	28 April 1999
National Water Act, 1989 (Act No. 36 of 1998, as amended)	National & Provincial	26 August 1998

Title of legislation, policy or guideline:	Administering authority:	Promulgation Date:
National Environmental Biodiversity, 2004 (Act No. 10 of 2004)	National & Provincial	7 June 2004
Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)	National & Provincial	23 June 1993
National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)	National & Provincial	24 February 2005
Hazardous Substances amendment Act, 1992 (Act No.53 of 1992) (as amended)	National	4 April 1973
Promotion of Access to Information Act, 2000 (Act No. 2 of 2000)	National	2 February 2000
Environmental Impact Assessment Regulations, 2014 (as amended)	National & Provincial	7 April 2017
National Environmental Management: Biodiversity Act: Alien and Invasive Species Regulations R 598 of 2014	National	1 August 2014
Northern Cape Nature Conservation Act (Act No. 9 of 2009)	Provincial	21 January 2010

Description of compliance with the relevant legislation, policy or guideline:

Legislation, policy of guideline	Description of compliance
Conservation of Agricultural Resources Act (Act No. 43 of 1983 as amended in 2001)	As specified in the Act, is the list of invasive weed and plant species, including prescribed actions to combat the spread thereof. Applicable to the study area, is category 1b invasive plant species, which requires control by an invasive species management programme.
The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996, as amended).	Section 24 of the constitution stipulates that everyone has the right — to an environment that is not harmful to their health or well-being; and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that — prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. The developer has the responsibility to ensure that project activities are undertaken in a manner that doesn't cause environmental degradation, whilst ensuring the principle of sustainable development is adhered to. This should be achieved through implementation and adherence to the EMP at all phases of the proposed activities.

Legislation, policy of guideline	Description of compliance
National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended).	Section 28 of the act applies to the activities to be undertaken by the developer. The developer has a duty to ensure that any activities that cause or may cause environmental degradation are assessed and measures for prevention, avoidance or minimization of such impacts from occurring are in place for all phases of the proposed project activities.
National Environmental Management: Waste Act, 2008 (Act 59 of 2008, as amended)	The Applicant should adhere to the following waste management practices:  *Figure 2: Waste management hierachy* The waste management mitigation measures as provided within the draft EMP should be adhered to in order to achieve compliance with the requirements of this act.
National Heritage Resources, 1999 (Act No. 25 of 1999)	The Applicant should ensure compliance to Section 38 of this Act, thus ensuring that the Heritage Resources Agency is notified and provides comments on the proposed activities. Based on the conducted Phase 1 Archaeological Impact Assessment by Millenium Heritage Group (Pty) Ltd, no heritage resources have been identified on site.
National Water Act, 1989 (Act No. 36 of 1998, as amended)	In line with this act, the proposed project activities should ensure compliance to section 19 of the NWA, thus putting in place measures that prevent pollution and/degradation on water resources. Additionally, a Water Use License is required for Section 21 (a) – Taking water from a water-resource (in this instance this refers to the abstraction of water from the borehole).
National Environmental Biodiversity, 2004 (Act No. 10 of 2004)	This Act requires that any red data and sensitive species within the site development should be conserved during the project implementation phases. Although no Threatened species were encountered during the field survey, recommendation in the draft EMP and ecological assessment should be adhered to on implementation of the proposed project activities.
Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)	All persons at work are entitled to a healthy and safe working environment while undertaking their respective activities. The developer has a responsibility to ensure that this requirement is adhered to.
National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)	Project activities should be undertaken in manner which doesn't cause air pollution/change in the ambient air quality (dust),

Legislation, policy of guideline	Description of compliance
	through implementation of mitigation measures as per the EMP on air quality related impacts.
Hazardous Substances amendment Act, 1992 (Act No.53 of 1992) (as amended)	The disposal of hazardous substances should be done in accordance with the waste management hierarchy and in an acceptable manner (Use of leak proof receptacles), separated from general waste. The use and handling of hazardous substances should be done in accordance with the hazardous substances handling and usage procedures to prevent any incidents from occurring.
Promotion of Access to Information Act, 2000 (Act No. 2 of 2000)	All documents relating to the project should be accessible to the Public, or authorized personnel where required (i.e. officials exercising their duties).
Environmental Impact Assessment Regulations, 2014 (as amended)	The proposed project activities does not require an environmental authorization, however the conditions as stipulated in this EMP with mitigation measures should be complied with and implemented.
National Environmental Management: Biodiversity Act: Alien and Invasive Species Regulations R 598 of 2014	Regulations should be complied with for the removal and controlling of alien and invasive species within the proposed project area.
Northern Cape Nature Conservation Act (Act No. 9 of 2009)	The act provides for the conservation of indigenous, red-data listed plant and animals, including the control for sustainable use where applicable. In relation to the proposed project, any red data listed plant and animal species protected in terms of this act, including aquatic habitats may be damaged and/or destroyed.

The draft EMP should be viewed as a stand-alone document, which must be used on site during the life-cycle of the project.

2.1.Objectives of the Draft EMP.

The stated objectives of the draft EMP are to ensure that:

a. All project activities are managed in a manner that reduces or avoids negative social and environmental impacts, while enhancing positive impacts.
b. Timely precautions are taken to forestall damage and claims arising from damages.
c. Communication between the developer, project manager, contractors and affected parties is optimised to ensure that all role-players are aware of their specific responsibilities.
d. The known risk and hazards are actively managed and monitored according to guidelines laid down in this draft EMP.
e. The completion date of the contract is not delayed due to problems arising from neighbours' concerns with the project.

f. Accurate records of environmental and/or social incidents, including accidents or objections and complaints are kept, so that the responsible parties are accountable in the event of claims against the developer.
g. Any improvements made in the mitigation of the draft EMP due to on-going monitoring of its effectiveness are documented, and then made available for future reference.
h. In order to meet the preceding objectives, the contractor should have a Safety, Health and Environmental Officer (SHE) representative to ensure that specifications of this draft EMP are adhered to, where required, advice should be sort from an independent service provider.

The draft EMP addresses the following three phases of the project:

2.1.1. The Planning and Design Phase

The draft EMP provides an ideal opportunity to incorporate pro-active environmental management and occupation health and safety measures to ensure that the project occurs in a safe, environmentally friendly and sustainable manner.

Pro-active safety and environmental measures minimise the risks of major incidents. The possibility of accidental incidents taking place still exists; however, through the incorporation of contingency plans during the planning phase, the necessary corrective action can be taken to further limit detrimental impacts arising from unforeseen/foreseen incidents. An unforeseeable event could be the lack of commitment of key role players to implement mitigation measures as proposed in this draft EMP, thus a practical solution to the problem has to be sought. The emphases is on viewing this draft EMP as a dynamic working tool that needs to be modified as and when necessary.

2.1.2. The Construction Phase

The majority of impacts identified during this phase will have immediate effect (e.g. noise, ambient air, water resource pollution and loss of both Flora and Fauna).

