DRAFT SCOPING REPORT - SUBMITTED TO THE NORTHERN CAPE DEPARTMENT OF AGRICULTURE, ENVIRONMENTAL AFFAIR, RURAL DEVELOPMENT AND LAND REFORM

Thaya Trading Enterprise

SUBMITTED TO THE NORTHERN CAPE DEPARTMENT OF AGRICULTURE, ENVIRONMENTAL AFFAIR, RURAL DEVELOPMENT AND LAND REFORM

OCT 2020

DRAFT SCOPING REPORT
FOR FARM MARSH LUSERN & HYDROPONICS SYSTEMS PROJECT

FOR COMMENT

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE PROPOSED AGRICULTURAL DEVELOPMENT.

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FILE REFERENCE NUMBER DEA:

I. Acronyms

AEL	Atmospheric Emission License
AQMP	Air Quality Management Plan
BAR	Basic Assessment Report
BPG	Best Practice Guideline
CA	Competent Authority
CMA	Catchment Management Agency
CMS	Catchment Management Strategy
COMSA	Chamber of Mines South Africa
CPA	Communal Property Association
CRR	Comments and Responses Report
DEFF	Department of Environment, Forestry and Fisheries
DENC	Department of Environment and Nature Conservation
DARDLR	Department of Agriculture, Rural Development and Land Reform
DME	Department of Mineral Resources and Energy
DMR	Department of Mineral Resources
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
DWAF	Department of Water Affairs and Forestry
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EC	Electrical Conductivity
ECO	Environmental Control Officer
EI	Ecological Importance
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
EMS	Environmental Management System
ES	Ecological Sensitivity
ESMS	Environmental and Social Management System
FIER	Final Environmental Impact Report
FEPA	Freshwater Ecosystem Priority Areas
FSR	Final Scoping Report
GDP	Gross Domestic Product

GN	Government Notice
Ha	Hectares
HDPE	High Density Polyethylene
I&AP's	Interested and Affected Parties
IDP	Integrated Development Plan
IEMPr	Integrated Environmental Management Programme
ISO	International Organisation for Standardisation
IWRM	Integrated Water Resources Management
IWULA	Integrated Water Use License Application
IWWMP	Integrated Water and Waste Management Plan
MAE	Mean Annual Evaporation
MAP	Mean Annual Precipitation
MAR	Mean Annual Runoff
MPRDA	Mineral and Petroleum Resources Development, 2002 (Act No. 28 of 2002)
MR	Mining Right
MSDS	Material Safety Data Sheet
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act
NEM:WA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NFEPA	National Freshwater Ecosystem Priority Areas
NCDAEARDLR	Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NWA	National Water Act, 1998 (Act No. 36 of 1998) [as amended]
NWRS	National Water Resource Strategy
PCO	Pest Control Officer
PES	Present Ecological Status
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 µm
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5 µm
PPP	Public Participation Process
RWD	Return water dam
SABS	South African Bureau of Standards
SACNASP	South African Council for National Scientific Professions

SAHRA	South African Heritage Resources Agency
SANAS	South African National Accreditation System
SANBI	South African National Biodiversity Institute
SANS	South African National Standard
SAWQG	South African Water Quality Guidelines
SDF	Spatial Development Framework
S&EIR	Scoping and Environmental Impact Report
SHE	Safety, Health and Environment
SHEQ	Safety, Health, Environment and Quality
SIA	Social Impact Assessment
SR	Scoping Report
TDS	Total Dissolved Salts
TOPS	Threatened or Protected Areas
ToR	Terms of Reference
TSS	Total Suspended Solids
VOC	Volatile Organic Compound
WARMS	Water Authorisation Registration and Management System
WCDM	Water Conservation and Demand Management
WESSA	Wildlife and Environmental Society of South Africa
WMA	Water Management Area
WMP	Waste Management Plan
WRC	Water Research Commission
WUL	Water Use License

II. SOME DEFINITIONS

Catchment - The area from which any rainfall will drain into the watercourse or watercourses or part of the water course, through surface flow to a common point or common points

Constitution – Refers to the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996).

Domestic waste - Waste, excluding hazardous waste that emanates from premises that are used wholly or mainly for residential, educational, health care, sport or recreation purposes;

Effective Management of Waste or Spills - Means the taking of all practicable steps to ensure that waste is managed in a manner that will protect health, property and the environment;

Environment – The external circumstances, conditions and objects that affect the existence and development of an individual, organism or group; these circumstances include biophysical, social, economic, historical, cultural and political aspects. Environment means the surroundings within which humans exist and that are made up of-

(i) the land, water and atmosphere of the earth;

(ii) micro-organisms, plant and animal life;

(iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and

(iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental Impact Assessment - An environmental Impact Assessment (EIA) refers to the process of identifying, predicting and assessing the potential positive and negative social, economic and biophysical impacts of any proposed project, plan, programme or policy which requires authorisation of permission by law and which may significantly affect the environment. The EIA includes an evaluation of alternatives. As well as recommendations for appropriate mitigation measures for minimising or avoiding negative impacts, measures enhancing the positive aspects of the proposal and environmental management and monitoring measures.

Existing Lawful use - An existing lawful use means a water use which has taken place at any time during a period of two years immediately before the date of commencement of the National Water Act 1998, (Act 36 of 1998) or which has been declared an existing lawful water use under section 33 and which was authorised by or under any law which was in force immediately before the date of commencement of the National Water Act.

Groundwater Recharge - The inflow of water into a groundwater reservoir from the surface, e.g. infiltration of precipitation and its movement to the water table.

General waste - Means waste that does not pose an immediate hazard or threat to health or to the environment, and includes-

(a) domestic waste;

(b) building and demolition waste;

(c) business waste; and

(d) inert waste.

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

Hydrogeological –The study of distribution and movement of groundwater.

Hydrological – The study of movement, distribution and quality of surface water and groundwater.

Inert waste - Means waste that-

(a) does not undergo any significant physical, chemical or biological transformation after disposal;

(b) does not burn, react physically or chemically biodegrade or otherwise adversely affect any other matter or environment with which it may come into contact; and

(c) does not impact negatively on the environment, because of its pollutant content and because the toxicity of its leachate is insignificant;

Monitoring programme - means a programme for taking regular measurements of the quantity and/or quality of a water resource, waste or wastewater discharge at specified intervals and at specific locations to determine the chemical, physical and biological nature of the water resource, waste or wastewater discharge.

Public Participation Process – A process of involving the public in order to identify issues and concerns, and obtain feedback on options and impacts associated with a proposed project, programme or development. Public Participation Process in terms of NEMA refers to: a process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to specific matters.

Red Data Book (South African) – An inventory of rare, endangered, threatened or vulnerable species of South African plants and animals.

Recycle - Means a process where waste is reclaimed for further use, which process 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.

Reserve - means the quantity and quality of water required –

(a) to satisfy basic human needs by securing a basic water supply, as prescribed under the Water Services Act, 1997 (Act No. 108 of 1997), for people who are now or who will, in the reasonably near future, be -

(i) relying upon;

(ii) taking water from; or

(iii) being supplied from, the relevant water resource; and

(b) to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource.

Re-use - Means to utilise articles from the waste stream again for a similar or different purpose without changing the form or properties of the articles;

The Act - The National Water Act, (NWA) (Act 36 of 1998)

Tributaries - A stream or river which flows directly into a larger river or stream.

Waste - Means any substance, whether or not that substance can be reduced, re-used, recycled and recovered-

(a) that is surplus, unwanted, rejected, discarded, abandoned or disposed of;

(b) which the generator has no further use of for the purposes of production;

(c) that must be treated or disposed of; or

(d) that is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector,

but –

(i) a by-product is not considered waste; and

(ii) Any portion of waste, once re-used, recycled and recovered, ceases to be waste.

Hazardous waste must be classified in terms of SANS 10228 class.

Class 1: Explosives

Class 2: Gases

Class 3: Flammable liquids

Class 4: Flammable solids

Class 5: Oxidising substances and organic peroxides

Class 6: Toxic and infectious substances

Class 7: Radioactive substances

Class 8: Corrosives

Class 9: Other miscellaneous substances

If not listed in SANS 10228 - consult DWS prior to classification.

Watercourse means -

(a) a river or spring;

(b) a natural channel in which water flows regularly or intermittently;

(c) a wetland, lake or dam into which, or from which, water flows; and

(d) 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.

Water quality means the physical, chemical, toxicological, biological (including microbiological) and aesthetic properties of water that determine sustained (1) healthy functioning of aquatic ecosystems and (2) fitness for use (e.g. domestic, recreational, agricultural, and industrial). Water quality is therefore reflected in (a) concentrations or loads of substances (either dissolved or suspended) or micro-organisms, (b) physico-chemical attributes (e.g. temperature) and (c) certain biological responses to those concentrations, loads or physico-chemical attributes.

Water Resource - A water resource includes any watercourse, surface water, estuary or aquifer. Watercourses include rivers, springs, and natural perennial and non-perennial channels. Wetlands, lakes, dams, or any collection identified as such by the Minister in the Government Gazette.

Water use license - An authorisation from the Department to a designated water user to use water. The authorisation will provide details on the time-frames and conditions for the designated water use

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III. Objective of the scoping process

The objective of the scoping process is to, through a consultative process—

(a) Identify the relevant policies and legislation to the activity;

(b) Motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;

(c) Identify and confirm the preferred activity and technology alternative through an identification of impacts and risks and ranking process of such impacts and risks;

(d) Identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;

(e) Identify the key issues to be addressed in the assessment phase;

(f) Agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and

(g) Identify, through a ranking of the site sensitivities and possible impacts, the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—

  (i) identify and motivate a preferred site, activity and technology alternative;

  (ii) identify suitable measures to manage, avoid or mitigate identified impacts; and

  (iii) identify residual risks that need to be managed and monitored.

IV. PART A
SCOPE OF ASSSSMENT AND BASIC ASSESSMENT REPORT

1. Introduction

South Africa is a developing country within a global space where environmental impacts my not be ignored any longer. The need for sustainable development in a State such as South Africa is accompanied by numerous obligations. Some of these obligations include developing the economy and protecting the environment. In an attempt to protect the environment through impact management in many ways, the international community has entered into agreements and treaties in order to address matters relating to impacts associated with development among others. As a consequence, South Africa is a signatory to a number of international treaties. Some of these treaties include the Paris Agreement on Climate Change. In order to meet the objectives of the Paris Agreement, South Africa is currently promoting renewable energy generation.

Currently, South Africa relies more on coal for energy supply than it relies on any other energy source even though the country is well resourced with renewable energy sources that offer sustainable alternatives to use of fossil fuels. Renewable energy such as solar, biomass, ocean current, hydro, wind, tidal wave and geothermal or a combination of some of these do not get depleted. South Africa is endowed with all these energy resources. However, Solar Energy has proven to be relatively economical and environmentally friendly.

The economy of South Africa relies largely on both mining and agriculture. The Northern Cape Province in particular relies on agriculture among other things. However, the province is relatively dry with high evaporation rate. In some instances the soil types in the Northern Cape are not suitable for crop farming. Alternative methods to practice agriculture are necessary to explore because limited availability of suitable soil types in some parts of the province.

Environmental Impact Assessment (EIA) plays a vital role in informing prospecting farmers of sustainable methods of practising farming. If properly implemented, Environmental Impact Assessments assist in ensuring optimal use of available resources, productivity increase and sustainability. South Africa should consider the conservation of productive agricultural land and embrace the use of latest technology and alternative methods in the agriculture field. The Northern Cape in particular has to consider alternative methods to practice agriculture because of climate, land capability and soil among other factors.

1.1 Background

Sishen Iron Ore Company (Pty) Ltd, Anglo American SED proposes to develop a Farm Marsh Lusern and Hydroponics Systems Project. The proposed agricultural project is going to be powered using Photovoltaic Plant and related or associated infrastructure.

The project is going to be powered using Photovoltaic Plant (PV) power generation facilities in phases and associated electrical infrastructure on Farm Marsh 467. The application area covers approximately 35 hectares in size. It is located in the John Taolo Gaetsewe District, Northern Cape Province, South Africa.

The proposed Farm Marsh Lusern and Hydroponics Systems Project, powered using Photovoltaic Plant is expected to be located on a particular site after consideration of socio-economic and environmental impacts. Generally, an irrigation project requires sufficient availability of water for sustainability. The planned study is going to consider all necessary factors in order to investigate potential impacts of the proposed development against the triple bottom-line of social, economic and environmental impacts.

The concept of sustainable development provides a framework for reconciling socio-economic development and environmental protection. The constitutional framework: Sustainable development is recognised in the Bill of Rights (s 24(b) of the Constitution). In terms of this section, the government must give effect to this right through reasonable legislative and other measures. The Constitution also provides for cooperative governance, which facilitates the implementation of sustainable development.

Sustainable development forms the basis of environmental policy. The White Paper on Environmental Policy states that sustainable development is an overarching goal. The National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended is the framework legislation for the environment and it contains uniform norms and standards applicable to all environmental legislation. One of these norms is sustainable development. NEMA defines sustainable development as “the integration of social, economic and environmental factors into planning, implementation and decision-making to ensure that development serves present and future generations”. Sustainable development underpins many principles and objectives of environmental management set out in NEMA. NEMA also provides the framework for compliance with and the enforcement of environmental legislation. Sustainable development is included in sectorial legislation relating to the environment (i.e. the National Water Act, 1998 (Act No. 36 of 1998), the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), the National

Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) and the Local Government: Municipal Systems Act, 2000 (Act No. 32 of 2000)).

The proposed development, intrinsically, requires the implementation of procedures and mechanisms to facilitate co-operative environmental governance. Chapter 3 of the NEMA deals with such procedures. Section 11 of NEMA makes provision for environmental implementation plans and management plans. Every national department listed in Schedule 2 must prepare an environmental management plan. The provinces and departments must further ensure that these environmental implementation or management plans are consistent. The purpose and objectives of these plans are to:

- coordinate and harmonise the environmental policies, plans, programmes and decisions of the various listed national departments and of provincial and local spheres of government, which must be done to minimise the duplication of procedures and functions and to promote consistency;
- give effect to the principle of cooperative government in Chapter 3 of the Constitution;
- secure the protection of the environment across the country as a whole;
- prevent unreasonable actions by provinces in respect of the environment, which actions are prejudicial to the economic or health interests of other provinces or the country as a whole; and
- enable the Minister to monitor the achievement, promotion and protection of a sustainable environment.

1.2 Need and Desirability

1.2.1 Agricultural Development

Sustainability in agricultural development is one of the key factors to consider as it plays a pivotal role in ensuring effective and efficient implementation of industry's best practices. The developing countries such as South Africa need now, more than ever, to ensure continued support, maintenance and monitoring of agricultural development as the world faces climate change which threatens food security among other things. The agricultural sector is one of the most important sectors of the South African economy. Not only does it contribute towards the country's GDP, the sector also contributes in environmental protection, water resource management, poverty elevation, job creation and efficient spatial and land use. These factors or aspects of the agricultural sector have to be considered in policy formulation in order to ensure sustainability for current and future generations.

Sustainability in agricultural development is an important aspect to consider in ensuring optimal utilisation of agricultural resources whilst preserving the environment. Hardtlein & Kaltschmitt (1999:220) suggests a definition for the concept

of Sustainable Agriculture as following: “Sustainable Agriculture is the management and utilisation of the agricultural ecosystem in a way that maintains its biological diversity, productivity, regeneration capacity, vitality and ability to function, so that it can fulfil today and in the future significant ecological, economic and social functions at the local, national and global levels and does not harm other ecosystems’’.

Land uses in South Africa are regulated. The process of spatial and land use change through zoning are easy to understand and implement. They are influenced by many factors such as population growth, household formation and economic development.
In order to meet current and future demands, technology that is applicable in irrigation projects has been evolving. Irrigation technologies may be used by both emerging rural and established farmers for more effective and sustainable use of limited water resources. It is pertinent to know the correct quantities of water and frequency to use in irrigation projects. Proper irrigation schedule needs to be devised and implemented effectively.
Agricultural land that is available for sustainable development remains an asset that is scarce. The applicability and relevance of agricultural land have been understood better over the years, especially in recent times. These now include the following:

- food safety - logistics-associated risks are limited food regulations;
- food security - that may emanate from inter-governmental tensions and political security;
- potential to reduce food carbon footprint; and
- lifestyle - in the sentimental and cultural attachment to working the land.

However, with the threats associated with urbanisation, agricultural developments have had to survive under dire situations as the number of farmers continues to decrease. Solutions to challenges that are faced by the agricultural sector lie on factors such as accurate irrigation scheduling in order to increase yield and improve quality.

1.2.2 Renewable Energy Independent Power Producers Programme (REIPPPP) and Integrated Resource Plan (2010)

The White Paper on Renewable Energy, 2003 forms part of one of the policy documents that laid foundation for embracing renewable energy sources and associated technologies such as solar, biomass, wind and hydro generation of electricity. The objectives of the White Paper on Renewable Energy, 2003 included the following:

- Ensure that an equitable level of national resources were invested in renewable technologies;
- Direct public resources to implementation of renewable energy technologies;
- Introduce suitable fiscal incentives for renewable energy; and

- Create an investment climate for the development of the renewable energy sector.

In consistence with South Africa's commitment to transition to relatively low carbon emissions, the Integrated Resource Plan (IRP 2010) was promulgated in May 2011. This Plan set an ambitious target of renewable energy generation of 17 800 MW to be achieved by 2030.

The Department of Energy (DoE) then, now the Department of Mineral Resources and Energy, together with the National Treasury and the Development Bank of Southern Africa (DBSA) introduced the concept of Renewable Energy Independent Power Producers Programme (REIPPPP) at the end of 2010. The introduction of the Renewable Energy Independent Power Producers Programme has since evolved to include what is now known as the Independent Power Producer Procurement Programme (IPPPP), which is regarded as a key vehicle for securing electricity capacity from the private Sector for renewable and non-renewable energy sources as determined by the Minister of Mineral Resources and Energy.

The Minister of Mineral Resources and Energy, acting in consistence with the Electricity Regulation Act, 2006 (Act No. 4 of 2006), read together with the Public Finance Management Act, 1999 (Act No. 1 of 1999), and subject to the concurrence of the energy regulator NERSA, determined that the Department of Mineral Resources and Energy will procure new capacity and Eskom will be the buyer of electricity from the Independent Power Producers through a 20-year Power Purchase Agreement (PPA). The move is backed by the Government Support Framework Agreement (GSFA) whereby government shall make support available to Eskom in an Eskom event of default. This highlights the need of use of renewable energy sources.

Renewable energy generation plants and associated hybrid technologies such as storage and the associated industrial value-chain activities will help alleviate poverty and through an increase in job opportunities.

The REIPPPP is one of South African government's important initiatives aimed at increasing the country's power generation capacity. The REIPPPP objectives include securing private sector investment in order to finance or fund proposed development on new electricity generation capacity that is diverse as proposed in the 1998 White Paper on Energy Policy of South Africa. These kind of initiatives contribute to broader national developmental objectives such as socio-economic development and transformation through broadening of economic participation.

1.2.3 National Development Plan 2030

The National Development Plan envisions a South Africa where “everyone feels free yet bounded to others”; where everyone embraces their full potential, a country where “opportunity is determined not by birth, but by ability, education and hard work”. A South Africa where “we participate fully in efforts to liberate ourselves from the conditions that hinder the flowering of our talents” as articulated in the Vision 2030.

