PROJECT DETAILS

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PROJECT NO.	108495
TITLE	Draft Scoping Report
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CLIENT	Mainstream Renewable Power South Africa (Pty) Ltd
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GLOSSARY OF TERMS

Environment	The surroundings (biophysical, social and economic) 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 wellbeing;
Environmental Impact Assessment (EIA)	A study of the environmental consequences of a proposed course of action.
Environmental Impact Report Assessment (EIR)	A report assessing the potential significant impacts as identified during the Scoping Phase.
Environmental impact	An environmental change caused by some human act.
Environmental Management Programme (EMP)	A document that provides procedures for mitigating and monitoring environmental impacts, during the construction, operation and decommissioning phases.
Public Participation Process	A process of involving the public in order to identify needs, address concerns, in order to contribute to more informed decision making relating to a proposed project, programme or development.
Scoping	A procedure for determining the extent of and approach to an EIA, used to focus the EIA to ensure that only the significant issues and reasonable alternatives are examined in detail
Scoping Report	A report describing the issues identified.
Turbine	A wind turbine is a rotary device that extracts energy from the wind.

ABBREVIATIONS

ACO	Archaeology Contracts Office
CAA	Civil Aviation Authority
CARs	Civil Aviation Regulations
CARA	Conservation of Agricultural Resources Act
CO_2	Carbon Dioxide
CRR	Comments and Response Report
DEA	Department of Environmental Affairs (previously Department of Environmental Affairs and Tourism)
DEA&DP	Department of Environmental Affairs and Development Planning
DEANC	Department of Environmental Affairs and Nature Conservations
DEAT	Department of Environmental Affairs and Tourism
DJEC	DJ Environmental Consultants
DM	District Municipality
DME	Department of Minerals and Energy

DoE	Department of Energy
DSR	Draft Scoping Report
EAP	Environmental Assessment Practitioner
EAPSA	Environmental Assessment Practitioner of South Africa
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Programme
EMF	Environmental Management Framework
ERA	Electricity Regulation Act
DEA	Department of Environmental Affairs
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
FSR	Final Scoping Report
GHG	Greenhouse Gas emissions
GN	Government Notice
GWh	Gigawatt hours
ha	Hectares
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IEA	International Energy Agency
IEC	International Electro-technical Commission
IEIM	Integrated Environmental Information Management
IEP	Integrated Energy Plan
IPP	Independent Power Producer
IRP	Integrated Resource Plan
kV	Kilovolt
LOWMA	Lower Orange Water Management Area
LM	Local Municipality
MW	Megawatts
NEMA	National Environmental Management Act (No. 107 of 1998) (as amended)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act (No. 25 of 1999)
NRTA	National Road Traffic Act
NWA	National Water Act
REFIT	Renewable Energy Feed-In Tariffs
RFP	Request for Qualification and Proposals
SABAP	Southern African Bird Atlas Project
SAHRA	South African Heritage Resources Agency
SACNSP	South African Council for Natural Scientific Professions
SACNSP	South African Council for Natural Scientific Professions
SAWS	South African Weather Service Station
SDF	Spatial Development Framework
SKA	Square Kilometre Array
ToR	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change
VIA	Visual Impact Assessment
WEF	Wind Energy Facility
WMA	Water Management Area

WULA Water Use Licence Application

1 INTRODUCTION AND BACKGROUND

The purpose of this Chapter is to introduce the project and describe the relevant legal framework within which the project takes place. Other applicable policies and guidelines are also discussed. The Terms of Reference (ToR), scope of and approach to the Environmental Impact Assessment are described and assumptions and limitations are stated.

1.1 INTRODUCTION

South Africa Mainstream Renewable Power Developments (Pty) Ltd (Mainstream) intends to develop a 750 MW wind energy facility and a 250 MW solar Photovoltaic (PV) and /or Concentrated Photovoltaic (CPV) energy facility on the farms near Springbok in the Northern Cape. The proposed wind and solar energy facilities are located approximately 48 km east of Springbok in the Northern Cape and can be accessed via the N14. Aurecon South Africa (Pty) Ltd (Aurecon) has been appointed to undertake the requisite environmental process as required in terms of the National Environmental Management Act (No. 107 of 1998), as amended, on behalf of Mainstream.

In terms of the National Environmental Management Act (No. 107 of 1998) (as amended) (NEMA), the proposed projects trigger a suite of activities, which require authorisation from the competent environmental authority via an Environmental Impact Assessment (EIA) process before they can be undertaken. Since the projects are for the generation of energy, and energy projects are dealt with by the national authority, the competent authority is the national Department of Environmental Affairs (DEA). DEA's decision will be based on the outcome of this EIA process.

This EIA is for the proposed wind and solar energy facilities on the farms near Springbok in the Northern Cape. The two proposed projects shall be adjacent to each other but are considered to be two separate projects. However, in order to avoid duplication of information, the two projects will be assessed in one EIA. This has the added advantage of considering cumulative impacts of the two projects in one report.

The associated infrastructure would include power lines to connect into the existing grid as well as access roads and cabling between turbines. The site is approximately 46 535 hectares (ha) in extent and consists of five portions of four farms (see **Figure 1.1**).

This report serves to document the Scoping Phase of the EIA process (the EIA process and sequence of documents produced as a result of the process are illustrated in **Figure 3.4**).