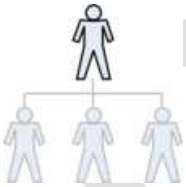
The other associated impact could be visual impacts as a result of construction activities. The draft EMP provides precautionary measures to be implemented in line with designs for the project.

The monitoring of the Draft EMP a continual basis during the construction phase, it is possible to identify and mitigate impacts to ensure proper safety and environmental management practices. Possible impacts include:

- Removal and/or destruction of natural vegetation.
- Groundwater pollution by chemical spills and leakages or caused by i.e. cements mixed on impervious surfaces.
- Soil contamination from oil and/or other chemicals from construction vehicles and equipment.
- Visual disturbances due to lack of proper house-keeping and the location of the construction site camp.
- Land disturbances as a result of earthworks and excavation activities.

Table 2, below explains briefly how incidents are identified and handled throughout the different phases of the project.

Table 2: Incident Identification

Activate and Communicate	Bring Incident Under Control	Audit	Recovery
			
Contractor	Safety, Health & Environmental Committee	Safety, Health & Environmental Audit Team	Incident Recovery Team

2.1.3. Post Construction Phase

The post construction phase outlines as far as possible measures to rehabilitate the environment affected by the project activities. The aim is to landscape all affected footprints/servitudes. Indigenous vegetation must be used for the landscaping. The areas to be landscaped must be incorporated in the designs of the development.

2.1.4. The Operational Phase

By taking pro-active measures during the planning and design, construction and post construction phases potential environmental impacts emanating from the operational phase may be minimised, and where possible, avoided.

Monitoring of certain critical aspects such as waste management, occupational health and safety, environmental pollution holistically will still be required. The Applicant will play a major role in the implementation of measures of the Draft EMP during the operational phase.

2.2. Financial Provision or Budget for Implementation of the Draft EMP

The developer will be required to provide means and resources to implement all aspects of the draft EMP for the construction and post construction. The manner in which compliance tasks with the draft EMP conditions is financed will depend on available in-house resources. As a result cost calculations should be based on any external consultations which may be required from time to time.

2.3. General Environmental Guidelines

This section provides environmental guidelines applicable to the project phases. The draft EMP provides specifications and regulations that must in all instances be adhered to. It is however the responsibility of all people involved, in committing themselves with the implementation of the draft EMP in all phases of the project. The developer or designated representative, which may be the project manager will be responsible for ensuring compliance of the contractors with the draft EMP and will rely on the Safety, Health and Environmental (SHE) Representative or Officer for compliance monitoring. As a result, the Contractor must monitor his/her employees through the SHE to ensure the adherence of the provisions of the draft EMP.

The contractor shall receive a copy of the draft EMP on which he/she will be given an opportunity to clear any misconceptions and uncertainties. The draft EMP will form part of the contract and will therefore be a legally binding document. In the event of discrepancy with regard to environmental matters or environmental specifications this document shall take precedence.

- **Failure to comply with Environmental Considerations**

All rules and regulations pertaining to the site and municipal bylaws must be adhered to. All outdoor advertising must be below the thresholds stipulated in the EIA Regulations 2014 (as amended). An official (Competent Authority) may order the contractor to suspend part of or all operations if the contractor causes damage to the environment by not adhering to the specifications set below. Any environmental degradation/damage must be mitigated/managed within a timeframe stipulated by any notices as provided by an official (Competent Authority).

- **Environmental Training Programme**

The responsibility to communicate all aspects of the Draft EMP to the site staff (i.e. sites agents and labourers) lies with the contractor. The developer may additionally appoint an external service provider for compliance monitoring and training purposes. The communications and/or training should be done prior and during the construction phase (where required, based on an identified need from compliance monitoring). Basic environmental awareness training should be included with the safety training, toolbox talks and induction programs. A copy of the draft EMP must always be made available on site.

- **Progress/Site Meetings**

Environmental management shall be a standing agenda point during site meetings. The SHE representative or officer designated for environmental management compliance monitoring on the project shall attend the progress and on-site meetings on a regular basis to provide feedback on any outstanding or continuous environmental matters, including any lessons learned with a focus on any negative and positive outputs.

3. ROLES AND RESPONSIBILITIES

The various roles and responsibilities for individuals involved in the proposed project are as follows**:**

- **The Developer :** The Developer is required to adhere to the following:
  - All relevant approvals and permits are attained prior to the start of construction activities on site.
  - Ensure that the contractor is aware of the specific conditions to be adhered to in line with activities to be undertaken during the construction phase.
  - Ensure that any recommendations emanating from the concept design, design, through construction and post construction are implemented.
  - Ensure that a suitably qualified Safety, Health and Environmental representative forms part of the contractor's staff.

- **The Engineer :** The engineer appointed for the proposed development has the following responsibilities:
  - Play a role in the decision-making process with the contractor and SHE representative or officer to address any environmental problems that may occur during the construction phase.
  - Ensure that the requirements as set out in this draft EMP and any other conditions stipulated by the relevant Authorities are implemented.
  - Monitor compliance with consultation with the SHE representative on the contractor's obligations on construction activities.
  - Consult the Contractors SHE representative on the review of the construction method statements.
  - Exercise and take actions on compliance of specifications by the SHE representative on site.
  - Play a role on internal reviews, SHE representative draft EMP review.

- **The Contractor :** In line with the implementation of this draft EMP, the contractor refers to the organisation or individual that has been appointed to carry out the work as required by the developer. The contractor is required to adhere to the following in terms of this draft EMP:
  - Ensure that the affected landowners are informed about your (the contractors) presence on their property.
  - Immediately report any damage to property or the environment to the project manager and the landowner. The damage must be repaired immediately to the owner's written satisfaction.
  - No wandering around adjacent properties. Access is limited to the site only.
  - The public and all property are to be treated with respect at all times.
  - Ensure that all stipulations within the draft EMP are communicated to and adhered to by the employees.
  - Monitor the draft EMP throughout the project by means of site visits, pictorial evidence and meetings to be documented as part of the site meeting minutes and compliance reports.

- Ensure that all clean up and rehabilitation or any remedial actions that are required are completed prior to the issuing of a completion certificate.

- **Safety, Health and Environmental Representative/Officer:** The SHE representative/officer will oversee all the environmental aspects relating to the project during the construction and post construction phase. The SHE Representative/Officer will form part of the contractor's employees. She/he must attend monthly project meetings, compile periodic Environmental Compliance Reports (ECRs) to evaluate compliance with the draft EMP and be responsible for providing feedback on potential environmental issues associated with the project. The ECR must contain information on the implementation and compliance of the draft EMP.
  - Liaison with relevant authorities, i.e. the South African Heritage Resources Agency (SAHRA) and the local authority (Dikgatlong Local Municipality) and the competent authority (DENC), where required.
  - Liaison with contractor regarding environmental compliance and
  - Undertaking routine monitoring and appointing a competent person/institution to be responsible for specialist monitoring, whenever necessary.
  - Compile periodic health and safety compliance reports.