- The NDP aims to achieve the following objectives by year 2030**:**Uniting South Africans of all races and classes around a common programme to eliminate poverty and reduce inequality;
- Encourage citizens to be active in their own development, in strengthening democracy and in holding their government accountable;
- Raising economic growth, promoting exports and making the economy more labour absorbing;
- Focusing on key capabilities of both people and the country;
- Capabilities include skills, infrastructure, social security, strong institutions and partnerships both within the country and with key international partners;
- Building a capable and developmental state; and
- Strong leadership throughout society that work together to solve our problems

At the core of the Nation Development Plan is the aim to ensure the achievement of a “decent standard of living” for all South Africans by 2030. A “decent standard of living” entails the following core elements as enshrined in the Bill of Rights:

- Housing, water, electricity and sanitation;
- Safe and reliable public transport;
- Quality education and skills development;
- Safety and security;
- Quality health care;
- Social protection;
- Employment;
- Recreation and leisure;
- Clean environment; and
- Adequate nutrition

South Africa’s National Development Plan (NDP) 2030 was adopted by Government in year 2012.

1.2.4 Strategic Infrastructure Projects (SIPs)

The South African Government adopted a National Infrastructure Plan in year 2012. The National Infrastructure Plan is at transforming the economic landscape of South Africa, create a formidable amount of new jobs, and improve the delivery of basic community services. The plan outlines the challenges and proposed solutions to these challenges to which South Africa needs to respond in order to build and develop infrastructure.

Seventeen Strategic Infrastructure Projects (SIPs) that fall within the Green Energy SIP have been, authorised, developed and approved in order to support socio-economic development in the poorest parts of South Africa.

1.2.5 Renewable Energy Development Zones (REDZ)

The Department of Environmental Affairs Fisheries and Forestry has been given a task to complete a Strategic Environmental Assessment (SEA) process. This process embraces the use solar photovoltaic power generation among others.

Government has indicated an intention to identify three additional Renewable Energy Development Zones.

Previously on 16 February 2018, Minister Edna Molewa published Gazette Number 41445 for implementation, providing in terms of section 24(5)(a) and (b) of the National Environmental Management Act, 1998 and Regulation 15 of the Environmental Impact Assessment Regulations, 2014, (Government Notice No. R. 982, in the Gazette No. 38282 of 4 December 2014), for the procedure to be followed in applying for environmental authorisation for large scale wind and solar photovoltaic energy development activities, identified in terms of section 24(2)(a) of the National Environmental Management Act, 1998.

1.3 Project Overview

The Northern Cape Province is, by enlarge, a semi-arid part of South Africa. The limited Surface Water resources in the province impact negatively on the possibility of developing irrigation projects. However, an alternative solution to the challenge exists. Water for irrigation projects could be sourced from groundwater resources. The soil type is also another factor to consider when planning or proposing and irrigation project. In order to achieve sustainable irrigation of soils, the appropriate soils need to be identified, to prevent water logging and salinization. During irrigation, considerable amounts of salts are applied with the water. When water is absorbed by plant roots through transpiration, the salts are precipitated in the soil and a long-term result is the increased concentration of salts called salinization. Salinization in the soil can hamper crop growth and in extreme cases salinization will render the soil non-vegetative. These effects can be negated with proper management on soils with specific properties. For this reason, the Department of Agriculture; Northern Cape, has provided guidelines to which soil properties must adhere before a ploughing license can be granted. A ploughing license is one of the requirements, which must be fulfilled before the Department of Water, and Sanitation will grant water rights for irrigation. An irrigation potential soil survey will investigate the morphological, physical and chemical properties of soils related to drainage, salinization and sodicity, and indicate the areas where the soils are suitable for irrigation.

Farmers in the Northern Cape Province were some of the hardest hit by factors affecting the agricultural sector throughout our country in the past four (4) years. Some of these factors were beyond the powers of South Africa's government as they included the global trends. Among global trends, were the shrinking economies, the volatility of the currencies including the rand, posing risks with regard to imported production inputs and related equipment, whilst benefiting the produce export industry. There is some direct correlation between the strength of our currency and the costs of seed, fertilizer, equipment and oil or fuel.

The increase in population growth that was experienced globally in the past century continued to create challenges as well as opportunities for various sectors of our economy, including the agricultural sector. An increase in population growth is directly proportional to an increase in the market for the farming and agro-processing sector. If this direct proportionality between population growth and the market is not properly catered for, increasing population may also present an increased state of household food insecurity and destabilise the necessary balance that has to be sustained between population growth and food security. The unemployment rate in South Africa is reaching alarming levels. The Northern Cape Province is no exception to having high unemployment rate. A need does exist for projects that create jobs to be developed. In order to attempt to meet the need for job creation among other things in the John Taolo Gaetsewe, the Department of Rural Development and Land Reform commissioned a Master Plan to inform way forward with the John Taolo

Gaetsewe District Municipality Agri-Park initiative in year 2016. The overall purpose of agricultural and rural economic transformation is to improve the quality of life of rural households, enhancing food security, creating jobs, alleviate poverty and address the skewed economic landscape through a broader base of rural industrial and agricultural production and exploiting the varied economic potential of each rural district municipality. The proposed development is thus in line with the JTG DM Agri-Park Master Plan.

“If available, accurate site specific measurements using soil water sensors that represent the whole field could be preferable over model predicted irrigation requirements. In the absence of such measuring devices, site specific calendars can be developed without considering rainfall using the SWB crop growth model. These calendars should be modified when rain falls by subtracting rainfall from the recommended irrigation amount. Therefore, irrigators can follow different strategies for making a decision on when and how much to irrigate depending on particular situations” *WRC – Irrigation Guidelines for Mixed Pastures and Lucerne - 2016*.

South Africa is exposed to some of the highest intensities of solar radiation in the World. The average daily solar radiation in South Africa varies between 4.5 and 6.5 kWh/m^2 (16 and 23 MJ/m^2). The Northern Cape Province experiences even more intense solar radiation than the other parts of South Africa (Figure 1) which is indicative of high solar resource potential for solar water heating applications, solar photovoltaic and solar thermal power generation.

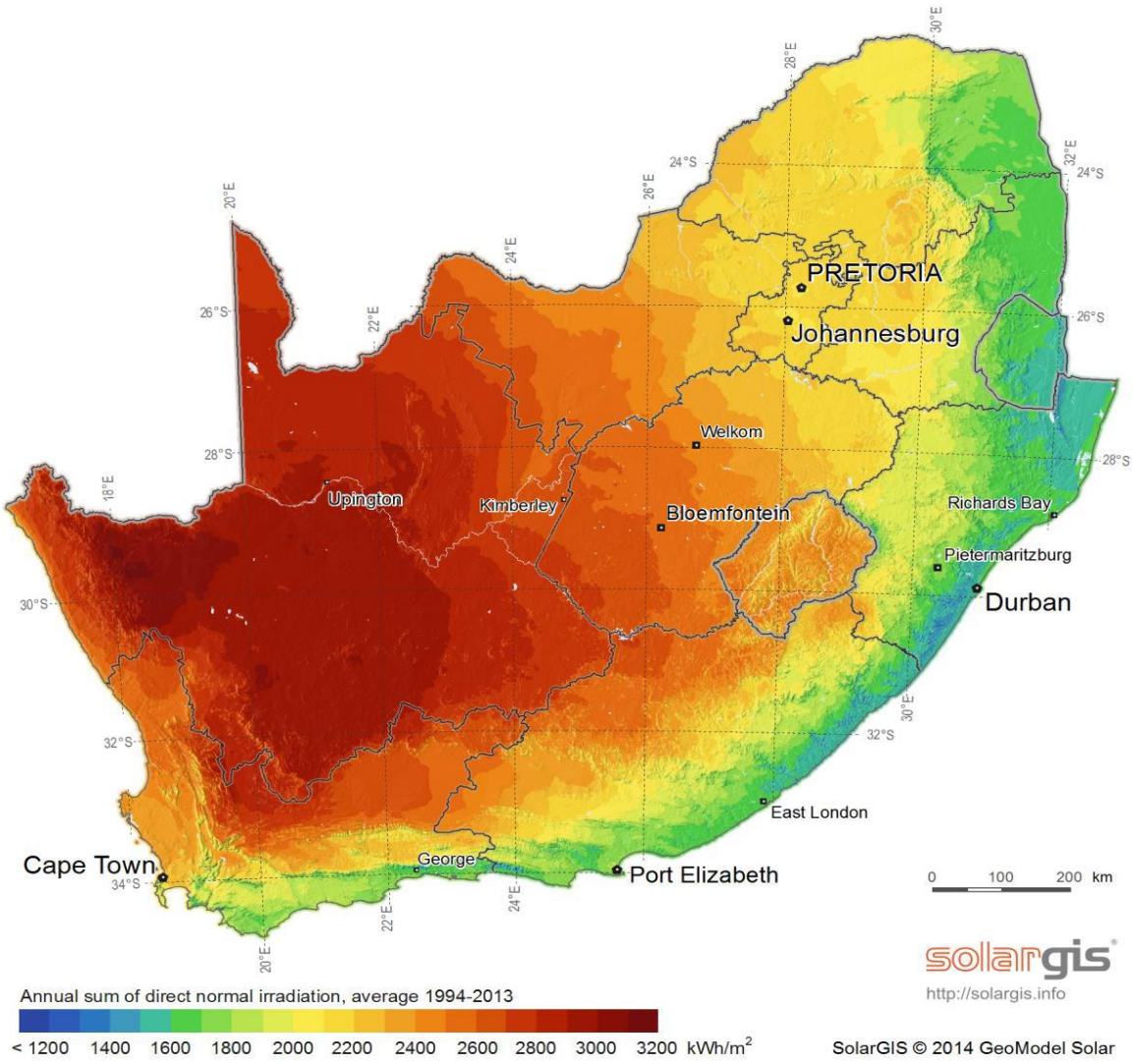

Figure 1: Annual incoming short wave radiation for South Africa (SolarGIS)

This piece of work focuses on the construction and operation Farm Marsh Lusern and Hydroponics System Project, powered using Photovoltaic Plant and related or associated infrastructure.

1.4 Approach to the EIA Studies

Section 24(1) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) states:

- *"In order to give effect to the general objectives of integrated environmental management laid down in this Chapter, the potential impact on the environment of listed activities must be considered investigated, assessed and reported to the competent authority charged by this Act with granting the relevant environmental authorization."*

Reference is made to "listed activities" in Section 24 of the NEMA. Listed activities relate to the regulations as promulgated in GN R327, R326, R325 and R324 in Government Gazette

40772, dated 7 April 2017. Currently, the Government Notice Regulations published by the Minister in terms of the NEMA relate to the NEMA EIA Regulations in order to specify listed activities that require either a Basic Assessment process, or Scoping and Environmental Impact Assessment (that is a "full EIA"). It is important to note that the proposed development requires a full EIA, as it particularly includes, *inter alia*, the inclusion of Listed Activity Number 1 in GN R325:

- *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area, or, on existing infrastructure".*

All the listed and specified activities which are triggered by this proposed development are going to be submitted to the Competent Authority before the Environmental Authorisation process underway completes. A copy of this Scoping Report is also going to be submitted to the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform for review. The Reference Number relating to the proposed agricultural development was pending at the time of submitting the first draft. A copy of the Application Form that was to be submitted to the Competent Authority at application stage, together with the anticipated acknowledgement letter (if applicable) from the Competent Authority will be included as an appendix to the Final Scoping Report that will be submitted to the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform for decision-making (in accordance with Regulation 21 (1) of the 2017 EIA Regulations).

The listed and specified activities potentially triggered by the proposed agricultural development are indicated in Table 1

Table 1: Listed and Specified Activities

Listed Activities		
Government Notice Regulation 325 – Listing Notice 2		
Activity Name	**Stated (Description)**	**Applicability**
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 total area that is going to be developed for agricultural use is 35 hectares of land in size. Natural vegetation of the entire 35 hectare area is going to be cleared.
Listed Activities		
Government Notice Regulation 327 – Listing Notice 1		
Activity Name	**Stated (Description)**	**Applicability**
1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where— (i) the electricity output is more than 10 megawatts but less than 20 megawatts; or (ii) the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare; excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs— (a) within an urban area; or (b) on existing infrastructure.	The total extent of the facility for electricity generation is expected to cover an area in excess of 1 hectare. A decision on the total extent of the facility still has to be made by be proponent and this section will be revised accordingly, if necessary.
8	The development and related operation of hatcheries or agri-industrial facilities outside industrial complexes where the development footprint covers an area of 2 000 square metres or more.	The total area that is going to be developed for agricultural use is 35 hectares of land in size.
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; excluding where— (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or	Infrastructure in excess of 1 000 metres in length for bulk transportation of water with an internal diameter of 0,36 meters may be developed to feed the 3 Ha Pivot from Reservoir may be necessary. However, this is going to be confirmed with the applicant.

	(b) where such development will occur within an urban area.	
10	The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes – (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more;	Infrastructure in excess of 1 000 metres in length for bulk transportation of process water or return water with an internal diameter of 0,36 meters may be developed to feed the 3 Ha Pivot from Reservoir may be necessary. However, this is going to be confirmed with the applicant.
11	The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more; excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is — (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development.	It is anticipated that infrastructure for transmission and distribution of electricity is going to be developed. However the capacity is yet to be confirmed if it is more than 33 kilovolts.
45	The expansion of infrastructure for the bulk transportation of water or storm water where the existing infrastructure— • has an internal diameter of 0,36 metres or more; or • has a peak throughput of 120 litres per second or more; and (a) where the facility or infrastructure is expanded by more than 1 000 metres in length; or (b) where the throughput capacity of the facility or infrastructure will be increased by 10% or more; excluding where such expansion— (aa) relates to transportation of water or storm water within a road reserve or railway line reserve; or (bb) will occur within an urban area.	The expansion of infrastructure in excess of 1 000 metres in length for bulk transportation of water with an internal diameter of 0,36 meters may be developed to feed the 3 Ha Pivot from Reservoir around the 1 Ha area that has been developed already may be necessary. However, this is going to be confirmed with the applicant. The throughput capacity of the facility or infrastructure will be increased by 10% or more.
46	The expansion and related operation of	The expansion of

	infrastructure for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes where the existing infrastructure— • has an internal diameter of 0,36 metres or more; or • has a peak throughput of 120 litres per second or more; and (a) where the facility or infrastructure is expanded by more than 1 000 metres in length; or (b) where the throughput capacity of the facility or infrastructure will be increased by 10% or more; excluding where such expansion— (aa) relates to the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes within a road reserve or railway line reserve; or (bb) will occur within an urban area.	infrastructure in excess of 1 000 metres in length for bulk transportation of process water, return water with an internal diameter of 0,36 meters may be developed to feed the 3 Ha Pivot from Reservoir around the 1 Ha area that has been developed already may be necessary. However, this is going to be confirmed with the applicant.
48	The expansion of— [(i) canals where the canal is expanded by 100 square metres or more in size; (ii) channels where the channel is expanded by 100 square metres or more in size; (iii) bridges where the bridge is expanded by 100 square metres or more in size; (iv) dams, where the dam, including infrastructure and water surface area, is expanded by 100 square metres or more in size; (v) weirs, where the weir, including infrastructure and water surface area, is expanded by 100 square metres or more in size; (vi) bulk storm water outlet structures where the bulk storm water outlet structure is expanded by 100 square metres or more in size; or (vii) marinas where the marina is expanded by 100 square metres or more in size;] (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or (ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more; where such expansion [or expansion and	The existing canals are going to be expanded by more than 100 square metres or more.

	related operation] occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding— (aa) the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such expansion activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such expansion occurs within an urban area; or (ee) where such expansion occurs within existing roads, road reserves or railway line reserves.	
49	[The expansion of - (i) jetties by more than 100 square metres; (ii) slipways by more than 100 square metres; (iii) buildings by more than 100 square metres; (iv) boardwalks by more than 100 square metres; or (v) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; where such expansion or expansion and related operation occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding (aa) the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such expansion activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in	The hydroponics system that is already developed on a 1 hectare area is going to be expanded by more than 100 square metre physical footprint.

	Listing Notice 3 of 2014, in which case that activity applies; (dd) where such expansion occurs within an urban area; or (ee) where such expansion occurs within existing roads or road reserves.] …	
56	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre— (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.	The roads are going to be lengthened by more than 1 kilometre where no reserve exists on the remaining extent of Farm Marsh 467.
67	Phased activities for all activities— (i) listed in this Notice, which commenced on or after the effective date of this Notice [;] or [(ii)] similarly listed in any of the previous NEMA notices, which commenced on or after the effective date of such previous NEMA Notices; [where any phase of the activity may be below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold;]	All processes of the proposed Farm Marsh Lusern and Hydroponics Systems Project are going to be introduced taking a phased in approach.
Listed Activities		
NEM:WA - Government Notice Regulation 921 – 29 November 2013		
	Handling of General Waste (The waste licensing process for listed activities under Schedule 1 in the National Environment Management Waste Act 2008 is as defined in the environmental impact assessment (EIA) regulations made under section 24(5) of the National Environment Management Act 2008 (NEMA) No. 107 of 1998. This is a Category A Waste License Application for listed activities under Schedule 1 in the National Environment Management Waste Act 2008.)	Waste is going to be generated during both construction and operational phases of the proposed project.

An application for Environmental Authorisation has been lodged with the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform. This Environmental Authorisation application process is being undertaken in a two-phased approach as written in this section in order to give members of the public to review and particle in the process and to enable the competent authority to make an informed decision pertaining to the application under discussion:

- Phase 1 - Scoping Report (SR) and Plan of Study for Environmental Impact Assessment; and
- Phase 2 - Environmental Impact Assessment (EIA).

1.4.1 Scoping Report Phase SRP

The Scoping Report Phase seeks to describe the receiving environment and how the environment may be affected by the proposed development. The desktop studies that are conducted making use of literature review mechanisms and preliminary investigations by means of brief site visit, was used to highlight and assist in the identification of potential significant socio-economic and environmental impacts associated with the proposed development.

The public participation process that is underway will held to identify any additional issues due for consideration in the course of current studies. Public Participation Process is a continuous process. Comments made, input submitted and / or questions asked during the Public Participation process are going to be considered in the compilation of the EIA relating to the proposed project.

All issues raised during the Scoping Phase of the current study underway will be capture in the Final Scoping Report and in the EIA report, if applicable.

The Scoping Report Phase aims to address the following:

- Description of the site selected for the proposed Farm Marsh Lusern and Hydroponics Systems Project, powered using Photovoltaic plant;
- Identification of potential significant socio-economic and environmental impact (both positive and negative); and
- Conduct public participation process widely to ensure that Interested and Affected Parties (I&AP) become part of the Environmental Authorisation process and that the issues they raise are recorded and form part of the EIA process.

Additionally, the Scoping Phase seeks to identify any fatal flaws, site alternatives, site layout alternatives (if applicable) and proposes mitigation alternatives to be evaluated and investigated during the EIA phase of the studies underway. A list of proposed specialist studies to be conducted in relation to the proposed project is found in Table 2.

Table 2: Suggested Specialist Studies to be undertaken as part of the EIA process underway

Specialist Study	Organisation	Reviewer
Heritage Impact Assessment	Dr. Edward Matenga (AHSA)	Not applicable
Palaeontological Impact Assessment (Desktop)	Prof Marion Bamford (Wits University)	Not applicable
Biodiversity Assessment	Dr. Natalie Birch (Environmental Management Services)	Not applicable
Social Impact Assessment	Vumile Dlamini – Ribeiro (Niara Environmental Consultants)	Not applicable
Visual Impact Assessment*	Lindokuhle Hlongwane and Zandile Dwane (Envirod Global Solutions)	

* *Peer review of the study/report is necessary to undertake*

1.4.2 Environmental Impact Assessment Phase / Study

The Constitution of the Republic is the supreme law of the land (South Africa). The Constitution provides the legal framework for legislation regulating any matters or conduct in South Africa, including environmental management in general. This regulating of matters has to be interpreted in accordance with the purport for the Bill of Rights. In order to give effect to section 24 of the Constitution, a nation framework (NEMA) for regulating environmental management was enacted. The NEMA sets out a number of principles (Chapter 1, Section 2) to give guidance to developers, private land owners, members of public and authorities.