The purpose of this Scoping Report[1] is to provide the background and outline the scope of work proposed to be undertaken in the EIA Report (EIAR) phase. Accordingly, the Scoping Report:

- Outlines the legal and policy framework;
- Describes the proposed project and its alternatives;
- Describes the Public Participation Process undertaken to date;
- Describes the biophysical and socio-economic context;

[1] Section 28 of EIA Regulation No. 543 of NEMA lists the content required in a Scoping Report.

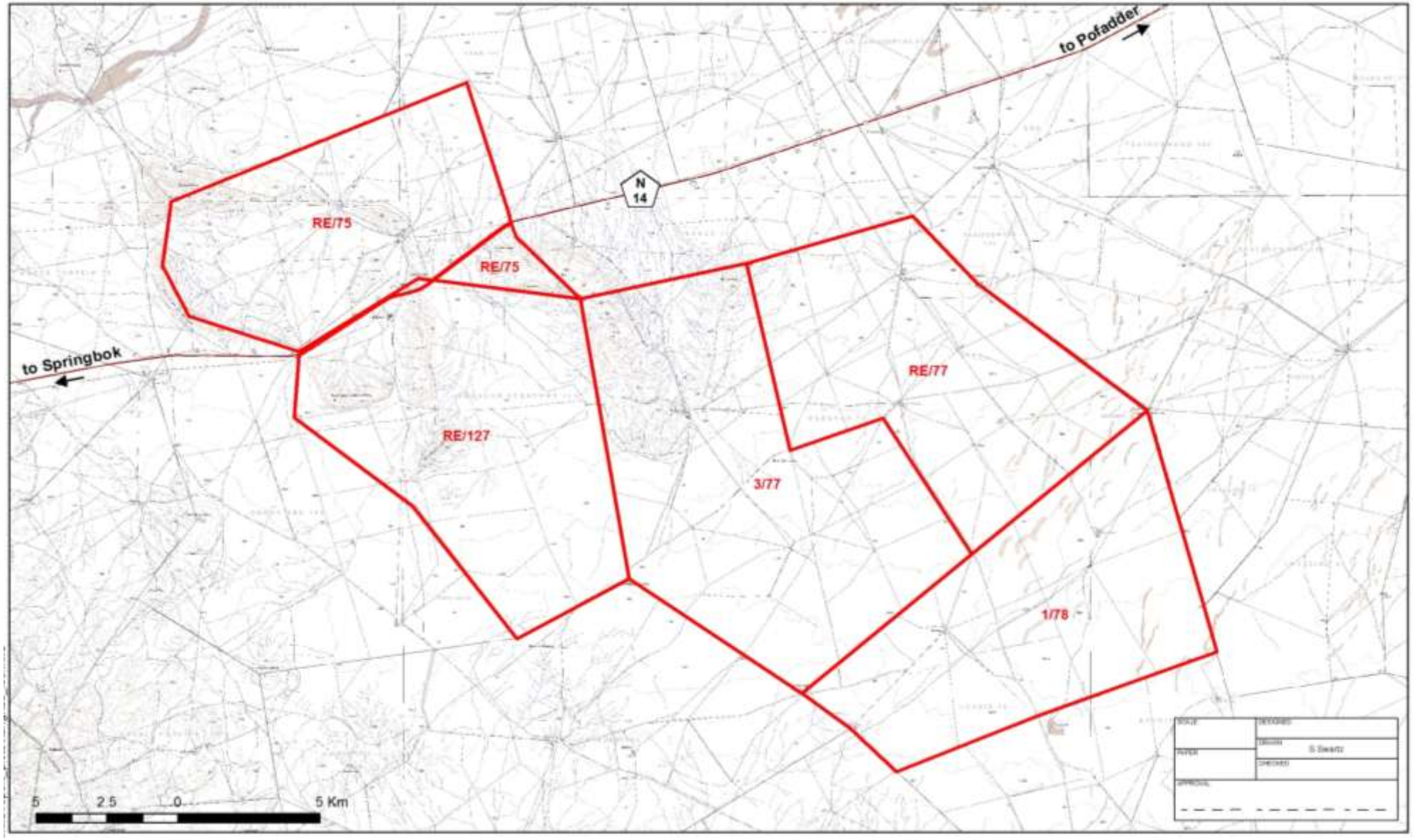

Figure 1.1: Location of the proposed wind and solar energy facilities on five farm portions near Springbok in the Northern Cape

- Describes the range of alternatives that require further investigation in the EIA Phase;
- Identifies potential impacts, including cumulative impacts, that will be assessed in the EIA Phase, inclusive of specialist studies that will be undertaken; and
- Details the assessment methodology that will be adopted for the project.

1.2 LEGAL REQUIREMENTS

1.2.1 National Environmental Management Act, No. 107 of 1998

NEMA, as amended, establishes the principles for decision-making on matters affecting the environment. Section 2 sets out the National Environmental Management Principles which apply to the actions of organs of state that may significantly affect the environment. Furthermore, Section 28(1) states that "every person who causes or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring". If such pollution or degradation cannot be prevented then appropriate measures must be taken to minimise or rectify such pollution or degradation.

Mainstream has the responsibility to ensure that the proposed activities, as well as the EIA process, conform to the principles of NEMA. In developing the EIA process, Aurecon has been cognisant of this need, and accordingly the EA process has been undertaken in terms of NEMA and the EIA Regulations promulgated on 18 June 2010[2].

In terms of the EIA regulations, certain activities are identified, which require authorisation from the competent environmental authority, in this case DEA, before commencing. Listed activities in Government Notice (GN) No. 545 require Scoping and EIA whilst those in GN No. 544 and 546 require Basic Assessment (unless they are being assessed under an EIA process). The same activities are being applied for in this EIA process, for both the north and the south projects, and these are listed in **Table 1.1**.