The SHE representative will be responsible for monitoring compliance, rather than enforcing it. Enforcement such as suspension of activities can however be implemented by the Project Manager, an external environmental and/or safety officer or an Official (Competent Authority).

4. KEY ENVIRONMENTAL ISSUES

The applicable environmental themes to the proposed project are outlined below:

- **Key issue 1: Biophysical impacts:** During the project phase cycle, there are a number of potential impacts on the biophysical environment. Such impacts must be mitigated by following the guidelines set forth in this draft EMP. The Safety, Health and Environmental Representative/Officer is responsible for monitoring, however may enforce the mitigation measures, where there is non-compliance with suggested corrective actions and must compile regular compliance reports concerning compliance of contractor to the draft EMP. Key issues to be considered are the following:
  - Vegetation clearing and topsoil management
  - Poor stockpiling of soil.
  - Soil erosion caused by run-off.
  - Loss of floral and faunal species of conservation concern.
  - Destruction of water resources (wetlands)
- **Key issue 2: The social environment:** It must be emphasised that whilst there are a number of impacts relating to the Occupational Health and Safety, fire risk and groundwater/surface water contamination, the project will be of major significance on the lives and means of livelihood of the surrounding community. Therefore, a major focus of the draft EMP is on reducing/mitigating the negative social impacts, while enhancing the expected positive benefits and spin-offs of the project. The groups of people identified as affected parties: employees of the construction company involved in the project, the road users and the community in close proximity to the site.

The following social issues can be linked to safety hazards.

  - Negative Impacts
    - Change in air quality due to increased dust during construction activities. This may result in respiratory disorders for both employees and nearby residents.
    - Movement of vehicles due to construction activities.
    - Temporary visual impacts due to construction activities.
    - Increased noise as a result of construction activities.
  - Positive Impacts
    - Temporary employment opportunities during construction.
    - Improved aesthetics (post-construction rehabilitation).
    - Cumulative economic opportunities for both the local community and the municipal area.

- **Key issue 3: Safety Hazards and Risks :** The key issues and impacts that must be managed pertain to safety hazards and risks that could arise due to human error or negligence leading to a major or minor incident. If the incident is a major one, with a severe impact, it is considered as a Disaster. Key negative impacts that this draft EMP addresses are:
  - Uncontrolled fire risks.
  - Operation of dangerous construction equipment by unqualified personnel.
  - Safety and health risks due to potential hazards on site such as vehicles, equipment/machinery.
  - Incidents due to less visual for road users (dust).
  - Working on heights, confined spaces by medically unfit personnel.

5. ENVIRONMENTAL MANAGEMENT PROGRAMME

The intention of this section of the draft EMP is that it forms a stand-alone document, which can be used as an integrated environmental, health and safety management tool during the various phases of the project.

The following table forms the core of this draft EMP for the planning and design, construction and post construction of the project. Table 3, below must be used as a checklist on site during each phase of the development. Compliance with this draft EMP must be audited monthly during the construction phase and once immediately following the completion of construction.

Table 3: Impact mitigation measures Planning, Design and Pre-Construction

Item	Aspect Impact/Issues	Mitigation Measures/Actions	Responsible party	Frequency of Action
Planning, Design and Pre-Construction				
1	**General compliance reporting**	➢ The draft EMP is binding on the Developer, professional team, Contractors and Subcontractors working within the construction site. ➢ The special conditions of the contract must include provision for the strict adherence to and compliance with this draft EMP as well as the general and specific conditions from both the Competent and Local Authority. ➢ The site layout plan (SDP), should be compliant with all safety, health, environmental (conditional environment) requirements.	Applicant	Once-off
		➢ The following compliance documents and/or files should be in place o Environmental Compliance file. o Occupational Health and Safety file. o Construction work permits. ➢ All applicable permits prior to construction should be in place : o Environmental Authorisation. o Construction work permit. o Water Use Licence. o Approved Site Development plan.	Developer/Project Manager	Once off

Item	Aspect Impact/Issues	Mitigation Measures/Actions	Responsible party	Frequency of Action
Planning, Design and Pre-Construction				
2	**Planning**	➢ The planning phase should incorporate all legislative requirements including conditions from Competent Authority (DENC), the Local Authority (by-law requirements), including other service providers i.e. Eskom, where applicable. ➢ Resources should be made available to ensure the planning of the proposed project process meets the requirements of all applicable legislative frameworks.	Developer/Project Manager	Once-Off
		➢ The location of the site offices and construction camp should be agreed on by the contractor and Safety, Health and Environmental Representative/Officer. o The activity area should be delineated and cordoned off, all no-go areas, within and outside of the boundary should be indicated and the personnel on site should be made aware of such areas. ▪ Conduct a walk-through survey on the working servitude to establish any indigenous vegetation (species) to be protected or relocated.	Contractor	Once-Off

Table 4: Impact mitigation measures Construction Phase

Item	Aspect Impact/Issues	Mitigation Measures/Actions	Responsible party	Frequency of Action
Construction Phase				
1	**Compliance**	➢ A qualified/trained, Safety, Health and Environmental Representative or Officer should be available on site, to monitor compliance with the specifications of this draft EMP.	Contractor	Bi-weekly
		➢ The developer may appoint an external Environmental Control Officer and Occupation, Health and Safety Officer. In other instances this can be a Safety, Health and Environmental Officer to monitor both environmental and safety compliance aspects.	Applicant	Monthly
2	**Employment**	➢ The contractor shall ensure that local labour is used as far as possible in order to improve the local economy of the area.	Contractor	Once off/or as and when required.
3	**Site Establishment**	➢ The construction camp must be clearly demarcated and fenced off. The material that can be used can be is wired fence with shade cloth. o Applicable Safety, Environmental and Health warning signs should be displayed at the construction camp. ➢ Appropriate signage must be placed within the study area for the public to be aware of the construction activities. The sign should include details of the main contractor, engineer and other applicable responsible professional team, with contact details.	Contractor	Once-Off

Item	Aspect Impact/Issues	Mitigation Measures/Actions	Responsible party	Frequency of Action
Construction Phase				
		➢ The site camp should not be located anywhere near identified sensitive areas, the position should be agreed on by the Safety, Health and Environmental Representative, the contractor and Engineer. ➢ The construction camp should have waste storage areas. Waste separation should be implemented on site. ➢ Sufficient space to accommodate all other equipment's required or to be used for the construction activities should be available.		
		➢ No maintenance of construction vehicles should take place anywhere near identified sensitive areas. The parking area for construction vehicles should be on impermeable surface area, which should be inspected regularly for spillages. The area should have necessary storm water control, where oil and fuel spillages are highly likely to occur. o Drip trays can be used for standing vehicles with oil or hydrocarbon leaks. ➢ A suitable area should be allocated where personnel should take their breaks, the construction site camp be used. ➢ Access control measures should be implemented and adhered to on site. ➢ The contractor should provide portable toilets and implement a scheduled maintenance plan (weekly). o Disposing of waste from the portable toilets on the environment is prohibited.	Contractor	On-Going