The Environmental Impact Assessment phase is going to be undertaken in order to aim to achieve the following:

- To give effect to the proposed Scoping Phase approach, inclusive of considered inputs from Interested and Affected Parties;
- To investigate overall potential impacts;
- To provide an overall assessment of the social-economic and environmental impacts pertaining to the area of application (Farm Marsh);
- To undertake a detailed assessment of the preferred site/s in terms of environmental criteria including the rating of significant impacts;
- To identify and recommend appropriate mitigation measures (to be included in the Environmental Management Programme) for potentially significant environmental impacts; and

- To undertake a wide public participation process that is transparent and inclusive to ensure that I&AP issues and concerns are duly considered in the EIA process that is underway.

1.5 Details of Environmental Impact Assessment Practitioner

The particulars of the EAP(s) involved in this study are presented in Table 3

Table 3: Details of the EAP

Name of Consultancy:	Thaya Trading Enterprise CC
Name of EAP	Andisiwe Stuurman and Kwindla Nobaza
Physical Address	9705 Eerste Laan Rooisand Kathu 8446
Contact Number:	071 959 9207
E-mail	kwindla.nobaza@thayatrading.co.za
Contact Person:	Kwindla Handy Nobaza
Title	Scoping and Environmental Impact Assessment for the proposed Farm Marsh Lusern and Hydroponics Systems Project, John Taolo Gaetsewe District, Northern Cape, South Africa.
Experience:	Andisiwe holds a M.Sc. degree in Geography and Environmental Resources from Southern Illinois University, Carbondale. Before joining EIMS in August 2015 as an Environmental Scientist, she worked in Research and Development at Johnson & Johnson. To date, Andisiwe has worked on several aspects of environmental management including: Environmental Impact Assessments, Basic Assessments, Geographic Information Systems (GIS), Environmental Compliance Monitoring, Environmental Awareness Training, Water Use Licence Applications, Prospecting Right Applications and Integrated Waste and Water Management Plans (IWWMP). Andisiwe is registered as a Professional Natural Scientist with the South African Council of Natural Scientific Professions. She has successfully completed the Environmental Management System Auditor/Lead Auditor course based on ISO 14001:2015 offered by Bureau Veritas in 2016. This course is certified by the International Register for Certificated Auditors (IRCA). To date, Andisiwe has worked on several aspects of environmental management including basic assessments, water quality monitoring and environmental compliance audits. Kwindla is the founding member of Thaya Trading Enterprise. He completed an M. Sc. degree in Chemistry with the University of Johannesburg; currently, he is studying towards an LLB degree through UNISA. The Director of Thaya Trading Enterprise has completed courses with the University of South Africa, such as: “Interpretation of Statutes” and “Environmental Law”. Based on completion of the course on Interpretation of Statutes, it is noteworthy that the company (TTE) is under the leadership of an individual who understands the contextual approach to interpretation of all pieces of legislation in South Africa. That includes the Mine Health and Safety Act; Mineral and Petroleum Resources Development, 2002 (Act No. 28 of 2002); National Environmental Management Waste Act, 2008 (Act No. 59 of 2008), National Water Act, 1998 (Act No. 36 of 1998) [as amended], among others. Kwindla is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions. He has been involved in EIAs for three (3) years.

1.6 Structure of this Scoping Report

The piece of work that is presented herein is written in accordance to the Guidelines as provided in Government Notice Regulation 326 of the EIA Regulations, 2017 as summarised in Table 4. This Scoping Report is compiled in accordance with Appendix 2 of Government Notice Regulation of the EIA Regulations, 2017.

Table 4: Structure of Scoping Report

SR Requirements according to Section 21(3) of GNR 326	Section of this Report
(a) details of (i) the EAP who prepared the report; and (ii) the expertise of the EAP to carry out scoping procedures	Section 1.5
(b) the location of the activity, including – **(i)** the 21 digit Surveyor General code of each cadastral and land parcel; **(ii)** where available, the physical address and farm name; **(iii)** where the required information on (i) and (ii) is not available, the coordinates of the boundary of the properties	Section 2
(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is – **(i)** a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or **(ii)** on land where the property has not been defined, the coordinates within which the activity is to be undertaken	Section 1.4
(d) a description of the scope of proposed activity, including – **(i)** all listed and specified activities triggered; **(ii)** a description of the activities to be undertaken, including associated structures and infrastructure	Section 4.2
(e) a description of the policy and legislative context within which the development is proposed including and identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process	Section 4.2
(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location	Section 1.2
(g) a full description of the process followed to reach the proposed preferred activity, site and location within the site, including – **(i)** details of the alternatives considered; **(ii)** details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; **(iii)** a summary of the issues raised by I&AP, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; **(iv)** the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; **(v)** the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to these impacts – (aa) can be reversed;	Section 3

(ab) may cause irreplaceable loss of resources; and (ac) can be avoided, managed or mitigated; **(vi)** the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; **(vii)** positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; **(viii)** the possible mitigation measures that could be applied and level of residual risk; **(ix)** the outcome of the site selection matrix; **(x)** if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and **(xi)** a concluding statement indicating the preferred alternatives, including preferred location of the activity	
(h) a plan of study for undertaking the environmental impact assessment process to be undertaken, including – **(i)** a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity; **(ii)** a description of the aspects to be assessed as part of the environmental impact assessment process; **(iii)** aspects to be assessed by specialists; **(iv)** a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists; **(v)** a description of the proposed method of assessing duration and significance; **(vi)** an indication of the stages at which the competent authority will be consulted **(vii)** particulars of the public participation process that will be conducted during the environmental impact assessment process; **(viii)** a description of the tasks that will be undertaken as part of the environmental impact assessment process; and **(ix)** identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be monitored.	Section 9
(i) An undertaking under oath or affirmation by the EAP in relation to – **(i)** The correctness of the information provided in the report; **(ii)** The inclusion of comments and inputs from stakeholders and I&APs; and **(iii)** Any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs	
(j) An undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and I&APs on the plan of study for undertaking the environmental impact assessment	
(k) Where applicable, any specific information required by the competent authority; and	
(l) Any other matter required in terms of section 24 (4)(a) and (b) of the Act	

2 Project Description

2.1 The Proposed Farm Marsh Lusern and Hydroponics Systems Project powered using Photovoltaic Plant.

Sishen Iron Ore Company (Pty) Ltd intends to develop a Farm Marsh Lusern and Hydroponics Systems Project. The project is going to be powered using Photovoltaic plant. An overview of Photovoltaic Technology is depicted in Figure 2.

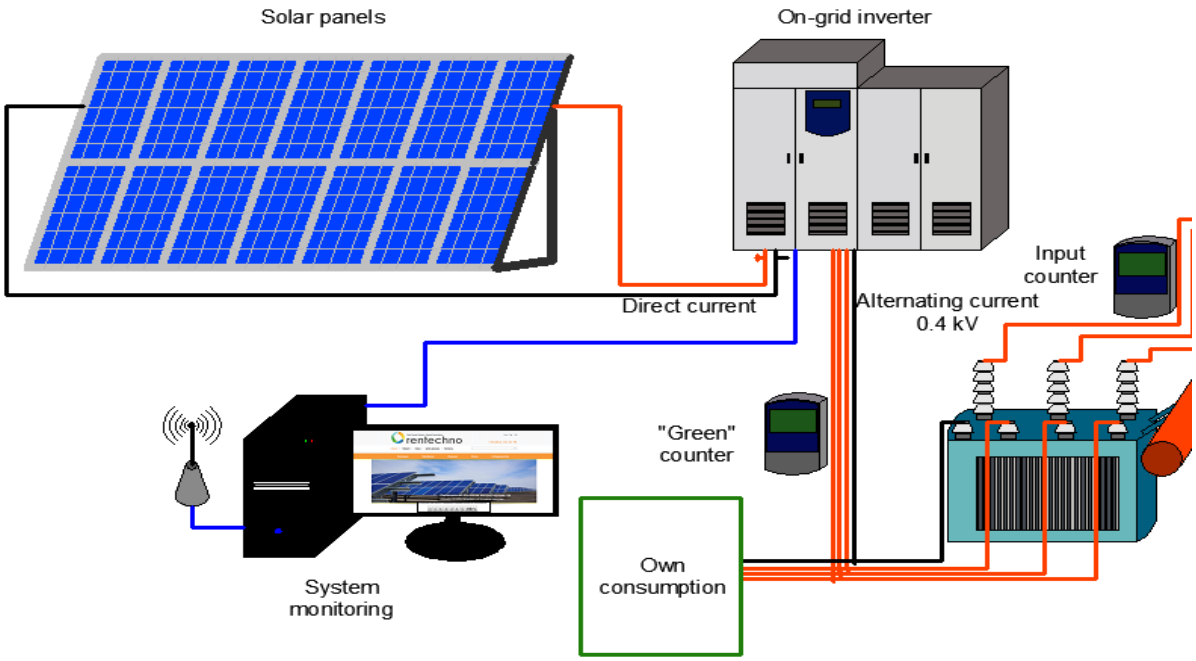

Figure 2: Overview of Photovoltaic Technology

2.2 Hydroponics Systems

Hydroponics can be described as the cultivation of plants without using soil. Hydroponic plants, vegetables, herbs, and flowers are planted in inert media that suitable for growth. As a requirement, nutrient-rich solutions, water and oxygen are supplied to the system. This system enables rapid growth, relatively higher yields, and superior quality. Contrary to conventional methods of growing plants in media where roots of plants perpetually search for nutrients that are necessary for growth and development, hydroponics systems do not utilise the soil. In conventional plant growth methods, the plant root system is exposed directly to water and nutrition, the plant does not have to exert any energy in sustaining itself. In hydroponics systems, the energy the roots would have expended acquiring food and water can be redirected into the plant's maturation. As a result, leaf growth flourishes as does the blooming of fruits and flowers.

Plants sustain themselves through a process of photosynthesis. Plants capture sunlight with chlorophyll (a green pigment present in their leaves). They use the light's energy to split water molecules they've absorbed via their root system. The hydrogen molecules combine with carbon dioxide to produce carbohydrates, which plants use to nourish themselves. Oxygen is then released into the atmosphere, a crucial factor in preserving our planet's habitability. Plants do not need soil to photosynthesize. They need the soil to supply them with water and nutrients. When nutrients are dissolved in water they can be applied directly to the plant's root system by flooding, misting, or immersion. Hydroponic innovations have proven direct exposure to nutrient-filled water can be a more effective and versatile method of growth than traditional irrigation.

Hydroponic systems work by allowing minute control over environmental conditions like temperature and pH balance and maximized exposure to nutrients and water. Hydroponics operates under a very simple principle: provide plants exactly what they need when they need it. Hydroponics supply nutrient solutions tailored to the needs of the particular plant being grown. They allow you to control exactly how much light the plants receive and for how long. pH levels can be monitored and adjusted. In a highly customized and controlled environment, plant growth accelerates. A simplified hydroponics system is shown in figure 3.

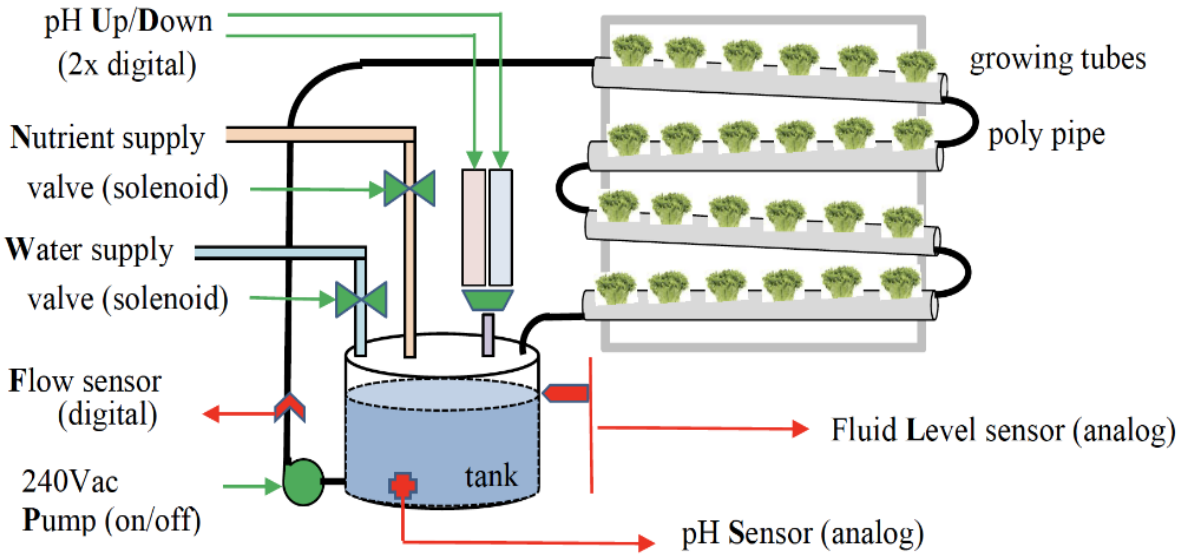

Figure 3: Basic configuration of equipment in hydroponics system

By controlling the environment of the plant, many risk factors are reduced. Plants grown in gardens and fields are introduced to a host of variables that negatively impact their health and growth. Fungus in the soil can spread diseases to plants. Wildlife like rabbits can plunder ripening vegetables from your garden. Pests like locusts can descend on crops and obliterate them in an afternoon. Hydroponic systems end the unpredictability of growing plants outdoors and in the earth. Without the mechanical resistance of the soil, seedlings can mature much faster. By

eliminating pesticides, hydroponics produce much healthier and high-quality fruits and vegetables. Without obstacles, plants are free to grow vigorously and rapidly.

2.3 Hydroponics Methods

There are six basic hydroponics systems, all of which could be modified and coupled to form multiple hydroponic methods.

2.3.1 Deep water culture

Deep water culture hydroponics are simply plants suspended in aerated water. Deep water culture systems (see Figure 4), also known as a DWC system, are one of the easiest and most popular methods of hydroponics on the market.

Figure 4: Typical Deep Water Culture

2.3.2 Drip system

In a hydroponic drip system (see Figure 5), the aerated and nutrient-rich reservoir pumps solution through a network of tubes to individual plants. This solution is dripped slowly into the growing media surrounding the root system, keeping the plants moist and well-nourished. Drip systems are the most popular and widespread method of hydroponics, especially among commercial growers.

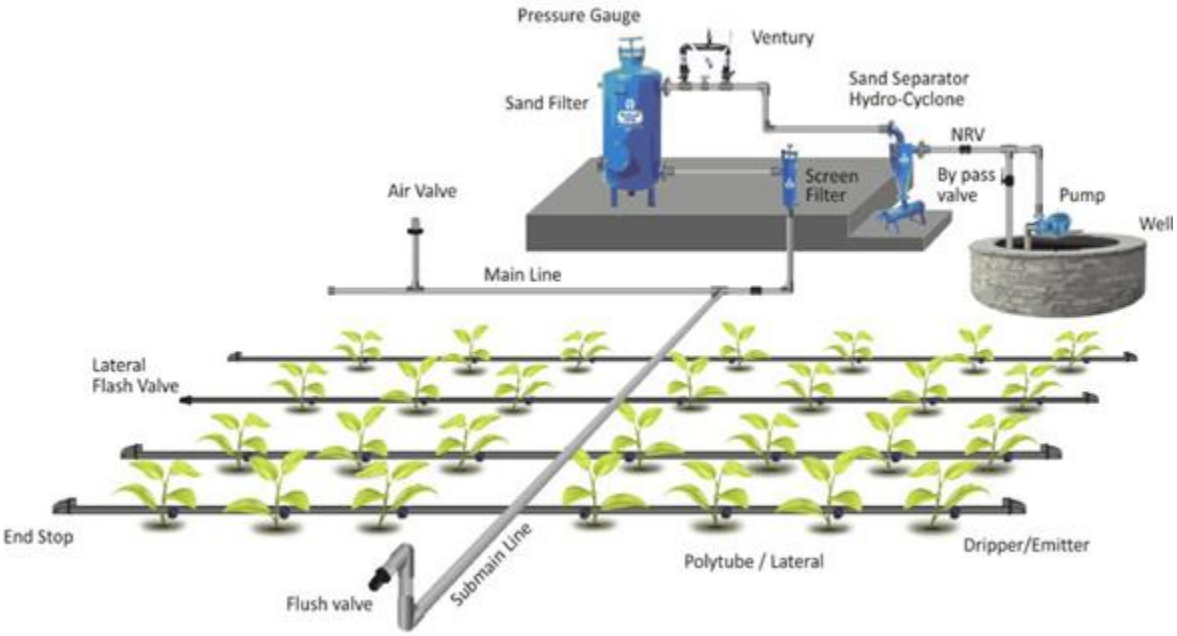

Figure 5: Typical Drip System Layout

2.3.3 Wick systems

In a wick system (see Figure 6), plants are nestled in growing media on a tray that sits on top of a reservoir. This reservoir houses a water solution with dissolved nutrients. Wicks travel from the reservoir to the growing tray. Water and nutrients flow up the wick and saturate the growing media around the root systems of the plants. These wicks can be made of material as simple as rope, string, or felt.

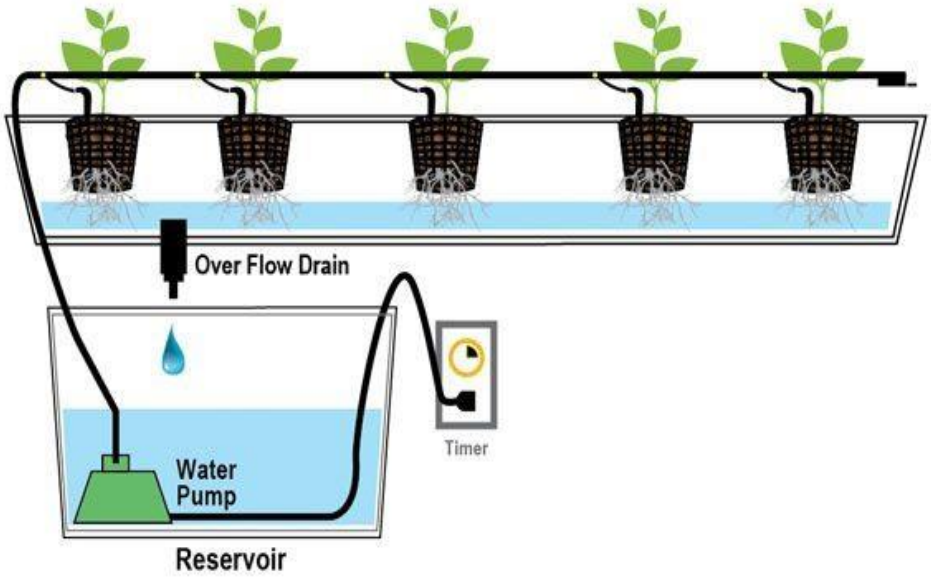

Figure 6: Typical Drip System Layout

2.3.4 Aeroponics

Aeroponics systems suspend plants in the air and expose the naked roots to a nutrient-filled mist. Aeroponics systems are enclosed frameworks, like cubes or towers that can hold a multitude of plants at once. Water and nutrients are stored in a reservoir, and then pumped to a nozzle that atomizes the solution and distributes it as a fine mist. The mist is usually released from the top of the tower, allowing it to cascade down the chamber. Some aeroponics continuously mist the plant's roots, much like NFT systems expose the roots to the nutrient film at all times. Others function more like the ebb and flow system, spraying the roots with mist in intervals. Aeroponics (see Figure 7) do not need substrate media to survive. The root's constant exposure to air allows them to drink in oxygen and grow at an accelerated rate.