Table 1.1: Listed activities in terms of NEMA GN No. 544, 545 and 546, 18 June 2010, to be authorised for the proposed north and south wind energy facilities

NO.	LISTED ACTIVITY	ASPECT OF PROJECT
	GN No. R544, 18 June 2010	
10	The construction of facilities or infrastructure for the transmission and distribution of electricity - • outside urban areas or industrial complexes with a capacity of more than 33 , but less than 275 kilovolts; or • inside urban areas or industrial complexes with a capacity of 275 kilovolts or more.	The proposed facilities would connect to the existing on site grid via 220 or 132 kV powerlines.
11	The construction of: (iii) bridges; (x) buildings exceeding 50 square metres in size; or (xi) infrastructure or structures covering 50	A few wetlands and drainage lines are scattered across the proposed site and one or more roads are likely to cross these lines.

[2] GN No. R 543, 544, 545, 546 and 547 in Government Gazette No. 33306 of 18 June 2010.

NO.	LISTED ACTIVITY	ASPECT OF PROJECT
	square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.	
	GN No. R545, 18 June 2010	
1	The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more.	The proposed wind and solar energy facilities would be 750 and 250 MW, respectively.
	GN No. R546, 18 June 2010	
12	The clearance of an area of 300 square metres or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation	An area of more than 300 square metres of indigenous vegetation is likely to be cleared.
14	The clearance of an area of 5 hectares or more of vegetation where 75 % or more of the vegetation cover constitutes indigenous vegetation (a) in the Northern Cape (i) All areas outside urban areas.	A vegetated area of approximately 110 ha or more would need to be cleared for the proposed project, which is located in a rural area. The vegetation is comprised of 75 % or more indigenous vegetation.

It should be noted that DEA has agreed (pers. comm. S Vilakazi, 13/09/2011) that the two applications can be assessed in one EIA process, in order to avoid duplication of information and duplication of time and effort on DEA's part in processing the two applications.

Since the proposed project is based in the Northern Cape, DEA will work closely with the provincial Department of Environmental Affairs and Nature Conservation (DEANC), to ensure that the provincial environmental concerns are specifically identified and addressed.

Further information on the EIA approach is provided in **Section 2.3**.

1.2.2 National Water Act, No. 36 of 1998

The National Water Act (NWA) (No. 36 of 1998) provides for the sustainable and equitable use and protection of water resources. It is founded on the principle that the National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, and that a person can only be entitled to use water if the use is permissible under the NWA. Section 21 of the NWA specifies the water uses which require authorisation from the Department of Water Affairs (DWA) in terms of the NWA before they may commence.

In terms of Section 21 (c) and (i)[3] of the NWA any activity which takes place within 500 m radius of the boundary of any wetland is excluded from General Authorisation for these water uses and

[3] (c) impeding of diverting the flow of water in a watercourse; (i) altering the bed, banks, course or characteristics of a watercourse

as such, must be licenced. Should the proposed development occur within 500 m radius of a wetland or watercourse it may be necessary to submit a water use license application to the DWA. Numerous drainage lines and some pans were identified on the site. Furthermore, Mainstream may source water for the proposed projects from underground sources depending on legal agreements and further details in this regard will be provided in the EIA phase. If a water use licence application (WULA) is required it would fall outside of the scope of this EIA and would be addressed by Mainstream as part of their broader project planning. Comment will be sought from DWA as part of the Scoping and EIA process.

1.2.3 National Heritage Resources Act, No. 25 of 1999

In terms of the National Heritage Resources Act (No. 25 of 1999) (NHRA), any person who intends to undertake "*any development … which will change the character of a site exceeding 5000 m^2 in extent*", *"the construction of a road…powerline, pipeline…exceeding 300 m in length"* or *"the rezoning of site larger than 10 000 m^2 in extent…"* must at the very earliest stages of initiating the development notify the responsible heritage resources authority, namely the South African Heritage Resources Agency (SAHRA) or the relevant provincial heritage agency. These agencies would in turn indicate whether or not a full Heritage Impact Assessment (HIA) would need to be undertaken.

Section 38(8) of the NHRA specifically excludes the need for a separate HIA where the evaluation of the impact of a development on heritage resources is required in terms of an EIA process. Accordingly, since the impact on heritage resources would be considered as part of the EIA process outlined here, no separate HIA would be required. SAHRA or the relevant provincial heritage agency would review the EIA reports and provide comments to DEA, who would include these in their final environmental decision. However, should a permit be required for the damaging or removal of specific heritage resources, a separate application would have to be submitted to SAHRA or the relevant provincial heritage agency for the approval of such an activity, if Mainstream obtains environmental authorisation and makes the decision to pursue the proposed project further.

1.2.4 Astronomy Geographic Advantage Act (No. 21 of 2007)

The Astronomy Geographic Advantage Act (No. 21 of 2007) provides for the preservation and protection of areas within South Africa that are uniquely suited for optical and radio astronomy; for intergovernmental co-operation and public consultation on matters concerning nationally significant astronomy advantage areas and for matters connected thereto.

Chapter 2 of the act allows for the declaration of astronomy advantage areas whilst Chapter 3 pertains to the management and control of astronomy advantage areas. Management and control of astronomy advantage areas include, amongst others, the following:

- Restrictions on use of radio frequency spectrum in astronomy advantage areas;
- Declared activities in core or central astronomy advantage area;
- Identified activities in coordinated astronomy advantage area; and
- Authorisation to undertake identified activities.