Item	Aspect Impact/Issues	Mitigation Measures/Actions	Responsible party	Frequency of Action
Construction Phase				
		➢ Vehicular speeds (recommended 30Km/h) should be regulated on detour routes, signage should be placed along routes.	Contractor	Once-Off
4	**Waste Management**	**General Waste** ➢ An agreement should be reached with the Dikgatlong Local Municipality on the general waste collection schedule. Waste skips can be used collection purposes (rubble), alternatively, where applicable wheelie bins can be used for the normal domestic waste. ➢ Where collection by the municipality is not applicable, a licenced waste collector can be hired for waste collection services. ➢ In order to ensure that littering is avoided or minimised on site sufficient general waste containers should be made available.	Contractor	Once- Off
		➢ No general waste should be mixed with hazardous waste. ➢ Waste separation should be implemented on site, thus waste containers for different waste streams should be provided. ➢ A designated area for disposal of general waste and sorting must be provided on site.		
		➢ All the generated general waste should be removed on a daily basis within the construction areas and disposed off at designated areas.	Contractor	On-going

Item	Aspect Impact/Issues	Mitigation Measures/Actions	Responsible party	Frequency of Action
Construction Phase				
		➢ On a weekly basis, the waste discarded on site at designated areas should be collected for disposal at a licensed waste management facility (Windsorton Landfill site). ➢ No waste should be burnt on site.		
		Hazardous Waste ➢ All hazardous waste should be separated from general waste and disposed of at a licensed disposal facility or collected by a licensed service provider. ➢ A designated area for hazardous waste with an impermeable surface should be provided. o Containers for hazardous waste should be clearly labelled and be leak proof. ➢ Any hydrocarbon spillages that occur should be contained and treated immediately, or disposed of at designated areas using appropriate disposal container for further disposal at the licensed facility. ➢ A spill kit should be on site for immediate clean-up and containment of accidental spills.	Contractor	Once-Off

Item	Aspect Impact/Issues	Mitigation Measures/Actions	Responsible party	Frequency of Action
		Construction Phase		
5	**Impact on Geology, Soil Erosion and Sedimentation.**	➢ Erosion control measures must be implemented in areas sensitive to erosion such as edges of slopes and/or exposed soil. The measures include but are not limited to - the use of sand bags, hessian sheets, silt fences, retention or replacement of vegetation and geotextiles such as soil cells which are used in the protection of slopes. o Exposed soils should be rehabilitated in order to limit the risk of erosion. ➢ A sustainable urban drainage system must be implemented; this includes the use of open and/or grass-lined channels/swales. ➢ Soil stockpiles should be protected from storm water run-off. o Stockpiling of materials should not occur adjacent to watercourses. ➢ Surface water or storm water concentration or flow into cut or fill slopes without erosion protection measures is prohibited. ➢ Construction activities should be limited to dry season. ➢ Mining of soil is prohibited. ➢ Vegetation should be removed in a phased manner (working areas), to avoid exposed loose soil. ➢ Rehabilitation of exposed areas should be done concurrently with construction activities to avoid run off.	Contractor	Once-Off
6	**Water Resources**	➢ No water should be abstracted from any water resource for the purpose of construction activities without a water use license.	Contractor	On going

Item	Aspect Impact/Issues	Mitigation Measures/Actions	Responsible party	Frequency of Action
Construction Phase				
		➢ Areas for maintenance and washing of construction equipment should be designated not anywhere near watercourses. ➢ Stockpiling of any material should be done at designated areas as agreed by the contractor and SHE representative away from watercourses. ➢ Soil erosion control measures should be in place, to avoid silt built up on water ways. ➢ The release of any substance i.e. cements, bitumen, waste into watercourse is prohibited. ➢ Construction camp should not be located within 50m of any watercourse. Mixing of cement must take place on impervious surfaces. ➢ Regular construction vehicle's checks prior to being used or during their standing period should be done in order to limit or avoid soil contamination. ➢ Sensitive riparian areas and delineated wetlands should be marked as no-go areas. A 50 m buffer area should be maintained. ➢ Cut-off trenches can be constructed to prevent any harmful substances from entering any watercourses. o Litter traps should be installed at all storm water outlets. Silt traps or silt barriers should be placed adjacent to the wetland to prohibit discharge of silt into watercourses or delineated wetlands.		
		➢ Hydrocarbon spillages should be avoided, where such occurs immediate clean up should be done and disposal should be at appropriate allocated disposal areas, using appropriate disposal containments for further disposal at appropriated licensed	Contractor	On going

Item	Aspect Impact/Issues	Mitigation Measures/Actions	Responsible party	Frequency of Action
Construction Phase				
		disposal facility. Maintenance can be done on impervious surfaces where required, with proper drainage for containment of accidental spills. ➢ Chemical portable toilets provided by contractors must be maintained for the duration of the construction phase. No portable toilet should be located within any watercourse; these should be atleast 50m away from any watercourse. ➢ Environmental awareness and education programmes must form part of tool box talks for good pollution prevention practices, these programmes should include information on material handling and spill prevention. ➢ An alien invasive management plan should be in place and implemented. ➢ No herbicides should be used within or near any water-resource.		
7	**Air Quality** **Dust and Odour**	➢ Chemical toilets should be cleaned and serviced weekly depending on usage or as required. ➢ Fires should not be allowed on site to avoid emissions into the surrounding ambient air. ➢ Any rubble generated during construction shouldn't be left on site for more than two weeks. ➢ Vehicles that will be transporting building materials such as sand or rubble need to be covered or wet down to avoid the material being blown by air during windy conditions. ➢ The topsoil removal must be done in a phased manner so that large areas of unconsolidated soils are avoided. ➢ A register must be made available for recording any dust complaints. ➢ Any remedial action taken in relation to a complaint must be communicated to the complainant.	Contractor	On-going

Item	Aspect Impact/Issues	Mitigation Measures/Actions	Responsible party	Frequency of Action
Construction Phase				
		➢ Vehicle speed limits on diversion routes should be adhered to limit (30 Km/h).		
8	**Flora and Fauna**	➢ Movement of vehicles and construction machinery should be restricted to road surfaced areas and the working servitude. ➢ The disposal of vegetation on neighbouring properties is prohibited. ➢ Good housekeeping principles should be adhered to, thus all waste generated during the construction should be disposed off at designated areas on site, then further disposed off at appropriate licensed disposal facility (Windsorton landfill site) or collected by the municipal waste collection services as agreed on. ➢ No wild animals may under any circumstance be handled, removed or be interfered with by construction workers – only by suitably trained staff. ➢ Hunting or collection of fauna is prohibited. ➢ Any snares or traps found on or adjacent to the site must be removed and disposed of. ➢ Any faunal species located on the site during the construction phase, which cannot relocate themselves (e.g. burrowing or hibernating animals) or may pose a risk to workers (e.g. snakes), must be moved to a more suitable location. This should be undertaken by a suitable qualified staff member. ➢ As part of rehabilitation of the non-paved road reserve, all stockpiled materials must be entirely removed, and the area landscaped to merge into the surroundings.	Contractor	On-going.
9	**Alien Vegetation**	➢ An alien vegetation management plan should be in place and adhered to. ➢ No introduction of new invasive plant species should be allowed.	Contractor	On-going.