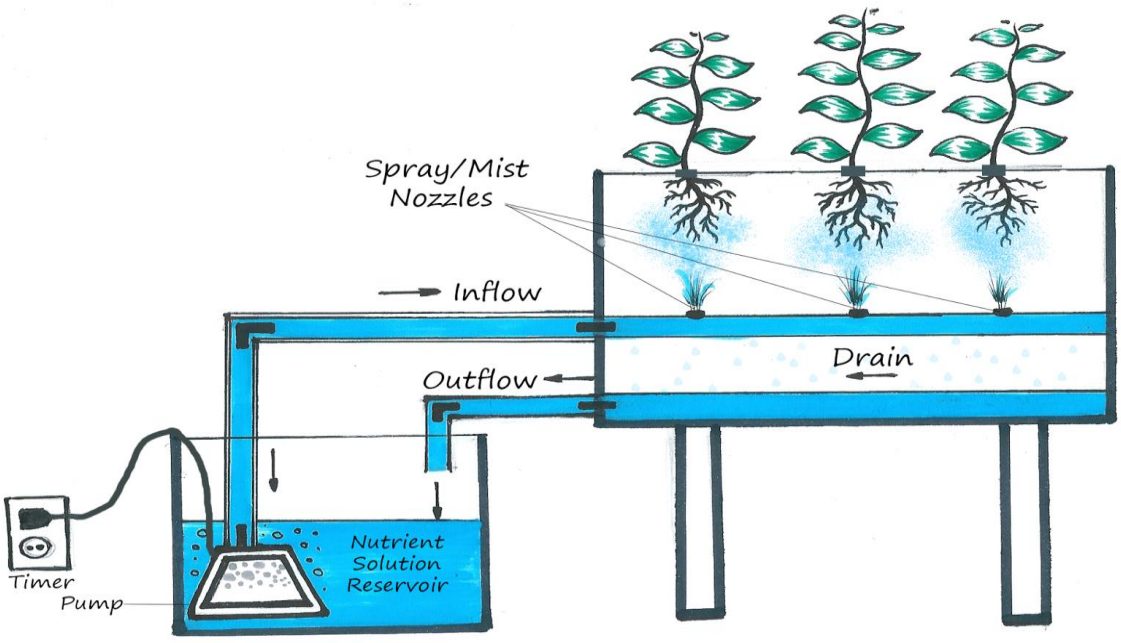

Figure 7: Typical Aeroponics System

2.3.5 Ebb and flow systems

Ebb and flow hydroponics (see Figure 8) work by flooding a grow bed with a nutrient solution from a reservoir below. The submersible pump in the reservoir is equipped with a timer. When the timer starts, the pump fills the grow bed with the water and nutrients. When the timer stops, gravity slowly drains the water out of the grow bed and flushes it back into the reservoir. The system is equipped with an overflow tube to ensure flooding doesn't surpass a certain level and damage the stalks and fruits of the plants.

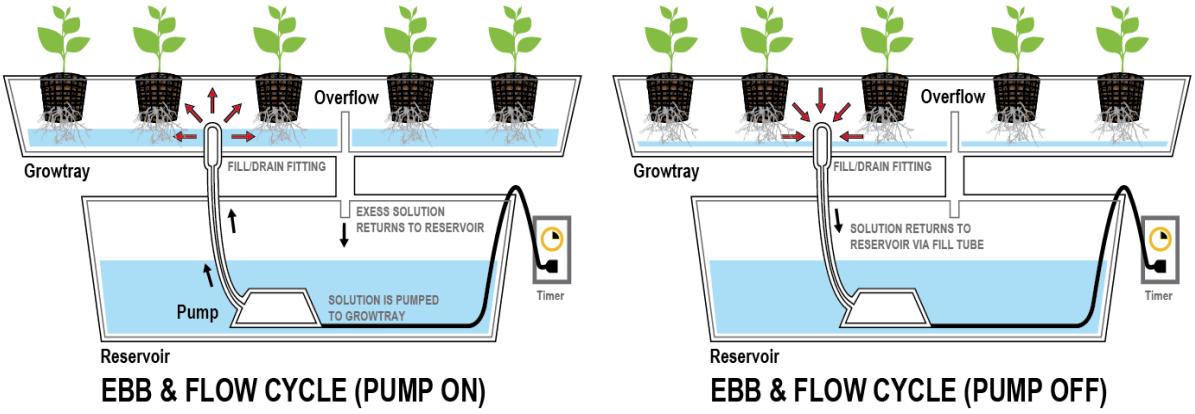

Figure 8: Typical Ebb and Flow System

2.3.6 Nutrient film technique

Nutrient film technique (NFT) systems (see Figure 9) suspend plants above a stream of continuously flowing nutrient solution that washes over the ends of the plant's root systems. The channels holding the plants are tilted, allowing water to run down the length of the grow tray before draining into the reservoir below. The water in the reservoir is then aerated via air stone. A submersible pump then pumps the nutrient-rich water out of the reservoir and back to the top of the channel. The nutrient film technique is a recirculating hydroponic system.

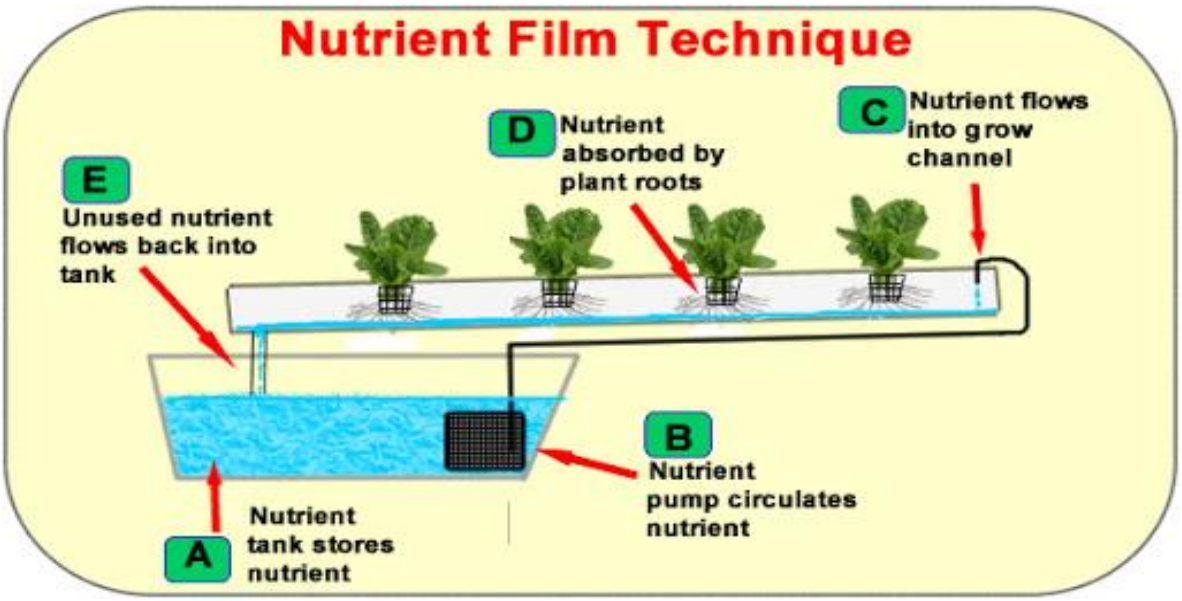

Figure 9: Typical Nutrient Film

2.4 Photovoltaic Technology

Photovoltaic technology involves the use solar radiation that is converted to electrical energy, which can be used as a source of power for domestic, agricultural, industrial and mining use. This kind of technology is adequate for both small-scale local user and large-scale use. Solar Plants that are located in areas zoned for agricultural purposes are sometimes called solar farms or solar ranches. This is merely a casual way of calling these solar plants.

In photovoltaic technology, the power conversion sources are photovoltaic modules that convert solar radiation directly to electrical energy, contrary to other large-scale solar generation technologies, concentrated solar power, which use heat to drive a variety of conventional generator systems.

Solar technology employs the use of solar panels, which produce direct current (DC) electricity. In order for the produced DC to be suitable for domestic, agricultural, industrial and / or mining use, conversion equipment to must be utilised in order for alternating current (AC) to reach consumers. The conversion to which referred herein is performed using inverters. In order to achieve optimal efficiency, solar power plants also incorporate maximum power point trackers. Power point trackers keep individual string of solar array close to its peak power point.

There are two primary options that are utilised to configure the conversion equipment under discussion, namely: string and centralised inverters. In some instances, individual or micro-inverters are used. Single inverters enable the optimisation of output per panel. Whereas, multiple inverters enhance reliability regulating of output, thereby reducing loss of performance in an event an inverter fails.

3 Project Alternatives

In terms of the EIA Regulations (2017), Section 21(3) - Appendix 2 (h) a full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site is required. In addition, the obligation that alternatives are investigated is also a required in terms of Section 24(7) of the National Environmental Management Act, 1998 (Act No. 107 of 1998)(NEMA) (as amended). An alternative in relation to a proposed activity refers to the different means of meeting the general purpose and requirements of the activity (as defined in Government Notice R326 of the EIA Regulations, 2017), 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.

Sections 24(4)(b)(i) and 24(4A) of the NEMA make provision for an EIA to encompass investigation and assessment of impacts that are associated with alternatives in relation to a proposed project. Furthermore, Section 24O(1)(b)(iv) provides for the Competent Authority, in its evaluated of Environmental Authorisation, takes into account "where appropriate, any feasible and reasonable alternatives to the activity which is the subject of the application and any feasible and reasonable modifications or changes to the activity that may minimise harm to the environment".

It is common practise for assessment of alternatives to include the following:

- The consideration of the no-go alternative as a baseline scenario;
- A comparison of the reasonable and feasible alternatives; and
- Providing a methodology for the elimination of an alternative.

3.1 Site Alternatives

In order to determine a relatively suitable site for the proposed Farm Marsh Lusern and Hydroponics Systems Project, powered using Photovoltaic Plant, various factors were considered. These factors include the following:

- Generation of a report in terms of Section 53 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002);
- Accessibility of location;
- Availability of infrastructure:
- Available Literature;
- The availability of ore body of economic value underground, climate, solar radiation and water;
- Zoning of application area to locate the site and associated infrastructure; and
- General environmental and socio-economic justice that is possible to achieve pertaining to the proposed development.

3.2 "No-go" Alternatives

The "No-go" alternative is, in essence, based on repercussions associated with the option of not going ahead with the proposed Farm Marsh Lusern and Hydroponics Systems Project.

An opportunity to farm in order to boost the economy, increase food security and contribution towards job creation will be lost if the proposed development does not become implemented.

3.2.1 Site Layout Alternatives

The site layout alternatives are going to be considered during the Environmental Impact Assessment that is going to be conducted. Alternative site layout alternatives are expected to be influenced significantly by the findings and recommendations of the detailed specialist studies that are going to be conducted during the second phase of this piece of work.

3.3 Agriculture Alternatives

Currently, the proposed location for agricultural development is zoned for mining land-use. Agricultural potential is expected to be relatively low across Farm Marsh site and the choice of footprint on the farm therefore has minimal influence on the significance of agricultural impacts.

Irrigation of lusern may take place in a number of ways. These include conventional irrigation and hydroponics system methods. Depending on a number of factors such as the availability of soil that is suitable for irrigation, suitable climate and water availability among other things, suitable irrigation methods may be chosen. A recommendation on the irrigation method of choice is going to be made at EIA phase pertaining to this proposed agricultural development.

3.4 Some Technology Alternatives

Solar Energy

The Northern Cape Province in South Africa is expected to have the highest Global Horizontal Irradiation (GHI) that is favourable for Photovoltaic installations and Direct Normal Irradiance (DNI) that are necessary for tracking Photovoltaic installations. Meaning, the Northern Cape in South Africa provides for construction and operation of solar energy facilities because of its high Global Horizontal Irradiation relative to other provinces of the country. The Northern Cape Province has a solar radiation of 2 300 kWh/m^2 per annum, which is the highest level. Solar plants are becoming popular and economical in South Africa with time as numerous solar plants are being constructed and operated in the province.

The newly constructed solar plants are either Concentrated Solar Plant or Photovoltaic Plant. Photovoltaic plants are relatives easier and cheaper to operate as opposed to Concentrated Solar Plants. The proposed project under discussion is expected to use Photovoltaic technology.

Only the Photovoltaic Plant type is going to be considered in during the EIA Phase as a result of the following factors:

- Scarcity of water in and around the application area; and
- Large volume of water required for CSP.

In addition, Photovoltaic technology required a relatively wider area on the surface for power generation than CSP.

Hydro Energy

Currently, the proposed location for agricultural development is semi-arid with minimal water resources. This factor prohibits the use of large quantities of water within the area of application for hydro generation.

The alternative of hydro power, if explored, was going create significant negative socio-economic impacts in relation to the proposed development.

3.5 Water Supply Infrastructure

A key aspect of the National Water Policy is Integrated Water Resources Management (IWRM). This recognises that water resources can only be successfully managed if the natural, social, economic and political environments in which water occurs and is used are taken into consideration. IWRM aims to strike a balance between the use of water resources for livelihoods and conservation of the resource whilst promoting social equity, environmental sustainability and economic growth and efficiency.

In a province such as the Northern Cape, more specifically in the John Taolo Gaetsewe District where surface water resource is scare, the abstraction of water from groundwater resources becomes the preferred alternative. Comprehensive investigations pertaining to water supply are going to be conducted during the EIA phase.

3.6 Waste Storage, Management and Transportation

Waste is expected to be generated as a result of the proposed development and associated activities. It is proposed that waste that is generated on site should be separated at source. Waste Separation at Source pertains to setting aside post-consumer dry recyclable waste and household generated garden waste for the purpose of re-use, recycling, composting, or further processing of these materials.
Enormous value in waste separation at source emanates from, among others, procurement, recycling materials that are well sorted and uncontaminated. A basic requirement to achieve this value is that as much as possible, and efficiently as possible, waste or materials are separated early in the recycling process. This is separating waste at source essentially.
In South Africa, waste management is governed by the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) which came into effect on 1 July 2009. Following the enactment of the NEM:WA, the Minister of Environmental Affairs established the National Waste Management Strategy (NWMS) to ensure the achievement the objectives of the NEM:WA. The NWMS was approved for implementation by the Cabinet in November 2011. The Waste Act supports the waste management hierarchy in its approach to waste management, by promoting cleaner

production, waste minimisation, reuse, recycling and waste treatment with disposal seen as a last resort in the management of waste. There are a number of types of waste to be transported. Before any waste is transported, the person responsible for transporting such waste needs to assess the nature as well as the requirements for a specific load if waste to be transported. Understandably the preparations for transporting building rubble for instance, would be different to that of medical waste.

4 Legal Requirements

In order to protect the environment and ensure that this development is undertaken in an environmentally responsible manner, there are a number of significant pieces of legislation that will be consulted for this study. After a brief scoping of applicable legislation these include but may not be limited to the following:

4.1 The Constitution of the Republic of South Africa, 1996

The Constitution of the Republic of South Africa, 1996 is the supreme law and the nucleus of all legislation in South Africa. The Constitution guarantees equality before the law, all the basic freedoms which human beings must enjoy, and must be reasonably entitled to, social and economic justice.

Section 24 of the Constitution states 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."*

Section 24 of the Constitution therefore guarantees citizens of South Africa the right to an environment that is not harmful to human health or well-being, and specifically imposes a duty on the State to enact legislation and take necessary steps to ensure that the right is upheld and to ensure sustainable development through prevention, minimization of control of ecological degradation and pollution. As enshrined in the Bill of Rights, the environmental management objectives of proposed project is to ensure that present and future generations benefit from this development, to support sustainable development and the use of natural resources, whilst promoting justifiable socio-economic development in nearby communities to the project location.

4.2 NEMA and EIA Regulations published on 7 April 2017 (GN R327, GN R326, GN R325 and GN R324)

The Nation Environmental Management Act, 1998 (Act No. 107 of 1998) sets out a number of principles in the first two (2) chapters of the act to give guidance to applicant or proponents, private land owners, members of public and authorities on how to handle environmental matters. The NEMA is the national legal framework that regulates environmental issues. Various necessities such as cooperative environmental governance, compliance and non-compliance, enforcement, and regulating government and business impacts on the environment, underpin the NEMA. The NEMA, as the primary environmental legislation, is complemented by a number of sectoral laws governing mining, waste, air quality, biodiversity, marine living resources, forestry, protected areas, pollution and integrated coastal management. The triple bottom line principle proposes that development must be socially, environmentally and economically sustainable. Principle Number 4(a) states that all relevant factors must be considered, inter alia i) that the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied; ii) that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied; vi) that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised; and viii) that negative impacts on the environment and on peoples' environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.

The national legal framework under which Environmental Impact assessments are undertaken is the National Environmental Management Act, 1998 (Act No. 107 of 1998) NEMA (as amended). The EIA studies under discussion are often complex as a result of many contributing factors. For purposes of remaining within the scope of work of this study, it is not necessary to discuss further these complexities. It is therefore important to highlight that the ultimate aim of EIA studies is to uphold environmental and socio-economic justice pertaining to any proposed development among other things. A definition of "environment" is given in section 1 of the NEMA. Section 2(2) of the NEMA urges sensitivity to the welfare of communities regarding their physical psychological, developmental, cultural and social interests. Development must be socially, environmentally and economically sustainable, which requires that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimized and remedied.

The EIA Regulations (2017) under the NEMA consist of three (3) categories of activities namely: Listing Notice 1 Activities (GNR. 327 of 2017) which require a Basic Assessment study, Listing Notice 2 Activities (GNR. 325 of 2017) which require both

a Scoping and an EIA study for authorisation and Listing Notice 3 Activities (GNR. 324 of 2017) which requires a Basic Assessment study for specific activities in identified sensitive geographical areas. The DEA is responsible for the authorisation of these activities.

4.3 The National Heritage Resources Act, 1999 (Act No. 25 of 1999)

The National Heritage Resources Act, 1999 (Act No. 25 of 1999) provides legal framework for the management of cultural and heritage resources in South Africa. Section 3 of the NHRA lists a wide range of phenomena under which resources may fall with the definition of heritage.

The NHRA was promulgated in order to introduce an integrated and interactive system for the management of the heritage resources, to promote good government at all levels, and empower civil society to nurture and conserve heritage resources so that they may be bequeathed to future generations and to lay down principles for governing heritage resources management throughout the Republic.

In terms of section 38 (subject to the provisions of subsections (7), (8) and (9) of the Act), any proponent who proposes to undertake a development categorised as:

- The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- The construction of a bridge or similar structure exceeding 50 m in length;
- Any development or other activity which will change the character of a site: - Exceeding 5 000 m² in extent;
    - Involving three or more existing erven or subdivisions thereof; or
    - Involving three or more erven or divisions thereof which have been consolidated within the past five years; or
    - The costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- The re-zoning of a site exceeding 10 000 m^2 in extent; or
- Any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

The provincial/national offices of the South African Heritage Resource Agency (SAHRA) are going to be provided with all relevant documentation that will enable them to make an informed statutory comment as enshrined in the NHRA.

A Heritage Impact Assessment and a Palaeontological Impact Assessment (Desktop Study) are going be undertaken during the EIA Phase of the proposed Farm Marsh Lusern and Hydroponics Systems Project. These environmental specialist studies will be included in the EIA Reports that is going to be published for review by I&APs during the EIA Phase.