On 19 February 2010, the Minister of Science and Technology (the Minister) declared the whole of the territory of the Northern Cape province, excluding Sol Plaatje Municipality, as an astronomy advantage area for radio astronomy purposes in terms of Section 5 of the Act and on

20 August 2010 declared the Karoo Core Astronomy Advantage Area for the purposes of radio astronomy.

The area consists of three portions of farming land of 13 407 hectares in the Kareeberg and Karoo Hoogland Municipalities purchased by the National Research Foundation. The Karoo Core Astronomy Advantage Area will contain the MeerKAT radio telescope and the core planned Square Kilometre Array (SKA) radio telescope that will be used for the purposes of radio astronomy and related scientific endeavours. The proposed wind energy facilities fall outside of the Karoo Core Astronomy Advantage Area.

The Minister may still declare that activities prescribed in Section 23(1) of the Act may be prohibited within the area, such as the construction, expansion or operation of any fixed radio frequency interference sources and the operation, construction or expansion of facilities for the generation, transmission or distribution of electricity. It should be noted that wind energy facilities are known to cause radio frequency interference. While the Minister has not yet prohibited these activities it is important that the relevant astronomical bodies are notified of the proposed projects and provided with the opportunity to comment on the proposed projects.

1.2.5 Aviation Act, No 74 of 1962

In terms of Section 22(1) of the Aviation Act (Act No 74 of 1962) (13th amendment of the Civil Aviation Regulations (CARs) 1997) the Minister promulgated amendments pertaining to obstacle limitation and markings outside aerodromes or heliports. In terms of this act no buildings or objects higher than 45 m above the mean level of the landing area, or, in the case of a water aerodrome or heliport, the normal level of the water, shall without the approval of the Commissioner be erected within a distance of 8 kilometres measured from the nearest point of the boundary of an aerodrome or heliport. No building, structure or other object which will project above the approach, transitional or horizontal surfaces of an aerodrome or heliport shall, without the prior approval of the Commissioner, be erected or allowed to come into existence. Structures lower than 45 m, which are considered as a danger to aviation shall be marked as such when specified. Overhead wires, cables etc., crossing a river, valley or major roads shall be marked and, in addition, their supporting towers marked and lighted if an aeronautical study indicates it could constitute a hazard to aircrafts.

Section 14 relates specifically to wind energy facilities and it is stated that due to the potential of wind turbine generators to interfere with radio navigation equipment, no wind farm should be built closer than 35 km from an aerodrome. In addition, several other conditions relating specifically to wind turbines are included in Section 14. In terms of the proposed wind energy facility, Mainstream would need to obtain the necessary approvals from the Civil Aviation Authority (CAA) for erection of the proposed wind turbines. It should be noted that while no aerodromes are in close proximity to the site, the Springbok aerodrome is located 28 km south west, the Aggeneys aerodrome is 42 km north east and the Vaalputs aerodrome is 52 km south from the proposed site.

1.2.6 Conservation of Agricultural Resources Act, No. 43 of 1983

The Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA) makes provision for the conservation of the natural agricultural resources of South Africa through maintaining the production potential of land, combating and preventing erosion, preventing the weakening or

destruction of the water sources, protecting vegetation, and combating weeds and invader plants. Regulation 15 of CARA lists problem plants (undesired aliens, declared weeds, and plant invaders). Plants listed in this regulation must be controlled by the landowner.

As such, as part of the EIA process, recommendations should be made to ensure that measures are implemented to maintain the agricultural production of land, prevent soil erosion, and protect any water bodies and natural vegetation on site. Mainstream together with the relevant farmers should also ensure the control of any undesired aliens, declared weeds, and plant invaders listed in the regulations that may pose a problem as a result of the proposed projects.

1.2.7 National Road Traffic Act, No. 93 of 1996 (as amended)

The National Road Traffic Act (No. 93 of 1996) (as amended) (NRTA) makes provision for all matters pertaining to the use and management of roads within South Africa. In terms of this policy certain vehicles and loads cannot be moved on public roads without exceeding the limitations in terms of the dimensions and/or mass as prescribed in the Regulations of the NRTA. Where such a vehicle or load cannot be dismantled without disproportionate effort, expense or risk of damage, into units that can travel or be transported legally, it is classified as an abnormal load. When the movement of an abnormal load is considered to be in the economic and/or social interest of the country, a special permit may be issued to allow it to operate on a public road for a limited period. Permits are normally issued by the Provincial Road Authorities and, if necessary, input is obtained from local and metropolitan authorities. Should such a permit be required, Mainstream would need to obtain the necessary road permits from the relevant Road Authorities as it is outside of the scope of the EIA process.

1.2.8 The National Environmental Management: Biodiversity Act, No. 10 of 2004

The National Environmental Management Biodiversity Act (No.10 of 2004) provides for the management and conservation of South African biodiversity within the framework of National Environmental Management Act. It deals, *inter alia*, with the protection of species and ecosystems that warrant national protection. Chapter 4 of the Act makes provision for the protection of critically endangered, endangered, vulnerable, and protected ecosystems that have undergone, or are at risk of undergoing significant degradation of ecological structure, function, or composition due to anthropogenic influences. Chapter 3 provides for Biodiversity Planning instruments, such as Bioregional Plans. No such Bioregional Plan exists for the area of concern yet, but a precursor to this, a Biodiversity Sector Plan (BSP), has been drafted by the Garden Route Initiative (GRI). A BSP provides a way forward in reconciling the conflict between development and the maintenance of natural systems. The BSP provides baseline biodiversity information needed for land-use planning and decision making and other multi-sectoral planning processes, through the identification of Critical Biodiversity Areas and Ecological Support Areas. Protecting these areas is important when considering the maintenance of Biodiversity. No BSP's have been identified within the immediate vicinity of the site.