Item	Aspect Impact/Issues	Mitigation Measures/Actions	Responsible party	Frequency of Action
Construction Phase				
10	**Noise Management**	➢ All operations during the construction phase must be compliant with the requirements of the Occupational Health and Safety Act (Act No 85 of 1993). ➢ Activities which involve excessive noise, levels above 85dBA must be prohibited at certain times during construction. ➢ On site personnel working on areas where the threshold exceeds the ambient 8-hour noise levels (75dBA) should be provided with PPE to assist in reducing noise level impacts. ➢ Construction activities must be limited to working hours (from 7am to 5p.m) during the week, not including public holidays.	Contractor SHE representative/Officer is responsible for the monitoring.	On-going
		➢ Signage informing the public of construction activities should be erected on site	Contractor	Once-off
		➢ Shall it happen that construction will take place after working hours the neighbours/I&APs needs to be notified. ➢ When required, the Community Liaison Officer (CLO) must inform the community of any planned noise disturbances outside of normal working hours.		
11	**Visual Aesthetics**	➢ The site must be screened off by use of wired fence with shade cloth. ➢ Construction camps and stockyards should be located out of the visual field of highly sensitive visual receptors.	Contractor	On-going

Item	Aspect Impact/Issues	Mitigation Measures/Actions	Responsible party	Frequency of Action
Construction Phase				
		➢ The construction sites and camps should be kept neat, clean and organised in order to portray a general tidy appearance. ➢ Rubble and other building litter should be removed off site as soon as possible or placed in a container in order to keep the construction site free from additional unsightly elements. ➢ Use lighting for security and other activities only where required, with the preferred options of Yellow Sodium lights.		
12	**Safety and Security**	➢ The contractor must provide the health and safety plan for approval by the Project manager or the appointed external Occupational, Health and Safety Officer. ➢ Safety signs must be erected on site with required PPE. ➢ Trenches which have been excavated must be cordoned off to prevent injury to people who are not aware of their existence. ➢ Emergency contact information should be provided and displayed at the contractor's office and site entrance ➢ The use of PPE should be enforced on site at all times, including visitors. ➢ The construction site must be adequately fenced off or access must be restricted to prevent unauthorised persons from entering the construction site.	Contractor	On-Going
		➢ An HIV/AIDS policy should be placed and implemented by the contractor.		

Item	Aspect Impact/Issues	Mitigation Measures/Actions	Responsible party	Frequency of Action
Construction Phase				
		➢ The appropriate number of staff members must be adequately trained in first-aid in accordance with the Health and Safety Regulations. ➢ Appropriate medical equipment must be placed on onsite and made accessible at all times. ➢ 24 Hour security must be provided at the construction site. ➢ Suitable barricades must be erected to secure the site and to avoid unrestricted access to the site during construction activities. ➢ Appropriate signage board/s must be placed on site informing the public on construction activities taking place on site		
		➢ Compliance reports must be compiled regularly by the Safety, Health and Environmental representative or Officer, to ensure full compliance with the EMP.	SHE ECO	Bi-Weekly Monthly

Item	Aspect Impact/Issues	Mitigation Measures/Actions	Responsible party	Frequency of Action
Construction Phase				
13	**Heritage Resources**	➢ Any heritage resources encountered during the construction phase should be reported to PHRAG. ➢ On account of any Heritage Resources discovered activities should stop for further indication in terms of commencement from PHRAG after investigations have been commissioned and concluded with recommendations.	Contractor	On-Going
14	**Social Impacts**	➢ Appropriate signage board/s must be placed on site informing the public on construction activities taking place on site ➢ A suitable candidate to assist with the employment of local labour and resolving any community disputes should be appointed. ➢ Construction activities must be limited to working hours (from 7am to 5p.m) during the week, not including public holidays. ➢ An HIV/AIDS policy should be placed at the construction site office and implemented by the contractor.	Contractor	Once off
		➢ The complaints and environmental incident register should be on site.	ECO (compliance monitoring compliance)	On-going

Table 5: Impact mitigation measures Post Construction Phase

Item	Aspect Impact/Issues	Mitigation Measures/Actions	Responsible party	Frequency of Action
Post-Construction Phase				
1	**General Requirements**	➢ Rehabilitate and revegetate all areas that will not be sealed as soon as practically possible. o It is recommended that a dense low grass layer be established, and in such a manner that it can be mowed regularly to discourage the establishment of alien invasive species, as well as use of these areas by fauna – the latter in an effort to prevent loss of fauna due to collisions with road users. ➢ Landscaping should make use of the indigenous vegetation to the study area. ➢ A sustainable urban drainage system must be implemented; this includes the use of open, grass-lined channels/swales.	Contractor	On-going

Table 6: Impact mitigation measures Operational Phase

Item	Aspect Impact/Issues	Mitigation Measures/Actions	Responsible party	Frequency of Action
		Operational Phase		
1	**Increased of alien invasive species.**	➢ Access roads and paved areas should be kept free of alien vegetation through routine maintenance. ➢ Herbicides should be carefully applied (in accordance with the Alien Invasive Programme) Spraying of herbicides within or near to any watercourses is strictly forbidden.	Applicant	On-going
2	**Increased sediment loads on watercourses (deterioration of watercourses/wetlands).** **Deterioration of aquatic ecosystems.**	➢ Culverts and storm water drains should be monitored for blockages and other possible obstacles. ➢ Maintenance plant during the operational phase should be in place.	Applicant	On-going
3	**Loss of Fauna**	➢ Vehicle speeds limits should be maintained on access roads. ➢ Induction on environmental awareness should be undertaken for employees. ➢ Illegal trapping, hunting and collection of faunal species is prohibited on site. ➢ Use lighting for security and other activities only where required, with the preferred options of Yellow Sodium lights.	Applicant	On-going