In order to comply with the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) is going to be completed for the proposed applications and findings and recommendations of specialist are going to be considered in the EIA.

4.4 The National Water Act, 1998 (Act No. 36 of 1998)

The National Water Act, 1998 (Act No. 36 of 1998) (NWA) makes provision for Section 21 Water Uses for which an application could be lodged and those that already exist. The NWA is the principal legal instrument relating to water resource management in South Africa and contains comprehensive provisions for the protection, use, development, conservation, management and control of the country's water resources. In addition, the management of water as a renewable resource must be carried out within the framework of environmental legislation, i.e. the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), under Regulations R324 to 327, of 07 April 2017.

A key aspect of the National Water Policy is Integrated Water Resources Management (IWRM). This recognises that water resources can only be successfully managed if the natural, social, economic and political environments in which water occurs and is used are taken into consideration. IWRM aims to strike a balance between the use of water resources for livelihoods and conservation of the resource whilst promoting social equity, environmental sustainability and economic growth and efficiency.

In addition to the National Water Act, 1998 (Act No. 36 of 1998) and the National Environmental Management Act, 1998 (Act No. 107 of 1998), the following legislation and guidelines/quality standards are applicable to hydrogeological investigations and assessments:

- National Water Act, 1998 (Act No. 36 of 1998);
- National Water Resource Strategy (NWRS, 1st Ed., September 2004);
- Department of Environmental Affairs and Development Planning's (DEA&DP) Guideline for Involving Hydrogeologists in EIA Processes (June 2005) (Snayman, 2005);

- Department of Water Affairs and Forestry's (DWAF) Integrated Water Resource Management: Guidelines for Groundwater Management in Water Management Areas in South Africa (DWAF, 2004).

The NWA defines eleven (11) consumptive and non-consumptive water uses:

- 21(a): Taking water from a water resource;
- 21(b): Storing water;
- 21(c): Impeding or diverting the flow of water in a watercourse;
- 21(d): Engaging in a stream flow reduction activity;
- 21(e): Engaging in a controlled activity;
- 21(f): Discharging waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit;
- 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource;
- 21(h): Disposing in any manner of water which contains waste from, or which has been heated in any industrial or power generation process;
- 21(i): Altering the bed, banks, course or characteristics of a watercourse;
- 21(j): Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and,
- 21(k): Using water for recreational purposes.

Section 27 of the NWA specifies that the following factors regarding water use authorisation be taken into consideration:

- The efficient and beneficial use of water in the public interest;
- The socio-economic impact of the decision whether or not to issue a license;
- Alignment with the catchment management strategy;
- The impact of the water use and possible resource directed measures; and,
- Investments made by the Applicant in respect of the water use in question.

This EIA study underway is going to be used to support the Water Use Licencing Application Process.

4.4.1 Controlled Activities

The Minister of Human Settlement, Water and Sanitation is allowed to regulate activities which have a detrimental impact on water resources by declaring them to be controlled activities. The following are considered to be controlled activities:

- Irrigation of any land with waste or water containing waste generated through any industrial activity or by a water work;
- An activity aimed at the modification of atmospheric precipitation;
- A power generation activity which alters the flow regime or a water resource;

- Intentional recharging of an aquifer with any waste or water containing waste; and
- An activity which has been declared as such under Section 38.

No person may undertake a controlled activity unless such person is authorised to do so by or under this Act. The Minister may, by notice in the Gazette, in general or specifically, declare an activity to be a controlled activity. Such notice might be for a specific activity on a specific site.

4.5 National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)

The National Environmental Management Waste Act, 2008 (Act No. 59 of 2008) has been developed as part of the law reform process enacted through the White Paper on Integrated Pollution and Waste Management and the National Waste Management Strategy (NWMS).

The objectives of the NEM:WA relate to the provision of measures to protect health, well-being and the environment, to ensure that people are aware of the impact of waste on their health, well-being and the environment, to provide for compliance with the measures, and to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being.

Government Notice Regulations 921 (of 29 November 2013) promulgated in terms of Section 19(1) of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) determine that no person may commence, undertake or conduct a waste management activity listed in the schedule unless a license is issued in respect of that activity.

4.6 Agricultural Laws Rationalisation Act, 1998 (Act No. 72 of 1998)

The Agricultural Laws Rationalisation Act, 1998 (Act No. 72 of 1998) was enacted in order to provide for the rationalisation of certain laws relating to agricultural affairs that remained in force in various areas of the national territory of the Republic prior to the commencement of the Constitution of the Republic of South Africa; and to provide for matters connected therewith.

The agricultural laws that were promulgated after the enactment of the Agricultural Laws Rationalisation Act have to be consistent with the provisions of the Constitution.

4.7 National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)

The object of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) is to protect the environment by providing reasonable measures for the protection and enhancement of the quality of air in South Africa; the prevention of air pollution and ecological degradation; and securing ecologically sustainable development while promoting justifiable economic and social development.

Government Notice Regulation 248 (of 31 March 2010) promulgated in terms of Section 21(1)(a) of the National Environmental Management Act: Air Quality Act (Act No. 39 of 2004) determine that an Atmospheric Emission License (AEL) is required for certain listed activities, which result in atmospheric emissions which have or may have a detrimental effect on the environment. The Regulation also sets out the minimum emission standards for the listed activities. It is not envisaged that an Atmospheric Emission License will be required for the proposed development.

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

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA) provides for "the management and conservation of South Africa's biodiversity within the framework of the NEMA, the protection of species and ecosystems that warrant national protection, and the use of indigenous biological resources in a sustainable manner, amongst other provisions". The NEM:BA specifies that the state is the custodian of South Africa's biological diversity and is committed to respect, protect, promote and fulfil the constitutional rights of its citizens.

Furthermore, the NEM:BA prohibits loss of biodiversity through habitat loss, degradation or fragmentation must be avoided, minimised or remedied. The loss of biodiversity includes inter alia the loss of threatened or protected species. Biodiversity offsets are a means of compensating for the loss of biodiversity after all measures to avoid, reduce or remedy biodiversity loss have been taken, but residual impacts still remain and these are predicted to be medium to high. Chapter 5 of NEM:BA (Sections 73 to 75) regulates activities involving invasive species, and lists duty of care as follows:

- the land owner/land user must take steps to control and eradicate the invasive species and prevent their spread, which includes targeting offspring, propagating material and regrowth, in order to prevent the production of offspring, formation of seed, regeneration or re-establishment;
- take all required steps to prevent or minimise harm to biodiversity; and

- ensure that actions taken to control/eradicate invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.

An amendment to the NEM:BA has been promulgated, which lists 225 threatened ecosystems based on vegetation types present within these ecosystems. Should a project fall within a vegetation type or ecosystem that is listed, actions in terms of NEM:BA are triggered. Based on the preliminary sensitivity screening undertaken for the proposed site, none of the threatened ecosystems occur within the study area. This will be confirmed as part of the Ecological Impact Assessment study undertaken during the EIA Phase.

4.9 National Forests Act, 1998 (Act No. 84 of 1998)

The National Forest Act, 1998 (Act No. 84 of 1998) allows for the protection of certain tree species. The Minister has the power to declare a particular tree to be a protected tree. According to Section 12 (1) d (read with Sections (5) 1 and 62 (2) (c)) of the National Forest Act (Act 84 of 1998), a licence is required to remove, cut, disturb, damage or destroy any of the listed protected trees. The most recent list of protected tree species was published in November 2014. The Department of Agriculture, Forestry and Fisheries (DAFF) is authorised to issue licences for any removal, cutting, disturbance, damage to or destruction of any protected trees. The protected trees that commonly occur in this region are *Acacia erioloba* and *Boscia albitrunca*. The presence of these trees on site will be confirmed as part of the Ecological Impact Assessment to be conducted during the EIA Phase.

4.10 Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)

The objectives of the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA) are to provide for the conservation of the natural agricultural resources of South Africa by the:

- maintenance of the production potential of land;
- combating and prevention of erosion and weakening or destruction of the water sources; and
- protection of the vegetation and the combating of weeds and invader plants.

The CARA states that no land user shall utilise the vegetation of wetlands (a watercourse or pans) in a manner that will cause its deterioration or damage. This includes cultivation, overgrazing, diverting water run-off and other developments that damage the water resource. The CARA includes regulations on alien invasive plants.

According to the amended regulations (GN R280 of March 2001), declared weeds and invader plants are divided into three categories:

- Category 1 may not be grown and must be eradicated and controlled;
- Category 2 may only be grown in an area demarcated for commercial cultivation purposes and for which a permit has been issued, and must be controlled; and
- Category 3 plants may no longer be planted and existing plants may remain as long as their spread is prevented, except within the flood line of watercourses and wetlands. It is the legal duty of the land user or land owner to control invasive alien plants occurring on the land under their control.

Should alien plant species occur within the study area; this will be managed in line with the EMPr. Rehabilitation after disturbance to agricultural land is also managed by CARA. The DAFF reviews and approves applications in terms of these Acts according to their Guidelines for the evaluation and review of applications pertaining to renewable energy on agricultural land, dated September 2011.

4.11 Subdivision of Agricultural Land Act, 1970 (Act No. 70 of 1970)

A change of land use (re-zoning) for the development on agricultural land needs to be approved in terms of the Subdivision of Agricultural Land Act, 1970 (Act No. 70 of 1970) (SALA). This is required for long term lease, even if no subdivision is required.

4.12 Development Facilitation Act, 1995 (Act No. 67 of 1995)

The Development Facilitation Act, 1995 (Act No. 67 of 1995) (DFA) sets out a number of key planning principles which have a bearing on assessing proposed developments in light of the national planning requirements. The planning principles most applicable to the study area include:

- Promoting the integration of the social, economic, institutional and physical aspects of land development;
- Promoting integrated land development in rural and urban areas in support of each other;
- Promoting the availability of residential and employment opportunities in close proximity to or integrated with each other;
- Optimising the use of existing resources including such resources relating to agriculture, land, minerals, bulk infrastructure, roads, transportation and social facilities;
- Contributing to the correction of the historically distorted spatial patterns of settlement in the Republic and to the optimum use of existing infrastructure in excess of current needs;
- Promoting the establishment of viable communities; and
- Promoting sustained protection of the environment.

4.13 Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013)

The Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013) was promulgated in order to enhance planning and land use management efficiently and effectively. The SPLUMA enable urban areas to drive spatial transformation.

4.14 Other Relevant Pieces of Legislation

- National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003);
- Agricultural Laws Rationalisation Act, 1998 (Act No. 72 of 1998);
- Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983);
- National Heritage Resources Act, 1999 (Act No. 25 of 1999);
- Fencing Act, 1963 (Act No. 31 of 1963);
- Electricity Act, 1987 (Act No. 41 of 1987);
- Electricity Regulations Amendments (August 2009);
- Biodiversity Act, 2004 (Act No. 10 of 2004);
- Hazardous Substance Act, 1973 (Act No. 15 of 1973);
- Agricultural Product Standards Act, 1993 (Act No. 129 of 1993);
- Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and Regulations;
- Road Transportation Act, 1977 (Act No. 74 of 1977)
- Civil Aviation Authority Act, 1998 (Act No. 40 of 1998); and
- Civil Aviation Act, 2009 (Act No. 13 of 2009) and Civil Aviation Regulations (CAR) of 1997;

4.14.1 Provincial Legislation

i. Northern Cape Nature Conservation, 2009 (Act No. 09 of 2009)

The Northern Cape Nature Conservation Act, 2009 (Act No. 09 of 2009) and in particular the Northern Cape Conservation promotes the protection of listed species. The Northern Cape Nature Conservation Act provides for sustainable development in terms of establishing and maintaining balance in the use of natural resource and protection or conservation thereof. The Act includes six schedules, as follows:

- Schedule 1 - Specially Protected species;
- Schedule 2 - Protected species;
- Schedule 3 - Common indigenous species;
- Schedule 4 - Damage causing animal species;
- Schedule 5 - Pet species; and
- Schedule 6 - Invasive Species.

With regards to protected flora, the Northern Cape Nature Conservation Act includes a list of protected flora. The plant species potentially present within the proposed project area will be identified as part of the Biodiversity Assessment as proposed. However, it will be recommended as part of the EMPr, that a detailed plant search and rescue operation be conducted before the final design process and prior to the commencement of surface disturbances. If any of the listed species are found, the relevant permits should be obtained by the proponent prior to their relocation or removal. In addition, the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform must be consulted before the planned clearance of indigenous vegetation on site takes place.

ii. The Provincial Spatial Development Framework for the Northern Cape (Office of the Premier of the Northern Cape, 2012)

The Provincial Spatial Development Framework (PSDF) provides for developmental planning to in consistence with the provincial legislation. In the province of the Northern Cape where agriculture and mining are predominant, solar and wind renewable energy are now emerging as some of the province's major activities.

The spatial vision for the province outlines a well-structured system of sustainable land-use zones that support the Northern Cape's economy vested in the primary economic sectors, in particular, mining, agriculture, tourism, and the energy industry.

5 Public Participation Process

The pre-application consultation with the Department of Agriculture, Land Reform and Rural Development that recently merged with the Department of Environment and Nature Conservation in Northern Cape Province was initiated. Another pre-application consultation meeting was conducted with the Department of Human Settlement, Water and Sanitation, Kimberley, Northern Cape. The Public Participation Process pertaining to Environmental Authorisation and Integrated Water Use License Applications will be conducted jointly.

Interested and Affected Parties (I&AP's) will be notified of the proposed Farm Marsh Lucerne & Hydroponics Systems Project Application via registered letters, e-mails, notices in public spaces, newspaper adverts or facsimiles and / or virtual conferencing platforms. The notification letters will include a questionnaire requesting comment on the proposed project. Site notices will be placed in and around the application area. In addition, two newspaper advertisements (in English and Afrikaans) will be placed in a newspaper which is widely distributed in the area. The Public Participation Process will be undertaken in accordance with the NWA and the NEMA process and the 2017 EIA Regulations (as amended). I&AP's will be provided an initial notification and call to register period of 30 days. The draft Scoping and

Environmental Impact Assessment Report will be made available for public review and comment for a total period of 30 days each. During this period, an Open Day will be scheduled to present the findings of the draft Environmental Impact Assessment Report to the public. All correspondence submitted by I&AP's will be utilised during the impact assessment and all correspondence received from I&AP's will be included in the final Environmental Impact Assessment Report.

The Environmental Impact Assessment Report and Environmental Management Programme (EMPr) for comment will be made available to all Registered Interested and Affected Parties (I&AP's). In order to take part in the process and to submit comments on these documents, I&AP's are invited to register by completing the registration form and sending it back to the consultant.

Information on the environment, the impacts of the proposed Farm Marsh Lucerne & Hydroponics Systems Project and recommended mitigation and management measures; as well as more information on the application itself, will be described in these documents.

The public participation process will be conducted strictly in accordance with applicable regulations. The following categories of variables will take into account when deciding the required level of public participation:

- The scale of anticipated impact; and
- The sensitivity of the affected environment.

Consultation is required in terms of Chapter 6 of the EIA Regulations, 2017. Landowners, neighbours and other Interested and Affected Parties (I&AP's) are entitled to participate in and be consulted in respect of new proposed agricultural development applications. The proposed PPP for this application will include a number of steps, as listed below:

- Newspaper advertisement in local newspaper;
- Site notices;
- Notification of surrounding land owners , land occupiers and current right owners around;
- Specialist studies will be conducted including the use of available environmental reports; and
- Public Meeting with stakeholders involve e.g. community.

5.1 Overview of the Public Participation Process Undertaken during the Scoping Phase

The primary aims and objectives of conducting public participation process during the Scoping Study are as follows:

- To notify Interested and Affected Parties (I&APs) of the proposed Farm Marsh Lusern and Hydroponics Systems Project;
- To document and consider issues, comments and concerns as raised by I&APs;
- To promote transparency, increase participation and raise awareness on the proposed development and associated consequences;
- To provide platform for liaison and communication with I&APs; and
- To identify potential environmental, socio-economic impacts associated with the proposed development.

5.2 Availing of Background Information

Copies of Scoping Report and Environmental Impact Assessment are going to be accessible at www.thayatrading.co.za

A briefing paper for the project has been compiled in English. The aim of this document is to provide a brief outline of the proposed project, provide preliminary details regarding the EIA Process, and explain how I&APs could become involved in the project. The briefing paper, together with a comment sheet and relevant map, will be distributed to identified stakeholders and I&APs via post or e-mail, inviting them to register for participation the proposed development and submit details of any issues and concerns that they may have.

Furthermore the briefing paper informed I&APs and Stakeholders of the prospective registration of the Farm Marsh Lusern and Hydroponics Systems Project and invited to comment on the project throughout the process. An introductory letter was sent to all I&APs and Stakeholders together with the briefing paper, questionnaire and comments sheet.

5.3 Identification of Key Stakeholders

The first step in the Public Participation Process (PPP) is to identify key stakeholders, including:

- National and Provincial Government Representatives:
    - Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARDLR);

    - Department of Human Settlement, Water & Sanitation (DHSWS);
    - Department of Public Enterprises;
    - Department of Trade and Industry (DTI);
    - Department of Mineral Resources and Energy (DMRE);
    - National Environmental Standards and Regulations Enforcement Agency (NESRA); and
    - South African Heritage Resources Agency (SAHRA).

- Relevant Local and District Municipalities;

    - John Taolo Gaetsewe District Municipality;
    - Gamagara Local Municipality;
    - Joe Morolong Local Municipality; and
    - Ga-segonyana Local Municipality

- State-owned Entities:

    - Transnet;
    - SANRAL; and
    - Eskom

- Landowner and neighbours

All I&AP information, together with record of dates and details of consultations and a record of all issues raised is recorded within a comprehensive project database. This database will be updated on an on-going basis throughout the project, and will act as a record of the communication/public involvement process.

5.4 Advertising

In compliance with the EIA Regulations (2017), notification of the commencement of the SR process for the project was advertised in a local newspaper, the project was advertised in the Kathu Gazette local newspaper in October 2020 in Afrikaans and English. Only an advertisement in the Kathu Gazette newspaper was required as only the Kathu town will be located within the Kathu Gazette distribution area.

The advertisement provided an abstract on key aspects of the Farm Marsh Lusern and Hydroponics Systems Project and PV projects (project description, location and contact details of the Environmental Assessment Practitioner). Furthermore the advertisement requested I&APs to register, and to become involved in the project by submitting comments and highlighting issues of concern to Thaya Trading Enterprise. The primary aim of the newspaper advert is to ensure that the widest possible group of I&APs were informed of the project.

5.5 Site Notices

Site notices were prepared according to the specifications set out in the EIA Regulations. The site notices included basic information regarding the proposed Farm Marsh Lusern and Hydroponics Systems Project, powered using Photovoltaic Plant project, the details of the public participation period, the listed activities applicable to the project and the contact details of the Environmental Assessment Practitioner. Nine site notices were placed at public venues.

- Main Entrance gate of Farm Marsh 467, Northern Cape;
- At the gate of the 1 ha operational area of Farm Marsh 467;
- At Gamagara Local Municipality Main Gate;
- At Hotazel Library entrance (Notice Board);
- At Tsineng Agricultural Hall Main Entrance;
- At Batlharos Library Entrance;
- At Gasegonyana Local Municipality (Notice Board);
- At Joe Morolong Local Municipality (Notice Board); and
- At M S Kitchen Library (Notice Board).

5.6 Review of Environmental Scoping Report

5.6.1 Sharing of Draft Scoping Report with Interested and Affected Parties who requested for a copy

A database of records of all communication between I&APs and Thaya Trading Enterprise pertaining to the proposed development is going to be created and managed.