1.2.9 Mineral and Petroleum Resources Development Act, No 28 of 2002

By virtue of the Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA), the State exercises sovereignty over all mineral and petroleum resources within South Africa and ensures the equitable access to such resources and the benefits derived there from. In seeking to promote economic growth and mineral and petroleum resources development, the Minister must also ensure that the natural resources are developed in a manner that is ecologically sustainable. Applications can be made for both prospecting and mining rights, as well as a mining permit to the Minister, which may be granted provided that the requisite environmental management programmes and plans have been submitted. In terms of the provisions on the MPRDA, the sourcing of material for road construction and foundation purposes (i.e. the use of borrow pits[1]) is regarded as mining and accordingly is subject to the requirements of the Act. In terms of the current project, one section of the Act is most relevant:If material is to be sourced on a property that would not form part of the development, and/ or is not owned by the applicant, authorisation would be required from Department of Minerals (DM). In terms of Section 27 of the Act, if the proposed borrow pits would be mined in less than two years and would each be less than 1.5 ha in extent, a Mining Permit would be required. If the borrow pit exceeds 1.5 ha, a Mining Right would be required. Mainsteam is not applying for any borrowpits and as such no licence or permit in terms of the MRDA is required.

1.2.10 National Veld and Forest Fire Act , No 101 of 1998 (as amended)

The National Veld and Forest Fire Act (No. 101 of 1998) reforms the law regulating veld and forest fires, and seeks to prevent and combat veld, forest and mountain fires within South Africa by making provision for the establishment of fire protection associations who are tasked with all aspects of veld fire prevention and fire fighting and the establishment of a fire danger rating system which will prohibit the lighting of fires in open areas where the fire danger rating is high. Landowners are required to comply with the National Veld and Forest Fire Act. The Act places a duty on landowners to prevent veld fires through the preparation and maintenance of firebreaks and to acquire equipment and have personnel available to fight fires in emergency situations.

[1] Gravel for construction purposes such as roads and foundations is obtained from a borrow pit, which consists of a shallow depression generally 1.5-2.5 m deep and 2-4 ha in area.

2 FORWARD PLANNING OF ENERGY IN SOUTH AFRICA

This chapter provides an overview of the policy and legislative context in which the development of renewable energy projects takes place in South Africa. The following policies and legislative context are described:

- Policies regarding greenhouse gas and carbon emissions;
- White Paper on the Energy Policy of the Republic of South Africa (1998);
- White Paper on Renewable Energy (2003);
- National Energy Act (No. 34 of 2008) and Electricity Regulation Act (ERA) (No. 4 of 2006);
- Integrated Energy Plan for the Republic of South Africa (2003);
- Integrated Resource Plan (2010);and
- Regional Methodology for Wind Energy Site Selection (Department of Environmental Affairs and Development Planning (DEA&DP), 2006 Guideline document).

2.1.1 Policies regarding greenhouse gas and carbon emissions

Gases that contribute to the greenhouse effect are known to include carbon dioxide (CO_2), methane, water vapour, nitrous oxide, chlorofluorocarbons, halons and peroxyacylnitrate. All of these gasses are transparent to shortwave radiation reaching the earth's surface, but trap long-wave radiation leaving the earth's surface. This action leads to a warming of the earth's lower atmosphere, resulting in changes in the global and regional climates, rising sea levels and extended desertification. This in turn is expected to have severe ecological consequences and a suite of implications for mankind.

Electricity generation using carbon based fuels is responsible for a large proportion of CO_2 emissions worldwide. In Africa, the CO_2 emissions are primarily the result of fossil fuel burning and industrial processes, such coal fired power stations. South Africa accounts for some 38 % of Africa's CO_2 emissions. The global per capita CO_2 average emission level is 1.23 metric tonnes. In South Africa however, the average emission rate is 2.68 metric tonnes per person per annum. The International Energy Agency (IEA) (2008) "*Renewables in global energy supply: An IEA facts sheet"* estimates that nearly 50% of global electricity supplies will need to come from renewable energy sources in order to halve carbon dioxide emissions by 2050 and minimise significant, irreversible climate change impacts

The United Nations Framework Convention on Climate Change (UNFCCC) has initiated a process to develop a more specific and binding agreement on the reduction of greenhouse gas (GHG) emissions. This led to negotiations with a particular focus on the commitments of developed countries, and culminated in the adoption of the Kyoto Protocol in 1997, which came into effect in February 2005. Using the above framework to inform their approach, the Kyoto Protocol has placed specific legal obligations in the form of GHG reduction targets on developed countries and countries with 'Economies in Transition'. The developed countries listed in Annex 1 of the UNFCCC are required to reduce their overall emissions of six GHGs by at least 5 % below the 1990 levels between 2008 and 2012. While South Africa, as a developing country, is not obliged to make such reductions, the increase in greenhouse gas emissions must be viewed in light of global trends to reduce these emissions significantly. More recently under the Copenhagen Accord 2010, countries representing over 80 % of global emissions

have submitted pledges on emission reductions. South Africa commitment is to reduce GHG emissions totalling 34 % by 2020 and 42 % by 2025.