Item	Aspect Impact/Issues	Mitigation Measures/Actions	Responsible party	Frequency of Action
Operational Phase				
4	**Loss of Flora**	➢ Illegal harvesting of plant species on site is prohibited. ➢ Landscaping of disturbed areas should make use of indigenous vegetation. ➢ Maintenance Plan should be in place and implemented.	Applicant	On-going
5	**Pollution on water resources.**	➢ Clean up of large-scale hydrocarbons spillages due to incidents should be executed rapidly. ➢ On-going water quality monitoring measures should be implemented. ➢ Appropriate measures to dissipate flow velocity below structure must be considered and designed during pre-construction phase.	Applicant	On-going
6	**Employment opportunities**	➢ Employment opportunities for the operational part of the plant should be provided to local residents.	Applicant	Once-Off
7	**Increased electricity supply to the grid.**	➢ Regular service maintenance for the added infrastructure to sustain the life of the solar plant.	Applicant	On-going
8	**Increased Water Use**	➢ Monitor water infrastructure (i.e. taps, pipes, pump station) for leaks and malfunctions. ➢ Prodecure for reporting infrastructure faults should be in place. ➢ Landscape only with indigenous vegetation. ➢ Implementation of Grey water systems.	Applicant	On-going
9	**Safety, Fire incidents and/or outbreaks**	➢ Firefighting equipment should be in place: o Flame arresters o Water sprinklers o Gas/ Fire detection equipment	Applicant	On-going

Item	Aspect Impact/Issues	Mitigation Measures/Actions	Responsible party	Frequency of Action
Operational Phase				
		○ Nitrogen and carbon dioxide blanketing equipment ○ Foam spraying ➢ Staff and management must undergo basic firefighting training on an annual basis. Regular fire drills must be undertaken. ➢ Maintenance on fire fighting equipment should be carried out as required. ➢ Building control : safety and warning signs should be in place, this includes but not limited to emergency exit signs and hazard tapes where applicable.		

5. CONCLUSIONS AND RECOMMENDATIONS

The draft Environmental Management Programme (EMP) must be used as an on-site reference document during all phases of the project, and compliance monitoring should be done to avoid adverse environmental impacts associated with the project activities. Parties involved in the transgression of this draft EMP must be held liable for any rehabilitation that may be required. Parties found liable for environmental degradation through irresponsible behaviour, negligence and/ or non-compliance with the draft EMP must receive penalties such as an order to cease activities and/or fines where applicable. During the operational phase, warning (yellow), red-card systems can be another form of a penalty system for transgression of any integrated management system to be adopted for the proposed development. The draft EMP has been compiled using the knowledge of known environmental impacts associated with the construction and operational aspects of a solar plant, with consideration of the current state of the receiving environment. Additionally, well-recognised integrated environmental management principles and relevant occupational health and safety principles were applied in developing the draft EMP.

Note: The basis of this document is on the strengths of the information available at the time of assessment. It must therefore be a living document that is updated and revised based on challenges which may arise on site during monitoring. If there are any queries please address them to:

Environmental Assessment Practitioner : Mr. Simon Vusmuzi Hlatshwayo

Consulting Firm : Tholoana Environmental Consulting CC

Email: vusi@tholoanaconsulting.co.za

PO Box 1549, HONEYDEW

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Appendix H: Details of EAP and expertise

CURRICULUM VITAE

Name	:	Simon Vusmuzi Hlatshwayo
Nationality	:	South African
Parent Firm	:	Tholoana Sustainable Development & Environmental Consultants
Position	:	Environmental Practitioner.
Languages	:	Zulu (Mother tongue), English; Tswana (Fluently Spoken and written); Afrikaans (Fair).

EDUCATIONAL QUALIFICATIONS

- National Diploma in Environmental Sciences, Tshwane University of Technology (2010)

OTHER CERTIFICATES

- Introduction to SAMTRAC

EMPLOYMENT EXPERIENCE

- **Environmental Intern:** INDEX (Pty) Ltd & Crushco (Pty) Ltd, July 2010 – 2011 June.
- **Environmental Intern:** Naledi Development (Pty) Ltd, 01 August 2011 – 31 March 2012.
- **Volunteer:** PUSH (Persevere Until Something Happens) NGO – Drop-in centre.
- **Environmental Intern:** SLR Global Environmental Solutions, 2 Months environmental intern exposure programme.
- **Environmental Assessment Practitioner:** Tholoana Sustainable Development & Environmental Consultants, May 2013 – Current.

CURRENT & RECENT WORK

- Current and recent projects:
    - Makhado Colliery, open day audio transcription, Grave relocation and Traffic Awareness programme research assistant, Stakeholder minutes transcription and Deed search. (Client – Coal of Africa Limited).
    - Environmental Assessment Practitioner – Environmental Impact Assessment & Waste License Applications including Development of

Environmental Management Plan, (Client - Msibi Holdings (Pty) Ltd. - MH)

- Data capturing (Client - Tivani Mining).
- Section 102 application (MPRDA), Environmental Impact Assessment Report amendment. (Client - Crushco (Pty) Ltd).
- Environmental Assessment Practitioner – Environmental Impact Assessment for the Madiba Heights Mixed Land-Use Development (Client: Magapa Investment Holdings (Pty) Ltd.)
- Dr Kenneth Kaunda District Coordinator (Ventersdorp; Klerksdorp; Maquassi Hills; Potchefstroom) for the North West Youth Jobs in Waste Programme. (Client-Department of Environmental Affairs).
- Environmental Authorisation Amendment ROD Notifications - Munsieville Extension 9 (Client - Magapa Investment Holdings (Pty) Ltd.)
- Environmental Authorisation Amendment ROD Notifications - Avianto Mogale City (Client - Magapa Investment Holdings (Pty) Ltd.)
- Water Use Licence Application: Public Participation Process and Report (Client - Magapa Investment Holdings (Pty) Ltd.)
- Waste Management License - Proposed Phuthadithjaba Landfill Site (Client: Maluti-A-Phofung Local Municipality, Free State province).
- Environmental Assessment Practitioner – Environmental Basic Assessment for the Krugersdorp Station Upgrade and Intermodal Facilities (Client: Magapa Investment Holdings (Pty) Ltd.)
- Environmental Assessment Practitioner – Environmental Scans in the following areas: Rustenburg, Ventersdorp and Lichtenburg (Client- MIB Infrastructure Development (Pty) Ltd)
- Cradle View Mixed Land Use development – Basic Assessment, Munsieville. Uvuko Civils.
- Blydeville Mixed Land Use Development.
- Pam Brink 800m Feeder Line: GA and NEMA Query (Client -
- Mahumas Farms Chicken Broiler House Basic Assessment: Basic Assessment and Water Use Licence.
- ECO, 37 Alexandra Avenue; Installation of Gabions (Client – Dikgato Engineering Consultants)
- ECO, 16 Bruce Close, Installation of Gabions (Client – Dikgato Engineering Consultants).
- ECO, Services, 56 Morsim street, Storm water system upgrade and road repairs (Client – Dikgato Engineering Consultants)
- MMSEZ specialist review – Integration report. (Client – LEDA).
- Kelland Wetland Rehabilitation Project, BA (Client – Dikgato Engineering Consultants).
- Proposed Tarlton Road Upgrade; NEMA query and EMP (Client - Epitome Engineering Consultants).
- Legal notice response (Stols Metals (Pty) Ltd).
- Ridge Road Upgrade, Water Use Licence (Client – Dikgato Engineering Consultants).