5.6.2 Authority Review of Draft Environmental Scoping Report

The Consultation Environmental Scoping Report will be made available for review and comments for a period of 43-days, to the following authorities:

- Department of Mineral Resources and Energy;
- Department of Human Settlement, Water and Sanitation; and
- The Northern Cape Department of Agriculture, Environment Affairs, Rural Development and Land Reform

5.6.3 Public Review of Draft Environmental Scoping Report

The draft Environmental Scoping Report was made available for public review at the following public locations in close proximity to the study areas, which were identified as readily accessible to I&APs:

- Kathu Library;
- Tsineng Library;
- Batlharos Library;
- M S Kitchen Library; and
- Hotazel Library.

The availability of this draft report was advertised in the Gemsbok newspaper. A 30-day period was allowed for this review process from October 2020 to 30 November 2020. Stakeholders and I&APs on the project database were notified of the availability of this report by letter (via post or e-mail) as sent out in October 2020.

5.6.4 Final Environmental Scoping Report

The compilation of the Consultation Environmental Scoping Report entails the consideration and inclusion of all relevant comments received from the public during the review of the draft Scoping Report. The final document will be submitted to Department of Agriculture, Environmental Affairs, Rural Development and Land Reform and to the Department of Environment Fisheries and Forestry for authority review and decision-making and/or comments.

6 General or Baseline Description of the Study Area

The purpose of this section is to provide baseline description of the area of application. The John Taolo Gaetsewe District dominated by both agricultural and mining activities. It is a semi-arid area with relatively high radiation in the Northern Cape, South Africa.

6.1 Socio-economic, Biophysical Environment

6.1.1 Locality

The Farm Marsh Lusern and Hydroponics Systems Project is located within and area that is zoned for mining. The area of application is does not within a protected area and is therefore relatively less threatened. The findings of the proposed Biodiversity Assessment to be conducted will provide guidance of what trees are protected within the application area.

Two (2) wetland pans occur in the proximity of the proposed development. Locality of the proposed development is depicted in figure 10.

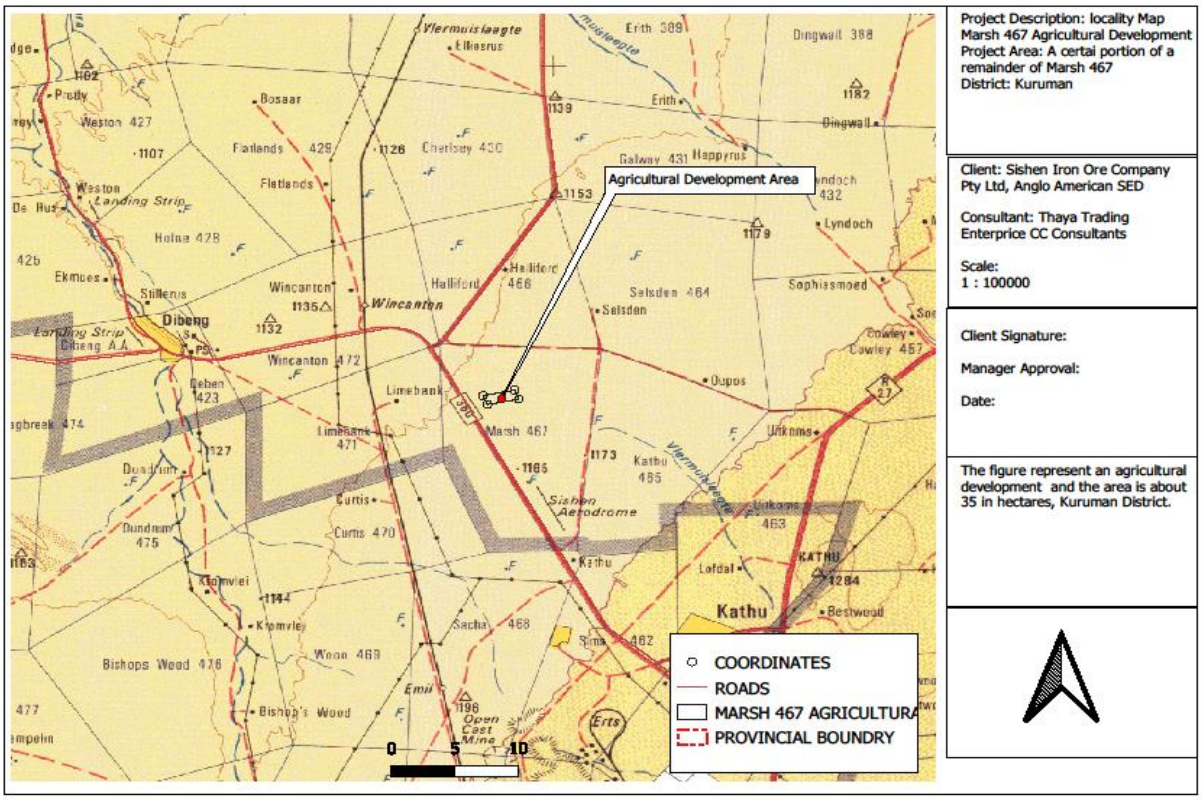

Figure 10: Locality Map of John Taolo Gaetsewe District

6.1.2 Geology

Rocks of the area are composed of pink white and grey fined-grained porphyritic granitic types which are the oldest rocks of the Swazian Erathem in the area.
The Schmidtsdrif Subgroup forms the lower part of the Ghaap Group and is divided into two formations (Boomplaas and Clearwater Formations) of approximately 100 m thick. In the middle of the formation shale becomes more predominant and ferruginised shale greywith siltstone and interbanded thin dolomite. Chert and chert conglomerate are present at the base. The upper formation consists of calcretic dolomite with few stromatolites and thin banded shale and siltstones (Beukes, 1987). The Ghaap Plateau Formation can be distinguished from the underlying formation only where the quartzite is present on the latter. Elsewhere the rocks consist of dark blue finegrained dolomite. A few stromatolite-bearing zones, small lenses of black chert locally developed in thin shale and siltstone are present. Brown ferruginous jasper layers up to 12 m thick, separate the lower part of the formation from the overlying grey coursegrained dolomite. A Breccia of black chert and a few stromatolites occur in the dolomite.

A third zone can be distinguished in the upper part of the formation. It contains lenses of limestone and a prominent layer of chert forms the top of the succession. The layer of chert occurs sporadically on the Maremane anticline where it is brecciated in places to form the silica breccia (Moen et al., 1977). Asbestos Hills Subgroup is the sole representative of the Ghaap Group in this area and follows conformably on the underlying rocks. The formation is divided into the Kuruman 41 and Danielskuil Formations. The uppermost chert of the Ghaap Group grades into banded iron formation of the Kuruman Formation which varies in thickness from 180 m to 240 m. It consistes of a succession of thin alternating layers of light coloured chert and jasper and dark coloured ferruginous jaspilite. The jaspilite contains mainly magnetite, haematite and limonite. A few thin layers of riebeckite-amphibolite and shale occur in places. The rock has well developed bedding plane cleavage and contains several crocidolite bearing zones. The basal layer of the banded iron formation lies on the dolomite of the Ghaap Plateau Formation in the Maremane anticline, is brecciated and ferruginised in places and constitutes the Blinkklip Breccia (Moen et al., 1977).

The “Main Marker” with a thickness of approximately 10m, lies conformably on the banded iron formation (BIF) and forms the base of the overlying jaspilite. It is characterized by an undulating structure and consists of brown jaspilite with thin magnetite layer and chert nodules. The overlying jaspilite attains a thickness of 150 m and contains several marker layers. Several “speckled markers” are present in the lower 40 m of the succession, of which only the upper one is indicated on the map. In the south a layer of eolithic chert with the appearance of quartzite is associated with the upper speckled marker. The two together are known as the quartzite marker. The intermediate quartzite maker occurs between lower speckled markers (Moen, 1977). The Gamagara Formation was deposited on the Maremane anticline and rests unconformably on dolomite and the BIF of the underlying strata Ghaap Plateau Formation. The succession consists of a basal conglomerate with pebbles of jasper and banded iron formation, shale and white to brown quartzite. The Makganyene Formation lies unconformably on the Gamagara Formation and has a maximum thickness of less than 480 m. Tillite occurs at the base of formation and contains

fragments of black, white and red chert in a reddish brown sandy ground mass. Higher up in the succession, alternating layers of grit, tillite, and silicified mudstone and feldspathic quartzite occur. Dolomite or limestone occur interbanded in mudstone (Moen et al., 1977).

The Ongeluk Formation forms the lower part of the Olifantshoek Group. The formation consists of greyish-green andesitic lava with amygdales and lenses of red jasper. The Voëlwater Formation overlies the Ongeluk Formation and has a thickness of 450 m. The lower beds are banded iron stone and banded red jaspilite with chert, dolomite and lava. The upper portion of the succession consists predominantly of dolomite with chert, banded jasper and lava (Moen et al., 1977). The Lucknow Formation occurs east of the Olifantshoek Group in the Korannaberg where the strata are disturbed by a number of faults Figure 11. It lies unconformably on the Voëlwater Formation and is absent in places in the north. The formation has a maximum thickness of 1500 m. The lower portion consists mainly of shale with subordinate layers of quartzite and lava and an upper portion of whitish quartzite with lenses of flagstone and dolomitic limestone. The Hartley Formation, the upper part of Olifantshoek Group, follows conformably on the Lucknow Formation with a basal conglomerate containing pebbles of quartzite, jaspilite and lava. It is overlain by andesitic lava which contains amygdales, tuff, breccia and pebbles of quartzite (Moen et al., 1977). The Matsap Subgroup lie conformably on the Hartley Formation but in places is found unconformably on the Voëlwater Formation in the Korannaberg. Three members were recognized. They consist predominantly of sub-greywacke and purple, grey and brown quartzite with thin pebble beds and a layer of conglomerate in which quartz, banded iron formation and red jasper pebbles are abundant. The Brulsand Formation consists mainly of quartzite with subordinate shale and subgreywacke. Together with the Matsap Subgroup they form the Volop Group with a thickness of 500m (Moen et al., 1977).

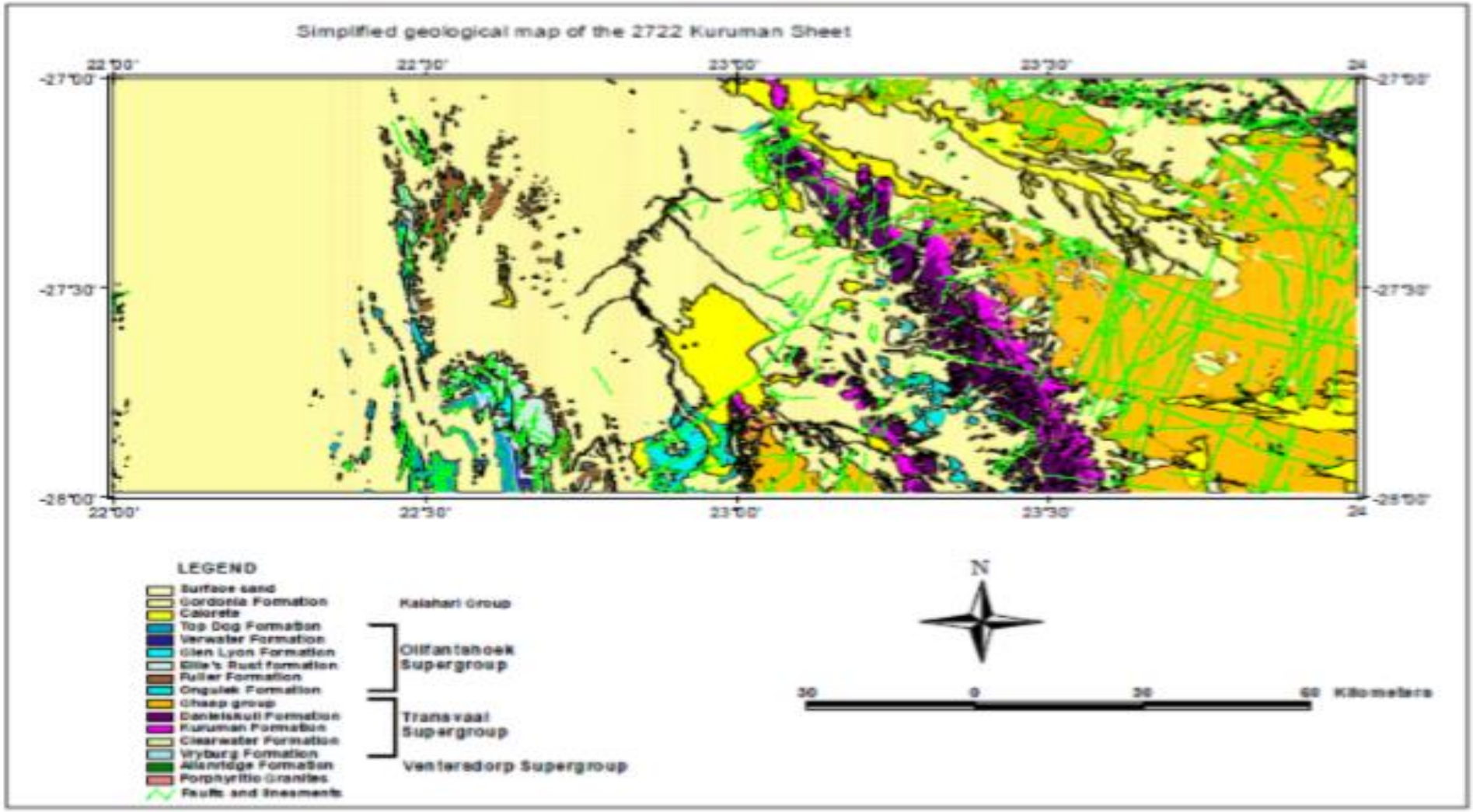

Figure 11: A simplified geological area of Kuruman (Moen, 1979)

Table 5: Lithostratigraphic column of the Kuruman Area

STRATIGRAPHY				DESCRIPTION	MAGNETIC EVENT
				Red to flesh-coloured wind-blown sand	
				Rubble	
				River-sand and gravel	
				Surface limestone	
OLIFANTSHOEK SUPERGROUP (±2 223-2 216 MA)	BRULPAN GROUP		Groblershoop Fm	Quartzite, quartz-sericite schist	Dolerite dykes
	VOLOP GROUP	Brulsand SBGRP	Top dog Fm	White, grey and pink quartzite with subordinate brown subgreywacke	
			Verwater Fm	Grey quartzite with nodule of and lenses of haematite	
		Matsap SBGRP	Glen Lyon Fm	Brown subgreywacke and conglomerate	
			Ellie's Rust Fm	Quartzite and subgreywacke	
			Fuller Fm	Quartzite, subgreywacke and conglomerate	
		Hartley Fm		Andesitic lava with interbedded tuff, agglomerate, quartzite and conglomerate	
		Lucknow Fm		Quartzite, dolomitic limestone; shale and lava	
	POSTMASBURG GROUP	Voëlwater SBGRP		Red jasper, dolomite, chert and lava	Basic lava
		Ongeluk Fm		Amygdaloidal andelisitic lava with interbedded tuff, agglomerate, chert, red jasper	
TRANVAAL SUPERGROUP (±2 224-2 219 MA)		Makganyene Fm		Diamicite, banded jasper, siltstone, mudstone, sandtone grit and dolomite	
	GHAAP GROUP	Campbell Rand SBGRP	Monteville Fm	Dolomite; quartzite	
		Asbestos Hills SBGRP	Danielskuil Fm	Yellow-brown jaspilite with crocidolite; conglomerate	
			Kuruman Fm	Banded Iron formation, subordinate amphibolite, crocidolite, jaspilite and chert	
		Schmidtsdrif SBGRP	Clearwater Fm	Conglomerate, chert ans dolomite, shale	
			Boomplaas Fm	Oolitic and stromatic dolomite and dolomite with chert and quartzite lenses	
	Vryburg Fm		Quartzite, grit, conglomerate, shale amygdaloidal lava		
VENTERSDORP SUPERGROUP (±2 714 MA)			Allanrigde Fm	Andesitic lava, amygdales and agglomerate	Andesitic lava
Porphyritic granite (basement)					

6.1.3 Climate

The area of interest is situated approximately 10 Km North West of Kathu town. The climate is predominantly semi-arid with low rainfall and high evaporation. The mean annual precipitation of the application area is approximately 374 mm/a. Climate plays a vital role in determining the availability of water resources, the nature of the natural landscape and vegetation types. Temperatures are high during the summer and low during the winter. The coldest months are experienced from June to August while the hottest months range from September to March. The average daily temperatures range from 19°C in June, to 26.7°C in January. The mean maximum average temperature during the summer months is approximately 33°C, while during the winter months the mean average minimum temperature of approximately 3,1°C. The area also experiences extreme events on a regular basis, including frost, hail, drought, and high speed winds. Prevailing winds are north-westerly and south easterly winds with an average speed of approximately 5 m/s, between the driest and wettest months; the difference in precipitation is 73 mm. During the year, the average temperatures vary by 15.3 °C.

The prevalent wind direction of the area of application is depicted in Figure 12.

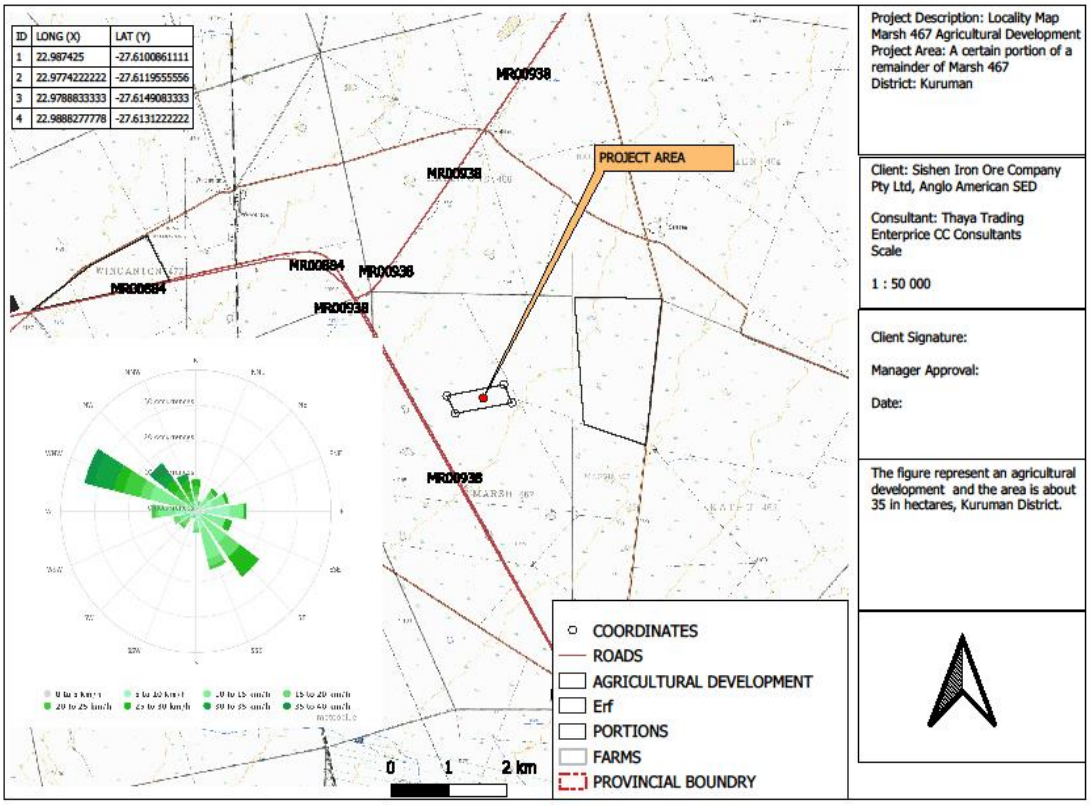

Figure 12: Prevalent wind direction

Climate can influence the potential for environmental impacts and related mine design. Specific issues include:

- rainfall could influence erosion, evaporation, vegetation growth, rehabilitation planning, dust suppression, and surface water management planning;
- temperature could influence air dispersion through impacts on atmospheric stability and mixing layers, vegetation growth, and evaporation which could influence rehabilitation planning; and
- wind could influence erosion, the dispersion of potential atmospheric pollutants, and rehabilitation planning.