The Kyoto Protocol, to which South Africa is a signatory, was informed by the principles of sustainable development which resulted in related policies and measures being identified to promote energy efficiency while protecting and enhancing the 'sinks and reservoirs' of greenhouse gases (forests, ocean, etc.). Other methods/approaches included encouraging more sustainable forms of agriculture, in addition to increasing the use of new and renewable energy and the adoption/implementation of advanced and innovative environmentally sound technologies. South African policies are being informed by the Kyoto Protocol (which is valid until 2012) and its partial successor the Copenhagen Accord 2010 and associated sustainable development principles whereby emphasis is being placed on industries for 'cleaner' technology and production.

2.1.2 White Paper on the Energy Policy of the Republic of South Africa (1998)

As required by the Constitution of the Republic of South Africa (Act No. 108 of 1996), the White Paper on the Energy Policy of the Republic of South Africa (1998) was published by the Department of Minerals and Energy in response to the changing political climate and socio-economic outlook. Key objectives are identified in terms of energy supply and demand, as well as co-ordinated with other social sectors and between energy sub-sectors.

The White Paper commits to government's focused support for the development, demonstration and implementation of renewable energy sources for both small and large-scale applications. With the aim of drawing on international best practice, specific emphasis is given to solar and wind energy sources, particularly for rural, and often off-grid areas.

While considering the larger environmental implications of energy production and supply, the White Paper looks into the future to adopting an integrated resource planning approach, integrating the environmental costs into economic analysis. It is with this outlook that the renewable energy, including solar energy, is seen as a viable, attractive and sustainable option to be promoted as part of South Africa's energy policy towards energy diversification.

2.1.3 White Paper on Renewable Energy (2003)

Published by the Department of Minerals and Energy (DME) in 2003, the White Paper on renewable Energy supplements the above-mentioned Energy Policy which identified the medium- and long-term potential for renewable energy as significant. The White Paper sets out the vision, policy principles, strategic goals, and objectives in terms of renewable energy. At the outset the policy refers to the long term target of "*10 000 GigaWatt hours (GWh) (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013.*" The aim of this 10-year plan is to meet this goal via the production of mainly biomass, wind, solar, and small-scale hydro sources. It is estimated that this would constitute approximately 4 % of projected energy demand for 2013.

The White Paper presents South Africa's options in terms of renewable energy as extensive and a viable and sustainable alternative to fossil fuel options. A strategic programme of action to develop South Africa's renewable energy resources is proposed, particularly for power generation and reducing the need for coal-based power generation. The starting point will be a

number of initial investments spread across both relatively low cost technologies, such as biomass-based cogeneration, as well as technologies with larger-scale application, such as solar water heating, wind and small-scale hydro.

Addressing environmental impacts and the overarching threats and commitments to climate change, the White Paper provides the platform for further policy and strategy development in terms of renewable energy in the South African energy environment.

2.1.4 National Energy Act (No. 34 of 2008) and Electricity Regulation Act (No. 4 of 2006)

South Africa has two acts that direct the planning and development of the country's electricity sector:

i. The National Energy Act (No. 34 of 2008); and

ii. The Electricity Regulation Act (ERA) (No. 4 of 2006).

In May 2011, the Department of Energy (DoE) gazetted the Electricity Regulations on New Generation Capacity under the ERA. The New Generation Regulations establish rules and guidelines that are applicable to the undertaking of an IPP Bid Programme and the procurement of an IPP for new generation capacity. They also facilitate the fair treatment and non-discrimination between IPPs and the buyer of the energy[4].

In terms of the New Generation Regulations, the Integrated Resource Plan (IRP) (see **Section 2.1.7**) has been developed by the DoE and sets out the new generation capacity requirement per technology, taking energy efficiency and the demand-side management projects into account. This required, new generation capacity must be met through the technologies and projects listed in the IRP and all IPP procurement programmes will be undertaken in accordance with the specified capacities and technologies listed in the IRP[5].

2.1.5 IPP Procurement Process

South Africa aims to procure 3 725 MW capacity of renewable energy by 2016 (the first round of procurement). This 3 725 MW is broadly in accordance with the capacity allocated to renewable energy generation in IRP2010.

On 3 August 2011, DoE formally invited interested parties with relevant experience to submit proposals for the finance, operation and maintenance of renewable energy generation facilities adopting any of onshore wind, solar thermal, solar photovoltaic, biomass, biogas, landfill gas or small hydro technologies for the purpose of entering, *inter alia*, an Implementation Agreement with DoE and a Power Purchase Agreement with a buyer (Eskom)[6] in terms of the ERA. This Request for Qualification and Proposals (RFP) for new generation capacity was issued under the IPP Procurement Programme. The IPP Procurement Programme has been designed to

[4] http://www.eskom.co.za/c/73/ipp-processes/ (accessed 29/10/11)
[5] http://www.eskom.co.za/c/73/ipp-processes/ (accessed 29/10/11)
[6] http://www.ipp-renewables.co.za/wp-content/uploads/2011/08/Tender_Notice.png (accessed 30/10/11)

contribute towards the target of 3 725 MW and towards socio-economic and environmentally sustainable growth, and to start and stimulate the renewable industry in South Africa[7].

In terms of this IPP Procurement Programme, Bidders will be required to bid on tariff and the identified socio-economic development objectives of DoE. The tariff will be payable by the Buyer should the project be selected. Although earlier information was that the 2009 Renewable Energy Feed In Tariff would act as an upper limit on price, the actual caps are set out in **Table 2.1**[8]. A bid will be 'non-compliant' and automatically rejected during the qualification phase if the price cap is exceeded. Bid Responses which are submitted must be accompanied by a Bid Guarantee in the form of a bank guarantee for an amount equal to R 100 000 per MW of the proposed installed capacity[9].