MEMBERSHIPS OF PROFESSIONAL SOCIETIES

- Member - International Association of Impact Assessment - (IAIA - SA Chapter)
- Registered

REFERENCES

- Ms. Carien Joubert, C.E.O Naledi Development Restructured, 083 302 0332,012 543 9093, carien@naledidev.co.za/carienjoubert@gamil.com
- Ms. Lizinda Grobbelaar, Project Manager Naledi Development Restructured, 082 922 2261, 012 543 9093, lizinda@gmail.com/lizinda@naledidev.co.za
- Mr. Ntsako Baloyi, Project Manager, SLR Global Solutions, 082 472 4919, nbaloyi@slrconsulting.com
- Ms. Lorna Fischer, Manager PUSH NGO, 011 945 2050, pusha@mweb.co.za
- Ms. Snowy Makhudu, C.E.O Tholoana Consulting and Environmental Consultants, 011 704 5071, snowy@tholoanaconsulting.co.za

Reviewer: Snowy Makhudu

CURRICULUM VITAE

Name:	**SNOWY MERCY MAKHUDU**
Nationality:	South African
Identity Number:	640623 0895 081
Country of Residence:	South Africa
Parent Firm:	Tholoana Sustainable Development & Environmental Consultants
Position:	Managing Director
Project Role	Lead : Environmental Control Officer
Languages:	**Tswana** (Mother tongue), **English; Afrikaans; N-Sotho & S-Sotho** (Excellent - Fluently spoken and written); Xhosa & Zulu (Fair to Good)

EDUCATIONAL QUALIFICATIONS

- National Higher Diploma in Meteorology, Tshwane University of Technology (1991)
- National Diploma in Meteorology, Tshwane University of Technology (1989)
- Certificate in Local Government and Development Management, Technikon SA (1997)
- Currently enrolled for MBA with Netherlands School of Business

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OTHER QUALIFICATIONS & SHORT COURSES

- Climate Change – Adaptation & Mitigation – UNDP (2007 & 2009 & 2010/2011)
- Waste Management Best Practices including Landfill Management Course (2000 & 2007 & 2009)
- Water Use License Application Course (2009)
- Certificate in Public Participation: Planning for Effective Public Participation International Association for Public Participation - IAP2 (2007)
- Waste Management Course at University of Potchefstroom (2006 & 2007)
- Environmental Law Course at University of Potchefstroom (2006)
- Clean Development Mechanism – DANIDA (1996/97)
- Environmental Management Courses – DANIDA (1996/97)
- Integrated Waste Management Courses – DANIDA (1996/97)
- Environmental Legal Compliance – DANIDA (1996/97)

EMPLOYMENT EXPERIENCE

Managing Member (**100% ownership** - Tholoana Sustainable Development & Environmental Consultants): **Dec 2009 – to Date** ; Tasks include:

- Business Development & Strategic Management and Project Director for all projects;
- Project Management on large-scale environmental assessments such as large-scale EIAs, Environmental Compliance; EMPr's; Strategic Environmental Assessments and Infrastructure Plans – IPP; Evaton Urban Renewal Project; Munsieville Ext. 9; Development of Avianto Estates; Africary Exploration Rights Application; BA – Msibi Bio Plant
- Business Development and Technical input on Clean Development Mechanism with focus on Luipaardsvlei Landfill Site; Sustainable development & local gov management; environmental & waste management projects in general;
- Project Manager – Development of Africary Mpumalanga Mining;
- Project Director/Manager – Stakeholder engagement and perception survey, Socio Economic and Environmental survey on SHANDUKA Mines (18) as sub-contracted by SSC Group;
- Project Manager – Training on Integrated Environmental Management (SRPP' Beneficiaries – Mamelodi & Mnquma & KSD Municipalities); Waste Management Training for Municipal officials;
- Project Manager – Social Facilitation and Community Mobilisation including Stakeholder perception survey for 2 x Eco-Towns in E Cape for Indalo Yethu/DEA.

- ***General Manager*** **(Environmental Services Division) – SEF): Sept 2007 – December 2009**.

Tasks include:

- Project Management and Leadership on large-scale environmental assessments such as large-scale EIAs, Strategic Environmental Assessments and Infrastructure Plans.
- Strategic Oversight on all projects – including technical input, client liaison,
- Personnel Management – Resource planning and performance management; Quality Assurance: Reviewing of EMPs; SoERs; EMFs; AQMPs; IWMPs; EIA and BA reports, SEAs, etc.
- Financial Management and Reporting for the Environmental Management Division (Pretoria & JHB Units) responsible for several large-scale Basic Assessments and EIAs in terms of NEMA EIA regulations and mining projects in terms of MPRDA.
- Marketing of environmental services to parastatals, Government and industry.

- ***Director: Integrated Environmental Management*** **(Mogale City Local Municipality): April 2003 – April 2007.** Tasks included:

- Project Management of all Environmental projects & all Infrastructure large-scale projects that needed EIAs;
- Financial Management
- Personnel Management – Management of 5 staff members (3 Deputy Directors & 1 PA) and overall management of IEM Department (almost 480 staff members)

- Project Director for Luipaardsvlei Landfill Site which included EIA, Permitting and Landfill gas pilot project for conversion into energy, within Mogale City, which led to receiving an award for Gauteng MEC in Local Government: Women in Local Government – Community Development.

STAKEHOLDER ENGAGEMENT EXPERIENCE

- Task include:
  - **Recent projects - Public Participation Processes for Evaton Urban Renewal Project; Munsieville Renewal Project; Evaton Estates; Refilwe Hostel Upgrade EMPr under Magapa Investment Holdings (Pty) Ltd. As Project Managers for Gauteng Housing & Local Government Department (now Human Settlement)**
  - Social Facilitation and Community Mobilisation for 2 Eco-Towns for **Indalo Yethu, Youth Jobs in Waste (North West) under Department of Environmental Affairs (DEA) SRPP (EPWP)**
  - Training for women & youth groups on the following Key Focus Areas:-
    - Establishment & Governance issues of Co-Operatives
    - Project Management – Monitoring & Evaluation; Contract Management & Project Implementation Plans including Life Skills and Climate Change (Adaptation & Mitigation)

CURRENT & RECENT WORK

- Current and recently completed studies, surveys/opinions include:
  - Project Conceptualisation & EIA and Waste License for Msibi Bio-Plant (Pyrolysis) **Client: Msibi Pty Ltd.**
  - Community Facilitation & Stakeholder Engagement including Environmental Awareness Programmes **(Client: Indalo Yethu Trust)**
  - Training of Environmental Awareness Campaigners on Waste, Environment, Climate Change, Water Awareness Programmes **(Client: Indalo Yethu Trust)**
  - Project Management including review – Development of EMPr : Petroleum Exploration Rights for Mpumalanga & Limpopo; (**Client: African Carbon Energy (Pty) Ltd. - Africary**)
  - Project Management including review – Environmental Impact Assessment and sensitivity mapping, utilising GIS as a mapping tool, for the Mixed Land Use Developments including Human Settlements - Evaton Estates; Madiba Heights (Pretoria); Krugersdorp Station Upgrade & Intermodal Facility and Refilwe Hostel Upgrade EMPr **(Client: Magapa Investment Holdings (Pty) Ltd.)**
  - Project Management including review – ECO for Munsieville **(Client: Magapa Investment Holdings (Pty) Ltd.)**
  - Project Management including review – Environmental Authorisation (RoD Amendment) for Munsieville **(Client: Magapa Investment Holdings (Pty) Ltd.)**