6.1.4 Agricultural Potential

Agricultural potential is very low due to shallow sandy soils and climatic constraints. Dry land production potential is estimated to be 13 ha per large stock unit. Specific limitations applicable to the area include shallow soils, unfavourable climate, low water-holding capacity, stony soils and rock outcrops and erosion hazards.

Currently, predominant land uses are mining and agriculture in the Gamagara area. However, generation of energy from renewable power source is becoming common in recent times. The single most influential factor to the development of the Gamagara area is Sishen Iron Ore mining development. The Gamagara area became known to the general South African community as a result of ernomous number of jobs that are created by Sishen Iron Ore Mine. Not only does the mine provide jobs to thousands of job-seekers, it is also the single contributing factor to the planning and development of Kathu town.

6.1.5 Surface Water

There are neither perennial nor non-perenial rivers that traverse the area of application. The Gamagara River traverses South West of the area of application. The area of application is located within the Lower Vaal Water Management Area (WMA), in the D41J Quaternary Catchment drained by the endorheic Gamagara River. The regional drainage pattern of the area is primarily to the northwest in the direction of the endorheic Gamagara River, but most of the drainage lines in the mining area have historically been impacted on by mining activities. There are two (2) wetland pans in the proximity of the proposed Farm Marsh Lusern and Hydroponics Systems Project. No wetlands, drainage patterns or rivers occur within the area of application.

6.1.6 Groundwater

Groundwater resource is valuable. Groundwater is defined as water that is located beneath the surface in soil, rock pore spaces and in the fractures of lithological formations. Groundwater resource is impacted by a number of activities such as domestic, agricultural and mining operations. Agriculture and mining may require dewatering services in order to operate effectively and efficiently whilst promoting environmental protection and for purposes of water supply.

The Gamagara area is groundwater resource is limited. The local mining operations require significant quantities of groundwater to support operations. The nearest mining operations to Farm Marsh that also use groundwater to support their operations are Tshipi Borwa and Sishen Mines. Sishen Mine's activities have impacted on water resources in two ways, these being firstly the direct dewatering zone of impact and secondly the indirect impact of restricted surface water flow in the Gamagara River as result of swallets that formed in the river. The quality of primary and shallow groundwater at Sishen Mine has been impacted on by historic pollution, with hydrocarbons being the most important contaminants resulting in pollution at the mine (Shangoni 2017).

6.1.7 Topography

The area of application is characterised by a flat topography with gentle slope. The elevation ranges from approximately 1159 m and 1164 m. The terrain morphological class of the area can be described as plains with high relief, either isolated moderately or strongly undulating. The area lies at an altitude of 1162 meters above sea level, with the highest elevations occurring in the South East corner. Sishen Airport is in the South East of the project area and the Kathu Solar Park is in the Far East of the project area. The application area remains relatively undisturbed.

6.1.8 Biodiversity

The area of application lies within the Savanna biome that is characterised by grassy ground layer and woody plants. The Savanna biome is the largest biome in the Southern African region.

Farm Marsh 467 is located within Kathu Bushveld/Kuruman Thornveld (Munica & Rutherford, 2006). The development footprint is 35 hectares in size and it comprises of wooded tree and shrub species.

A comprehensive Biodiversity Assessment in relation to the proposed development is going to be conducted.

6.1.9 Wetlands

A wetland as defined by the National Water Act refers to land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water and which under normal circumstances supports or would support vegetation typically adapted to life in water saturated soil. However, there are some wetlands (ephemeral pans) in the region surrounding the project area.

6.1.10 Waste

Waste is expected to be generated as a result of the proposed development and associated activities. It is proposed that waste that is generated on site should be separated at source. Waste Separation at Source pertains to setting aside post-consumer dry recyclable waste and household generated garden waste for the purpose of re-use, recycling, composting, or further processing of these materials.

Enormous value in waste separation at source emanates from, among others, procurement, recycling materials that are well sorted and uncontaminated. A basic requirement to achieve this value is that as much as possible, and efficiently as possible, waste or materials are separated early in the recycling process. This is separating waste at source essentially.

In South Africa, waste management is governed by the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) which came into effect on 1 July 2009. Following the enactment of the NEM:WA, the Minister of Environmental Affairs established the National Waste Management Strategy (NWMS) to ensure the achievement the objectives of the NEM:WA. The NWMS was approved for implementation by the Cabinet in November 2011. The Waste Act supports the waste management hierarchy in its

approach to waste management, by promoting cleaner production, waste minimisation, reuse, recycling and waste treatment with disposal seen as a last resort in the management of waste. There are a number of types of waste to be transported. Before any waste is transported, the person responsible for transporting such waste needs to assess the nature as well as the requirements for a specific load if waste to be transported. Understandably the preparations for transporting building rubble for instance, would be different to that of medical waste.

6.1.11 Heritage and Cultural Resources

The existing heritage resources, if any, are going to be protected through demarcation of the NO-GO zone(s). All encountered graves, if any, are going to be preserved. Buffer zones may be built, at least 100 m away from the preserved heritage resource. Specialists and relevant authorities will be notified and called in should any Heritage Resources of significant importance be encountered. Alternatively, a procedure/protocol that is recommended by specialists may have to be followed.

A Heritage Impact Assessment (HIA) including a Palaeontological Impact Assessment (Desktop Study) is going to be conducted in respect of the proposed Farm Marsh Lusern and Hydroponics Systems Project.

6.1.12 Socio-economic

Farm Marsh Lusern and Hydroponics Systems Project is located in the Gamagara Local Municipality within the John Taolo Gaetsewe District Municipality which includes the towns of Kathu, Dibeng, Sesheng and Olifantshoek. Sending municipalities include Joe Morolong Local Municipality and Ga-Estonians Local Municipality. Sishen Mine has played a significant role in the establishment and development of the town of Kathu and surrounds since 1953. The district is largely reliant on mining with mining contributing 55.5% to the district and 77.5% to the local municipal economy (Demacon, 2016). The mining sector is also the largest employer in the local economy. According to Demacon (2016) there are approximately 50 000 people living in the Gamagara municipal area of which 65% are economically active.

6.1.13 Land Uses

Potchefstroom University then, North West University now conducted soil and land use survey in year 2003. Currently, there is hydroponics systems project (less than 1 hectare) and bee harvesting going on at Farm Marsh. Irrigation suitability study

To achieve sustainable irrigation of soils, the appropriate soils need to be identified, to prevent water logging and salinization. During irrigation, considerable amounts of salts are applied with the water. When water is absorbed by plant roots through transpiration, the salts are precipitated in the soil and a long-term result is the increased concentration of salts called salinization. Salinization in the soil can hamper crop growth and in extreme cases salinization will render the soil non-vegetative. These effects can be negated with proper management on soils with specific properties. For this reason, the Department of Agriculture; Northern Cape, has provided guidelines to which soil properties must adhere before a ploughing license can be granted. A ploughing license is one of the requirements, which must be fulfilled before the Department of Water, and Sanitation will grant water rights for irrigation. An irrigation potential soil survey will investigate the morphological, physical and chemical properties of soils related to drainage, salinization and sodicity, and indicate the areas where the soils are suitable for irrigation.

6.1.14 Visual Amenity

Activities and associated infrastructure possess potential to impact negatively on the visual aspect of the environment. Dust that is going to be generated from the proposed development he landscape character, scenic quality among others.

There are approximately 14 Solar developments with either an approved Environmental Authorisation or applications under consideration within 30 Km radius of the proposed development. Additionally, the project area is within 8 Km of other civil aviation aerodrome.

―Visual, scenic and cultural components of the environment can be seen as a resource, much like any other resource, which has a value to individuals, to society and to the economy of the region‖ (Oberholzer, 2005). A Visual Impact Assessment (VIA) is a specialist study performed to identify the visual impacts of a proposed project on the surrounding environment. The proposed Project will be investigated in terms of the visual characteristics of the receiving environment.

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

6.1.15 Noise and Vibration

There are activities that are conducted in the locality which cause noise pollution. Some of them cause some vibration of the ground. They include mining activities among others. All these aspects may cause a disturbance to receptors that are in the locality.

6.1.16 Traffic

The proposed development may increase traffic volumes in the locality. This is going to pose some risks to humans and animals. An increase in traffic volumes results in increase in air and noise pollution and possibility of accidents to occur.

6.1.17 Air Quality

The air quality of the pre-mining period is expected to have been of a better quality; however, the existing mines in the surrounding areas also contribute to the air quality degradation. The main concern in this regard would however be dust from the proposed diamond mining settling on surrounding areas. However, a dust control plan will be implemented for the proposed project in order to control any possible nuisance dust that might give rise from the surrounding. The main contaminants associated with the project includes: inhalable particulate matter less than 10 microns in size (PM_{10}), larger total suspended particulates (TSP) that relate to dust fallout, VOC, SO_2, NO_2 and gaseous emissions mainly from vehicles and generators. A change in ambient air quality can have health and/or nuisance impacts. Related mitigation measures focus on pollution prevention and monitoring.

6.1.17 Site Sensitivity

Site sensitivity of the area of application is crucial to establish. This is possible achieve after specialist studies have been conducted.

6.2 Site Selection Matrix

Due to the nature of the proposed development, the location of the facility is largely dependent on technical and environmental factors such as irrigation suitability, climatic conditions, solar irradiation and cleared piece of land. The solar irradiation to which the Northern Cape Province is exposed indicates is indicative of potential for the solar power generation.

The receptiveness of the site to Photovoltaic development includes the suitability of the area for the proposed Farm Marsh Lusern and Hydroponics Systems Project. The Remaining Extent of Farm Marsh No. 467, where the project is proposed to be located is considered favourable and suitable from a technical perspective due to the following characteristics:

- Irrigation Suitability: An irrigation potential soil survey will investigate the morphological, physical and chemical properties of soils related to drainage, salinization and sodicity, and indicate the areas where the soils are suitable for irrigation;
- Climatic conditions: Climatic conditions are a factor to consider in determining whether or not the project will be viable from a socio-economic and environmental perspective as Farm Marsh Lusern and Hydroponics Systems Project, powered using solar energy is directly dependent on the annual direct solar irradiation values of John Taolo Gaetsewe District;
- Topographic conditions: The area of application for the proposed Farm Marsh Lusern and Hydroponics Systems Project. The topographical landscape of the area within which the proposed development is going to be built relatively of low slope ensuring that the solar panels are always exposed to sunlight;
- Land accessibility and availability: The piece of land of the remainder of Farm Marsh 467 is available for purposes of the proposed project. The main entrance gate of the farm faces R380;
- Mineral Sterilisation: a geological map of farm Marsh was sourced from the Council for Geosciences. In order to prepare a comprehensive application to the Competent Authority, an application for approval of the Minister in terms of Section 53 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (The Act) to use land surface contrary to the objects of the Act; and

- Environmental sensitivity: Environmentally, the proposed project location is regarded as relatively limited ecological sensitivity in respect of receiving environment.

6.3 Concluding Statement on Alternatives

Based on the criteria set above, the remainder of farm Marsh is he preferred location thus far. However, specialist studies that are going to be conducted at EIA phase are going to inform the final site layout of the proposed development.

7 Potential Environmental Impacts

7.1 Construction Phase

These are impacts on the environment and socio-economic aspects that are expected to occur during the construction phase of the proposed Farm Marsh Lusern and Hydroponics Systems Project. It is intrinsic that such impacts are temporary in duration, but may have longer lasting effects e.g. pollution of a sensitive area during construction, could have effects that may last long after construction is over. Construction phase impacts could potentially include:

- Destruction or loss of biodiversity;
- Loss of medicinal flora;
- Proliferation of invasive and alien plant species;
- Reduction in Woody Alien Species;
- Faunal Mortality and Displacement (including CI species);
- Increase in dust and erosion degrading habitat integrity;
- Sensory disturbances;
- Destruction of Heritage and Cultural Resources;
- Emissions from construction vehicles and generation of dust; and
- Pollution caused by spillage or discharge of construction waste water

Pollution of the groundwater and soil as a result of use of hydrocarbons and generation of infrastructural building rubble:

- Employment creation and skills development opportunities (Positive);
- Visual intrusion of construction/demolition activities;
- Noise impact from the use of construction and farming equipment;
- Health injuries to construction personnel as a result of construction work;
- Traffic, congestion and potential for collisions;

- Impacts on groundwater resources;
- Impact on agricultural potential and soils;
- Disturbance of flora and fauna;
- Increase in traffic volumes in the vicinity of the construction site;
- Windblown dust;
- Impact on heritage and cultural resources;
- Noise pollution; and
- Pollution of the environment with waste.

Based on the temporary duration of the construction phase and the fact that negative impacts of construction can be readily predicted and mitigated, generally speaking, more attention will be given to the operational phase impacts of the proposed Farm Marsh Lusern and Hydroponics Systems Project than to the construction phase impacts. However, wherever relevant, specialist studies would consider construction phase impacts, and in certain cases, would be focused on construction phase impacts e.g. impacts on biodiversity are mainly construction phase-related impacts.

7.2 Operational Phase

The EIA phase is going to assess impacts associated with the operating the proposed project. Given the long-term effect of these impacts at operational phase, the EIA study is going to be comprehensive. The suggested specialist studies are expected to identify and assess the significance of these impacts and propose mitigation measures accordingly.

7.2.1 A Description of the Environmental Impacts and Risks Identified During the Environmental Assessment Process

This section describes potential impacts on environmental and socioeconomic pertaining to each of the fundamental project actions / activities, processes that will be followed and associated infrastructure that will be used in the proposed development (Please see Table 6).

Table 6: Environmental Impacts and Risks Identified

Activity/process or part thereof	Impacts (Pre-mitigation)
Sterilisation of Mineral Resources	Sterilisation of mineral resources Infrastructure, posing safety risks to personnel and animals Loss of soil and land capability affected through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Proliferation of Invasive and Alien Plant species Change in visual amenity Use of fertiliser Lowering of groundwater level Air pollution, greenhouse gas emissions, global warming Loss of heritage/cultural and palaeontological resources Influx of labour Wetlands Health and Safety Traffic Waste Socio-economic impact Influx of labour Interference with existing land uses (Zoned for mining)
Infrastructure, posing safety risks to personnel and animals	Sterilisation of mineral resources Infrastructure, posing safety risks to personnel and animals Loss of soil and land capability affected through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Proliferation of Invasive and Alien Plant species Change in visual amenity Use of fertiliser Lowering of groundwater level Air pollution, greenhouse gas emissions, global warming Loss of heritage/cultural and palaeontological resources Influx of labour Wetlands Health and Safety Traffic Waste Socio-economic impact Influx of labour Interference with existing land uses (Zoned for mining)
Water use and management; Waste Management	Sterilisation of mineral resources Infrastructure, posing safety risks to personnel and animals Loss of soil and land capability affected through physical

	disturbance Physical destruction of biodiversity General disturbance of biodiversity Proliferation of Invasive and Alien Plant species Change in visual amenity Use of fertiliser Lowering of groundwater level Air pollution, greenhouse gas emissions, global warming Loss of heritage/cultural and palaeontological resources Influx of labour Wetlands Health and Safety Traffic Waste Socio-economic impact Influx of labour Interference with existing land uses (Zoned for mining)
Support services	Sterilisation of mineral resources Infrastructure, posing safety risks to personnel and animals Loss of soil and land capability affected through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Proliferation of Invasive and Alien Plant species Change in visual amenity Use of fertiliser Lowering of groundwater level Air pollution, greenhouse gas emissions, global warming Loss of heritage/cultural and palaeontological resources Influx of labour Wetlands Health and Safety Traffic Waste Socio-economic impact Influx of labour Interference with existing land uses (Zoned for mining)
Transport system	Sterilisation of mineral resources Infrastructure, posing safety risks to personnel and animals Loss of soil and land capability affected through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Proliferation of Invasive and Alien Plant species Change in visual amenity Use of fertiliser Lowering of groundwater level Air pollution, greenhouse gas emissions, global warming

	Loss of heritage/cultural and palaeontological resources Influx of labour Wetlands Health and Safety Traffic Waste Socio-economic impact Influx of labour Interference with existing land uses (Zoned for mining)
Use of Fertilisers	Sterilisation of mineral resources Infrastructure, posing safety risks to personnel and animals Loss of soil and land capability affected through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Proliferation of Invasive and Alien Plant species Change in visual amenity Use of fertiliser Lowering of groundwater level Air pollution, greenhouse gas emissions, global warming Loss of heritage/cultural and palaeontological resources Influx of labour Wetlands Health and Safety Traffic Waste Socio-economic impact Influx of labour Interference with existing land uses (Zoned for mining)
Use of facilities and services	Sterilisation of mineral resources Infrastructure, posing safety risks to personnel and animals Loss of soil and land capability affected through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Proliferation of Invasive and Alien Plant species Change in visual amenity Use of fertiliser Lowering of groundwater level Air pollution, greenhouse gas emissions, global warming Loss of heritage/cultural and palaeontological resources Influx of labour Wetlands Health and Safety Traffic Waste Socio-economic impact Influx of labour

	Interference with existing land uses (Zoned for mining)
Restoration of destructed biodiversity	Sterilisation of mineral resources Infrastructure, posing safety risks to personnel and animals Loss of soil and land capability affected through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Proliferation of Invasive and Alien Plant species Change in visual amenity Use of fertiliser Lowering of groundwater level Air pollution, greenhouse gas emissions, global warming Loss of heritage/cultural and palaeontological resources Influx of labour Wetlands Health and Safety Traffic Waste Socio-economic impact Influx of labour Interference with existing land uses (Zoned for mining)
Closure , post-closure alternative land uses	Loss of job opportunities Economic impact Proliferation of Invasive and Alien Plant species

8 Conclusion and Recommendations

The Draft Scoping Report presented herein is open for public review at his stage. A revised and final copy of this report is going to be submitted to the Competent Authority for approval after comments have been received from the proponent, the public community, government departments and the Competent Authority.

9 Plan of Study for EIA

9.1 Introduction

This section gives a brief outline of the Plan of Study for EIA (PoSEIA) and the tasks that will be undertaken and the anticipated process to meet the objectives for the EIA phase. The approach to the EIA is to focus on those key issues identified for the preferred alternative. This will ensure that the EIA focuses on the most significant impacts and in the process save time and resources.

9.2 Process Phases

9.2.1 Scoping Phase

The Scoping Report presented herein is in respect of the proposed Farm Marsh Lusern and Hydroponics Systems Project. Literature review, comments from Interested and Affected Parties and findings of specialists are going to inform the findings of the full Environmental Impact Assessment that is underway. There were no identified environmental fatal flaws in relation to the proposed development at the time of publishing this draft Scoping Report.

The EIA is going to be undertaken in order to present an assessment of these potential impacts and make recommendations on proposed mitigation measures. The EIA, as informed by literature review, comments received from interested and affected parties and findings and recommendations of specialists are also going to be used to collate all this information into a single coherent piece of work.

9.2.2 Environmental Impact Assessment

All potentially significant socio-economic and environmental impacts that are associated with the proposed development have been identified in the Scoping Study presented herein. However, these impacts are going to be revised before the submission of final Scoping Report copy to the Competent Authority. All the impacts are going to be investigated further during the EIA phase. The proposed mitigation measures are going to be presented accordingly.