The generation capacity allocated to each technology is set out in **Table 2.1**.

Table 2.1: Generation capacity and price cap per each technology

Technology	MW	Price cap (per MWh)
Onshore wind	1 850	R 1 150
Concentrated solar thermal	200	R 2850
Solar photovoltaic	1 450	R 2850
Biomass solid	12.5	R 1070
Biogas	12.5	R 800
Landfill gas	25	R 600
Small hydro	75	R 1 030
Small projects[10]	100	As above
TOTAL	**3 725**	

Each project procured in terms of this IPP Procurement Programme will be required to achieve commercial operation by not later than end 2016.

The submission and selection dates for projects for the RFP are given in **Table 2.2**.

Table 2.2: Bid submission dates, selection of preferred bidders and signing of agreements[11]

Submission no.	Submission date	Preferred bidder selection date	Signing of agreements date
First	4 November 2011	25 November 2011	19 June 2012
Second	5 March 2012	21 May 2012	13 December 2012
Third	20 August 2012	TBA	31 May 2013
Fourth	4 March 2013	TBA	13 December 2013
Fifth	13 August 2013	TBA	26 May 2014

The selection process to determine the preferred bidders will be based on both price and other economic development criteria in a 70 %/ 30 % ratio respectively (Creamer, T. 2011). If the

[7] http://www.ipp-renewables.co.za/ (accessed 30/10/11)
[8] http://www.nortonrose.com/knowledge/publications/54959/south-africa-renewable-energy-ipp-request-for-proposals (accessed 30/10/11)
[9] http://www.ipp-renewables.co.za/wp-content/uploads/2011/08/Tender_Notice.png (accessed 30/10/11)
[10] Small projects are less than 5 MW.
[11] http://www.ipp-renewables.co.za/?page_id=524 (accessed 30/10/11)

maximum MW allowance for any particular technology has been allocated during any particular window, then the subsequent bidding opportunities will not be opened for that technology.

IPPs that wish to connect to Eskom's network will be required to apply for a connection, pay a connection charge and sign a connection and use-of-system agreement[12]. All IPPs will be provided non-discriminatory access to Eskom's network, subject to the IPP's obtaining its required approvals such as EIA's and a generating and trading licence from NERSA.

2.1.6 Integrated Energy Plan for the Republic of South Africa

Commissioned by DME in 2003, the Integrated Energy Plan (IEP) aims to provide a framework in which specific energy policies, development decisions and energy supply trade-offs can be made on a project-by-project basis. The framework is intended to create a balance in providing low cost electricity for social and economic developments, ensuring security of supply, and minimising the associated environmental impacts.

The IEP projected that the additional demand in electricity would necessitate an increase in electricity generation capacity in South Africa by 2007. Furthermore, the IEP concluded that, based on energy resources available in South Africa, coal would be the primary fuel source in the 20 year planning horizon, which was specified as the years 2000 to 2020, although other cleaner technologies continue to be investigated as alternatives in electricity generation options. Therefore, though the next two decades of energy generation are anticipated to remain coal-based, alternative technologies and approaches are available and need to be contextually considered.

2.1.7 Integrated Resource Plan

The Integrated Resource Plan (IRP) is a National Electricity Plan, which is a subset of the Integrated Energy Plan. The IRP is also not a short or medium-term operational plan but a plan that directs the expansion of the electricity supply over the given period.

The IRP, indicating the schedule for energy generation programmes, was first gazetted on 31 December 2009. A revised schedule was gazetted on 29 January 2010 and the schedule has once again been revised and the final IRP (IRP2010-2030) was gazetted on 6 May 2011.

Developed for the period of 2010 to 2030, the primary objective of the IRP2010, as with its predecessors, is to determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing, and cost. While promoting increased economic development through energy security, the IRP2010 aims to achieve a "*balance between an affordable electricity price to support a globally competitive economy, a more sustainable and efficient economy, the creation of local jobs, the demand on scarce resources such as water and the need to meet nationally appropriate emission targets in line with global commitments*".

As can be seen by **Table 2.3** below the current final IRP provides for an additional 20 409 MW (shaded in grey) of renewable energy in the electricity mix in South Africa by 2030.

[12] http://www.eskom.co.za/c/article/150/independent-power-prodicers-ipp/ (accessed 30/10/11)

Table 2.3: Policy adjusted scenario of the IRP2010 as gazetted on 6 May 2011

	Total generating capacity in 2030		Capacity added (including committed) from 2010-2030		New (uncommitted) capacity options from 2010-2030	
Technology	**MW**	**%**	**MW**	**%**	**MW**	**%**
Coal	41 074	45.9	16 383	29.0	6 250	14.7
OCGT	7 330	8.2	4 930	8.7	3 910	9.2
CCGT	2 370	2.6	2 370	4.2	2 370	5.6
Pumped Storage	2 912	3.3	1 332	2.4	0	0
Nuclear	11 400	12.7	9 600	17.0	9 600	22.6
Hydro	4 759	5.3	2 659	4.7	2 609	6.1
Wind	9 200	10.3	9 200	16.3	8 400	19.7
CSP	1 200	1.3	1 200	2.1	1 000	2.4
PV	8 400	9.4	8 400	14.9	8 400	19.7
Other	890	1.0	465	0.8	0	0
Total	**89 532**	**100**	**56 539**	**100**	**42 539**	**100**