MEMBERSHIPS OF PROFESSIONAL SOCIETIES

- Member - International Association of Impact Assessment - (IAIA - SA Chapter)
- Chairperson – IAIAsa Gauteng Branch
- President – National Women in Environment & Gauteng Women in Environment
- Chairperso – Environmental Assessment Practitioners Association in South Africa (EAPASA)
- Member - Institute of Waste Management in Southern Africa (IWMSA)

CLIENT REFERENCES

- Department of Environmental Affairs (DEA), Ms Sarah Komane, 018 381 8022 & 082 447 3397 and Mr. Cedric Raganya, 082 8307634
- Indalo Yethu Trust, Mr. Kayyoom Ganie, 083 235 2492 and 083 471 2970;
- SSC Group, Mr. Champ Thekiso, 0126546112 & 0725692266
- Department of Water Affairs (DWA), Ms. Phuti Setati, 082 610 0408
- Msibi Holdings (Pty) Ltd, Mr. Sifiso Msibi, 083 658 0542
- Oliviera Developments, Avianto Estates, Mr. Trevor Oliviera, 083 400 3939
- African Carbon Energy (Pty) Ltd. Mr. Napo Matsietsi, 011 325 0838 & 072 699 7905.
- Department of Agriculture and Rural Development, Gauteng, Mr Loyiso Mkwana, Chief Director, 011 240 3111 & 076 164 7447.
- West Rand District Municipality, Environment & Waste Department Ms Susan Stoffberg, 011 411 5000.
- Magapa Investment Holdings (Pty) Ltd. Ms. Magapa Phaweni, 083 296 5236/011 656 2863.
- Jo'burg City Metro Municipality, Gauteng, Ms. Lebo Molefe, 083 528 7289.

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describes me, my qualifications, and my experience. I also certify that I am available for the duration of the projects on which I may be required to work.

Snowy Mercy Makhudu _____

Appendix I: Specialist's declaration of interest

Wetland and Ecological Assessment Declaration

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Department:
Environment & Nature Conservation
NORTHERN CAPE PROVINCE
REPUBLIC OF SOUTH AFRICA

Private Bag X6102, Kimberley, 8300, Metlife Towers, T-Floor, Tel: 053 807 7300, Fax: 053 807 7328

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

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

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

1. Project title:

Ecological assessment for the proposed Ikomkhulu solar plant on portion 5 of the farm van zoelen's laagte no. 158.

2. Details of the specialist:

Project Specialist:	Maanakana Projects and Consulting (Pty) Ltd		
Trading name (if any):			
Business reg. no./ID. no.:	2012/1132123107		
Contact person:	Milambo Freddy Tshiala		
Physical address:	1062 Embankment Road; 307 Lougardia Building; Centurion-Highveld, 0157		
Postal address:	P.O Box. 99615; Garsfontein, 0060; Pretoria-East		
Postal code:	0060	**Cell:**	0836691702
Telephone:	0813120002	**Fax:**	0864653066
E-mail:	mftshiala@maanakana.co.za		
Qualifications:	PhD, MSc, (BSc Honours)		
Professional affiliation (s) (if any)	SACNASP (Pr.Nat.Sci.4000021/18)		

3. Details of the consultant

Project consultant/firm:	Tholoana Environmental Consulting CC		
Business reg. no./ID. no.:	2006/186236/23		
Contact person:	Vusmuzi Hlatshwayo		
Postal address:	PO Box 1549, Honeydew, 2040		
Postal code:	2040	**Cell:**	078 6390 199
Telephone:	011 704 5071	**Fax:**	N/A
E-mail:	vusi@tholoanaconsulting.co.za		

4. Declaration by the specialist appointed in terms of the Environmental Impact Assessment Regulations, 2014 as amended.

I, Milambo Freddy Tshiala, declare that --

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

Signature of the specialist:

Name of company (if applicable): MAANAKANA PROJECTS AND CONSULTING

Date: 27-01-2023

Signature of the Commissioner of Oaths:

2023-01-27

Date:

Designation:

Official stamp (below):

SOUTH AFRICAN POLICE SERVICE
DETECTIVE SERVICES
2023 -01- 2 7
SUNNYSIDE
SOUTH AFRICAN POLICE SERVICE

Heritage Impact Assessment

the denc

Department:
Environment & Nature Conservation
NORTHERN CAPE PROVINCE
REPUBLIC OF SOUTH AFRICA

Private Bag X6102, Kimberley, 8300, Metlife Towers, T-Floor, Tel: 053 807 7300, Fax: 053 807 7328

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

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

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

1. Project title:

Proposed Ikomkhulu Solar Plant

2. Details of the specialist:

Project Specialist:	Heritage and Archaeological Specialist		
Trading name (if any):	Millenium Heritage Group (Pty) Ltd		
Business reg. no./ID. no.:	2015/134094/07		
Contact person:	Dr. Eric N. Mathoho		
Physical address:	30 Breda street, No 7 Silver sands Building		
Postal address:	PO Box 404 Paledi Mall, Sovenga Polokwane		
Postal code:	0892	**Cell:**	071 870 6947
Telephone:	071 870 6947	**Fax:**	N/A
E-mail:	mathohoe@gmail.com		
Qualifications:	PhD in Archaeology		
Professional affiliation (s) (if any)	ASAPA#312		

3. Details of the consultant

Project consultant/firm:	Tholoana Environmental Consulting CC		
Business reg. no./ID. no.:	2006/186236/23		
Contact person:	Vusmuzi Hlatshwayo		
Postal address:	PO Box 1549, Honeydew		
Postal code:	2040	**Cell:**	0786390199
Telephone:	0117045071	**Fax:**	N/A
E-mail:	vusi@tholoanaconsulting.co.za		

4. Declaration by the specialist appointed in terms of the Environmental Impact Assessment Regulations, 2014 as amended.

I, Dr. Eric Ndivhuho Mathoho, declare that --

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

Signature of the specialist:

Millenium Heritage Group (PTY) LTD

Name of company (if applicable):

23 January 2023

Date:

Signature of the Commissioner of Oaths:

2023.01.24

Date:

Constable

Designation:

Official stamp (below):

SOUTH AFRICAN POLICE SERVICE
MAKHADO UNIFORM
24 JAN 2023
COMMUNITY SERVICE CENTRE
SUID-AFRIKAANSE POLISIEDIENS

Appendix J: Additional Information