9.3 Conduct Impact Assessment

9.3.1 Rating of Impact

Severity/Magnitude

Describes whether an impact is destructive or benign

An assessment of locating surface infrastructure and associated activities would bare minimal magnitude on sterilisation of any mineral resources. Severity is going to be determined before proposed mitigation measures are implemented effectively. Post effective implementation of proposed mitigation measures, severity is going to be determined.

Extent/Spatial

The area over which the impact will be expressed is known as Extent of Impact. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact. For example, high at a local scale, but low at a regional scale

The spatial scale or extent is a relative term that links the identified impact to the spatial scale or extent of the proposed development and the world as a whole. The extent is on-site before proposed mitigation measures are implemented effectively. Post effective implementation of proposed mitigation measures, the extent is on-site.

Duration

Indicates what the lifetime of the impact will be;

The sterilisation of resources will be limited to occur during the construction and operation of the proposed development because infrastructure is going to be utilised in most instances. Post effective implementation of proposed mitigation measures, duration, remains throughout life of operation.

Consequence

The consequence is low before proposed mitigation measures are implemented effectively. Post effective implementation of proposed mitigation measures, consequence is low.

Probability

Describes the likelihood of an impact actually occurring; and

Probability (synergy /summation) of impact frequency and activity frequency is going to be determined before proposed mitigation measures are implemented effectively. Post effective implementation of proposed mitigation measures, such as, among other, selection of location infrastructure and associated activities in a manner that will promote actions such as prevention (avoid), minimization (reduce), control, correction (remedy).

Significance

The significance is going to be calculated before proposed mitigation measures are implemented effectively. Post effective implementation of proposed mitigation measures, significance is also going to be determined.

Cumulative Impact

In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

The cumulative impact rating considers the predicted effects, residual effects, effects of other projects and activities in the form of potential synergistic, interactive system components, pattern, augmentative, consecutive impacts and mitigation measures, within the context of proposed development. The cumulative impact is low before proposed mitigation measures are implemented effectively.

The impact significance rating methodology presented herein is in compliance with provisions of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended, read in tandem with the Environmental Impact Assessment Regulations 2017 (as amended). The approach followed to determine significance rating is that of considering the consequence (*C*) of each impact (comprising Nature, Extent, Duration and Magnitude) and relate this to the probability/ likelihood (*P*) of the impact occurring as a product. This determines the significance of impact. In addition, other factors, including cumulative impacts, public concern, reversibility, and potential for irreplaceable loss of resources, are used to determine Priority. Priority is used as a guide for authorities and stakeholders to making informed decisions pertaining to the development approach. The impact assessment will be applied to all identified alternatives. For purposes of this study, only Alternative A was considered because all other alternatives have similar ecological setup to that of Alternative A. Where possible, mitigation measures will be recommended for impacts identified.

Impact Assessment, Rating and Mitigation

The criteria used to assess the significance of the impacts are discussed below. The criteria used to assess the significance of the impacts are shown in the table below. The limits were defined in relation to mining characteristics. Those for probability, intensity/severity and significance are subjective, based on rule-of-thumb and experience. Natural and existing mitigation measures were considered.

These natural mitigation measures were defined as natural conditions, conditions inherent in the project design and existing management measures, which alleviate impacts. The significance rating of the impacts was calculated by using the following formula:

The Significance Rating (*SR*) of an impact is determined by applying Consequence (*C*) of the particular impact and the Probability (*P*) of the impact occurring. Consequence is determined through the consideration of the Nature (*N*), Spatial Scope/Extent (*E*), Duration (*D*), and Severity (*S)* applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$C = (E+D+S) \times N$$

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in Tables 7 to 11.

The criteria used to assess the significance of the impacts are shown in Tables 7 - 11. The different project activities and associated infrastructure were identified and considered in order to identify and analyse the various possible impacts. The limits were defined in relation to project characteristics. Those for severity, extent, duration and probability are subjective, based on rule-of-thumb and experience. Natural and existing mitigation measures were considered. These natural mitigation measures were defined as natural conditions, conditions inherent in the project design and existing management measures, which alleviate impacts. The Consequence value of the impacts was calculated by using the following formula:

CONSEQUENCE	X	*PROBABILITY*
N x(Severity + Spatial Scope + Duration)		(Frequency of activity + Frequency of impact)

For the impact assessment, the different project activities and associated infrastructure were identified and considered in order to identify and analyse the various possible impacts. These include roads and hauling, excavations,

temporary waste dumping, topsoil storage, mine residue deposit dam, plant and processing area, temporary office, workshops and ablution facilities, water tanks, diesel tanks, pipeline, other temporary buildings, etc.

Significance of impacts is described as follows:

Very Low – Impact would be negligible. Almost no mitigation and/or remedial activity would be needed, and any minor steps which might be needed would be easy, cheap and simple.

Low – Impact would have little real effect. Mitigation and/or remedial activity would be either easily achieved or little would be required or both.

Low – Medium: Impact would be real but not substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be both feasible and fairly easily possible.

Medium – High: Impact would be real and rather substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be feasible, but not necessarily possible without difficulty.

High – Impacts of substantial order. Mitigation and/or remedial activity would be feasible but difficult, expensive, time consuming or some combination of these factors.

Very High – Of the highest order possible within the bounds of impacts which could occur. There would be no possible mitigation and/or remedial activity to offset the impact at the spatial or time scale for which was predicted.

Table 7: Some Consequence Parameters

Weight	Severity	Spatial Scope/Extent	Duration
0	Insignificant/non-harmful	Activity specific/No effect/Controlled	Immediate (0 – 6 months)
1	Minimal / potentially Harmful	Slight permanent deviation / on-site	Short term / construction (6 months- 1 yr)
2	Medium / slightly Harmful	Immediate surroundings / local / outside mine area	Life of operation
3	High / Critical / Serious	Regional effect	Decommissioning
4	Catastrophic / major	National/ Severe environmental damage	Residual
5	Disastrous	Trans boundary effects	Permanent

Table 8: Probability Parameters

Weight		1	2	3	4	5
Frequency						
Probability	Frequency of Impact	Highly unlikely	Rare	Low likelihood	Probable/ possible	Certain
		Practically impossible	Conceivable but very unlikely	Only remotely possible	Unusual but possible	Definite
	Frequency of Activity	Annually or less	6 monthly/temporarily	Infrequent	Half-life of operation	Life of operation

Table 9: Significance Rating (It could be either positive or negative, depending on the nature of impact)

CONSEQUENCE (Severity + Spatial Scope + Duration)															
PROBABILITY (Frequency of activity + frequency of impact)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Table 10: Significance

Colour Code	Significance Rating	Value	Negative Impact Management Strategy	Positive Impact Management Strategy
	VERY HIGH	126 – 150	Improve current management	Maintain current management
	HIGH	101 – 125	Improve current management	Maintain current management
	MEDIUM – HIGH	76 – 100	Improve current management	Maintain current management
	LOW – MEDIUM	51 – 75	Improve current management	Maintain current management
	LOW	26 – 50	Improve current management	Maintain current management
	VERY LOW	1 – 25	Improve current management	Maintain current management

Table 11: The Rating System (Summary of Impact Rating Parameters)

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
+1	Positive	Likely to result in a beneficial impact.
-1	Negative	Likely to result in a detrimental impact.
SPATIAL SCOPE/EXTENT		
This is defined as the area over which the impact will be experienced.		
0	Activity Specific	The impact will only affect the activity and personnel working on it.
1	On-site	The impact will only affect the site.
2	Local or immediate surroundings outside project footprint	Will affect the local area or district.
3	Regional Impact	Will affect the Province
4	National	Will affect the entire country.
5	International	Will affect the Globe/Earth
FREQUENCY OF IMPACT		
This describes the chance of occurrence of an impact.		
1	Unlikely/Annually	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Rare/Temporary	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Relatively low likelihood/Infrequent	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Probable/Possible/Life of operation	Impact will most likely occur (Greater than a 75% chance of occurrence).
5	Definite/Certain/Life of operation	Impact will certainly occur (100% chance of occurrence).
FREQUENCY OF ACTIVITY		
This describes the chance of activity taking place.		
1	Annually of Less	The chance of the activity occurring is extremely low (Less than a 25% chance of occurrence).
2	6 Monthly or Temporarily	The activity may occur (Between a 25% to 50% chance of occurrence).
3	Infrequent	The activity will likely occur (Between a 50% to 75% chance of occurrence).
4	Frequently	Activity will most likely occur (Greater than a 75% chance of occurrence).
5	Life of Operation	Activity will certainly occur (100% chance of occurrence).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
0	Immediate	The impact is avoidable through conducting and implementing risk assessment.
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter, it will be entirely negated (0 – 2 years).
2	Medium to medium term/ Life of	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action

	operation	or by natural processes thereafter (2 – 10 years).
3	Medium term/Decommissioning	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Medium to Long term/Residual	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.
5	Long term/Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.
INTENSITY/ SEVERITY		
Describes the severity of an impact.		
0	Insignificant/ Non-harmful	Impact affects results of an performance an individual task.
1	Minimal/ Potentially Harmful	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium/Slightly Harmful	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High/Critical/Serious	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
4	Major/Catastrophic	Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation
5	Disastrous	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
REVERSIBILITY		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
0	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
1	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
2	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
3	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question. Cumulative Impact: Considering predicted effects, residual effects, effects of other projects and activities in the form of potential synergistic, interactive system components, pattern, augmentative, consecutive impacts and mitigation measures.		

0	Low cumulative impact	The impact would result in negligible/insignificant cumulative effects.
1	Medium cumulative impact	The impact would result in minor cumulative effects.
2	High cumulative impact	The impact would result in significant cumulative effects
PUBLIC RESPONSE		
1	Low public response	Issue has received relatively low public response
2	Medium Public Response	Issue has received relatively moderate public response
3	High Public Response	Issue has received relatively high public response
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: Nature x (Extent + severity + duration) x (frequency of impact +frequency of activity). The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	Impact significance rating	Description
1 to 25	Negative very low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
1 to 25	Positive very low impact	The anticipated impact will have negligible positive effects.
26 to 50	Negative low impact	The anticipated impact will have minor negative effects and will require minor mitigation measures.
26 to 50	Positive low impact	The anticipated impact will have minor positive effects.
51 to 75	Negative low to medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
51 to 75	Positive low to medium impact	The anticipated impact will have moderate positive effects.
76 to 100	Negative medium to high impact	The anticipated impact will have moderate to high negative effects and will require moderate to high significant mitigation measures.
76 to 100	Positive medium to high impact	The anticipated impact will have moderate to high positive effects.
101 to 125	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
101 to 125	Positive high impact	The anticipated impact will have significant positive effects.
126 to 150	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
126 to 150	Positive very high impact	The anticipated impact will have highly significant positive effects.
PRIORITY		
Priority is determined through consideration of other parameters that may relate to the proposed development however not necessarily forming part of the process followed to determine significance. Determination of priority is performed for purposes of assisting all stakeholders at decision-making level reach informed decisions. The calculation of Priority of an impact uses the following formula: Priority = Public Response (*PR*) + Cumulative Impact (*CI*) + Reversibility (*R*) + Irreplaceable Loss of Resources (*LR*)		
2	Very Low	The anticipated impact is of negligible effects and will require no attention.
3 to 4	Low	The anticipated impact is of minor effects and will require minor attention.
5 to 7	Low to Medium	The anticipated impact is of moderate effects and will require moderate attention.

8 to 10	Medium to High	The anticipated impact is of moderate to high priority and will require moderate to urgent attention.
11 to 12	High	The anticipated impact is of high priority and requires urgent attention.

IMPACT PRIORITISATION

Further to the assessment criteria presented in the section above, it is necessary to assess each potentially significant impact in terms of:

- Public Response;
- Cumulative impacts;
- Reversibility; and
- The degree to which the impact may cause irreplaceable loss of resources.

In addition, it is important that the public opinion and sentiment regarding a prospective development and consequent potential resultant impacts, changes to the environment that are caused by the combined impact of past, present and future human activities and natural processes are considered in the decision making process.

Criteria of Determining Prioritisation are as follows:

Priority = Public Response (*PR*) + Cumulative Impact (*CI*) + Reversibility (*R*) + Irreplaceable Loss of Resources (*LR*)

The priority ratings are presented in Table 12

Table 12: Determination of Priority

Priority	Rating
2	Very Low
3	Low
4	Low
5	Low to Medium
6	Low to Medium
7	Medium to Medium
8	Medium to High
9	Medium to High
10	Medium to High
11	High
12	High

9.4 Anticipated Outcomes of the Impact Assessment Phase

The purpose of the EIA phase is going to assess issues identified in the scoping phase and will include an environmental management programme (EMPr). The EMPr will provide information on the proposed activity and the manner in which potential impacts will be minimized or mitigated. The EIA report will comply with Appendix 3 and will:

- Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- Identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- Determine the—

  (i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
  (ii) degree to which these impacts-

  (aa) can be reversed;
  (bb) may cause irreplaceable loss of resources, and
  (cc) can be avoided, managed or mitigated;

- Identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
- Identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- Identify suitable measures to avoid, manage or mitigate identified impacts; and
- Identify residual risks that need to be managed and monitored.

9.5 Proposed Specialist Studies

9.5.1 Heritage Impact Assessment (Field Survey), inclusive of Palaentological Impact Assessment (Desktop Study)

A Palaeontological Impact Assessment (Desktop) will be conducted for the proposed Farm Marsh Lucerne and Hydroponics Systems Project, which is located North West

of Kathu, Northern Cape Province. In order to comply with the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) will be completed for the proposed project. The palaeontological sensitivity of the area under consideration will be presented. As part of the palaeontological context, information on fossils, among others, will be presented.

A Heritage Impact Assessment (Field Survey) will be undertaken in terms of Section 38 of the National Heritage Resources Act (Act No. 25 of 1999). The heritage sensitivity of the property will be assessed in terms of Stone Age, the Iron Age, Historical structures and Burial grounds among others.

9.5.2 Biodiversity Assessment Study

The Biodiversity Assessment study is required in order to identify sensitive biodiversity areas and protected fauna and flora on the site. A comprehensive investigation will be undertaken to identify potential floral species of special concern, this includes all IUCN listed species, TOPS listed species and species listed in schedule 1 and 2 of the NCNCA among others. The study may propose protection of certain sensitive areas such as wetlands and pans (among other) on site. The report and survey must comply with the NEMA Appendix 6 requirements.

9.5.3 Social Impact Assessment

It is proposed that a Social Impact Assessment is undertaken as part of the specialist studies for the proposed Project. The SIA will identify and assess the negative and positive social impacts (including cumulative impacts and social risks) associated with the proposed Project and develop feasible measures to avoid, mitigate and / or enhance these impacts. The findings of the SIA will be incorporated into the Environmental Impact Assessment / Basic Assessment Report and Environmental Management Programme for the proposed Project.

National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) as amended requires the identification, prediction and evaluation of the impact of specified projects on the environment, socio-economic conditions and cultural heritage of a local area through all project cycles (including construction, operations and closure) with a view to minimising negative impacts and maximise project benefits. The ‘polluter pays principle’ also applies namely that the costs of remedying pollution, environmental degradation and consequent health effects must be paid for by culprits.

In the 2002 Johannesburg Declaration on Sustainable Development, the on-going threats facing our planet were detailed, which include among others, loss of biodiversity, desertification of fertile land and water pollution. The alarming statistics on increasing environmental degradation is a result of numerous contributing factors such as disharmony in the relationship between humanity and the earth, the

cumulative impact of many minor human acts, and the emphasis on specialisation, thereby ignoring other contributing factors to the total challenge or problem. In the National Environmental Management Act, 1998 (Act No. 107 of 1998), the concept of "sustainable development" is defined in section 1 to mean- "…the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations".

9.5.4 Visual Impact Assessment

There are approximately 14 Solar developments with either an approved Environmental Authorisation or applications under consideration within 30 Km radius of the proposed development. Additionally, the project area is within 8 Km of other civil aviation aerodrome.

"Visual, scenic and cultural components of the environment can be seen as a resource, much like any other resource, which has a value to individuals, to society and to the economy of the region" (Oberholzer, 2005). A Visual Impact Assessment (VIA) is a specialist study performed to identify the visual impacts of a proposed project on the surrounding environment. The proposed Project will be investigated in terms of the visual characteristics of the receiving environment.

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

With the increase in the number of solar powered facilities in the John Taolo Gaetsewe District, it is certain that cumulative impacts on visual aspect have to be considered, especially when aerial views are considered.

9.5.5 Irrigation Suitability for Lucerne Cultivation (Soil Study)

To achieve sustainable irrigation of soils, the appropriate soils need to be identified, to prevent water logging and salinization. During irrigation, considerable amounts of salts are applied with the water. When water is absorbed by plant roots through transpiration, the salts are precipitated in the soil and a long-term result is the increased concentration of salts called salinization. Salinization in the soil can hamper crop growth and in extreme cases salinization will render the soil non-vegetative. These effects can be negated with proper management on soils with specific properties. For this reason, the Department of Agriculture; Northern Cape, has provided guidelines to which soil properties must adhere before a ploughing

license can be granted. A ploughing license is one of the requirements, which must be fulfilled before the Department of Water, and Sanitation will grant water rights for irrigation. An irrigation potential soil survey will investigate the morphological, physical and chemical properties of soils related to drainage, salinization and sodicity, and indicate the areas where the soils are suitable for irrigation.

9.6 Compile the Environmental Impact Assessment Report

The EIA Report will include and address the following:

- A project description (including a description of the proposed activity, plans illustrating the study area and proposed site, and detailed technical details regarding the proposed project);
- A description of the pre-construction environment;
- A description of the public participation process, including the identification of I&APs, a record of the procedures followed, and the perceptions and views of the I&APs regarding the activity;
- A description of socio-economic and environmental issues identified and potential impacts of the proposed project on these aspects (i.e. how the environment may be affected as a result of the proposed activity)
- Assessment of impacts identified in the Scoping Study which were determined to be significant. These impacts will be assessed in terms of the nature, extent, duration, intensity, severity and probability of the impact occurring; and
- Conclusions and recommendations regarding the presence of any environmental fatal flaws and recommendations (including a preferred site and mitigation and management measures) regarding the proposed project.

Furthermore, the EIA Report will comply with Regulation 23 – Appendix 3 of the EIA Regulations 2017 and other applicable regulations/guidelines insofar as content and issues addressed are concerned. The integration of the specialist studies into a consolidated report will allow for easy assessment of the potential environmental aspects. In order to evaluate the significance of the identified impacts, the following characteristics of each potential impact will be identified:

9.7 Review of Environmental Impact Assessment Report

9.7.1 Public Review of the Draft Environmental Impact Assessment Report

The draft Environmental Impact Assessment Report will be made available at public places for public review and comment, in accordance with the EIA Regulations. A 30-day period will be allowed for this review process. An advert indicating the availability of this report and the information regarding the public meeting will be placed in the local newspaper. In addition, all I&APs registered on the project database will be notified of the public meeting and the availability of this report by letter.

9.7.2 Authority Review of the Draft Environmental Impact Assessment Report

The Environmental Impact Report will be submitted to NCDAEARDLR for review and comment. The draft report will not be made available to the authorities as they are not obligated to review Draft reports in terms of the Regulations. All I&AP comments received during the 30-day public review period will be incorporated into a final Environmental Scoping Report. This final report will be submitted to the Authorities for their review and consideration.

ANNEXURE A
CURRICULUM VITAE OF EAP

ANNEXURE B
ENLARGED MAPS

ANNEXURE C
PUBLIC PARTITIPATION RECORDS