The final IRP2010 reflects both the consultation process on the draft IRP2010 currently being undertaken with stakeholders and the further technical work undertaken in this period. It is noted that *"given the rapid changes in generation technologies and pricing, especially for "clean" energy sources, the IRP will have to be reviewed on a regular basis, for instance every two years, in order to ensure that South Africa takes advantage of emerging technologies. This may result in adjustments in the energy mix set out in the balanced revised scenario within the target for total system capacity."*

2.1.8 Regional Methodology for Wind Energy Site Selection- a DEA&DP Guideline document (2006)

In May 2006 DEA&DP published the *Strategic Initiative to Introduce Commercial Land Based Wind Energy Development to the Western Cape: Towards a Regional Methodology for Wind Energy Site Selection.* With the aim of paving the way for wind energy as a viable, clean, renewable energy development in the Western Cape the following vision was developed: "*The vision for the Western Cape is to establish a policy on the implementation of regional criteria for the identification of areas suitable for the establishment of wind energy projects. This will promote the implementation of wind energy projects while balancing national interests of promoting alternative energy generation with local strategic environmental objectives. This will also avoid conflict between local and national interests through a proactive environmental planning process."*

Further to the above the Guideline aims to facilitate:

- Policy on the implementation of a methodology to be used for the identification of areas suitable for the establishment of wind energy projects;
- Alignment with the White Paper on Energy Policy for the Republic of South Africa;
- Coordinated implementation;
- Responsible and rational wind energy developments to benefit both developers as well as affected communities;
- Avoidance of unsuitable sites;

- Public awareness; and
- Guidance in terms of environmental assessments processes.

In a total of seven volumes two alternative assessment methodologies, a criteria based/quantitative method, and a landscape based/qualitative method are presented. The comparative assessment pointed towards restricted, negotiable, preferred areas as well as cumulative impacts. The methodology delineates areas appropriate for wind energy development including negative and positive thresholds (buffers), cumulative impacts as well as landscape character, value, sensitivity and capacity. The methodology stops short of addressing local level issues and indicates the need to address these on a site-specific level. The methodologies were tested on a large study area on the Cape West Coast.

The document is designed to guide planners and decision-makers to appropriate areas for wind farm development based on planning, infrastructure, environmental and landscape criteria. As many of these criteria are also applicable to other areas, outside the Cape West Coast, reference has been made to this guideline here. Note that it this document is still in draft format and is not necessarily in line with best practice. As such certain key requirements have been omitted from the Applicant's approach.

2.2 TERMS OF REFERENCE AND SCOPE OF THE EIA

In March 2012, Mainstream appointed Aurecon to undertake an EIA process, in terms of NEMA, for the proposed wind and solar (photovoltaic) energy facilities near Springbok in the Northern Cape.

This EIA process specifically excludes any upgrades of existing Eskom infrastructure (i.e. the existing grid) that may be required, however it does include connections to the grid.

2.2.1 Guidelines

This EIA process is informed by the series of national Environmental Guidelines[13] where applicable and relevant:

- Integrated Environmental Information Management (IEIM), Information Series 5: Companion to the NEMA EIA Regulations of 2010 (DEA, 2010).
- Implementation Guidelines: Sector Guidelines for the EIA Regulations (draft) (DEA, 2010).
- IEIM, Information Series 2: Scoping (Department of Environmental Affairs and Tourism (DEAT), 2002).
- DEAT. 2002. IEIM, Information Series 3: Stakeholder Engagement (DEAT, 2002)
- IEIM, Information Series 4: Specialist Studies (DEAT, 2002).
- IEIM, Information Series 11: Criteria for determining Alternatives in EIA (DEAT, 2004)
- IEIM, Information Series 12: Environmental Management Plans (DEAT, 2004).
- Integrated Environmental Management Guideline Series, Guideline 4: Public Participation, in support of the EIA Regulations. Unpublished (DEAT, 2005).

[13] Note that these Guidelines have not yet been subjected to the requisite public consultation process as required by Section 74 of R385 of NEMA.

- Integrated Environmental Management Guideline Series, Guideline 7: Detailed Guide to Implementation of the Environmental Impact Assessment Regulations. Unpublished (DEAT, 2007).

The following guidelines from the Department of Environmental Affairs and Development Planning (Western Cape) (DEA&DP) were also taken into consideration:

- Brownlie. 2005. Guideline for involving biodiversity specialists in EIA process (June 2005).
- Winter & Baumann. 2005. Guideline for involving heritage specialists in the EIR process (June 2005).
- Oberholzer. 2005. Guideline for involving visual and aesthetic specialists in the EIR process (June 2005).
- Guideline for Environmental Management Plans (June 2005).
- Guideline for determining the scope of specialist involvement in EIA Processes (June 2005).
- Guideline for the review of specialist input into the EIA Process (June 2005).
- DEA&DP.2011. Guideline on Alternatives, EIA Guideline and Information Document Series. (DEA&DP, October 2011).
- DEA&DP.2011. Guideline on Need and Desirability, EIA Guideline and Information Document Series. (DEA&DP, October 2011).
- DEA&DP.2011. Guideline on Public Participation, EIA Guideline and Information Document Series. (DEA&DP, October 2011).

2.3 APPROACH TO THE PROJECT

As outlined in **Figure 2.1** on the overleaf, there are three distinct phases in the EIA process, as required in terms of NEMA, namely the Initial Application Phase, the Scoping Phase and the EIA Phase. This report covers the second phase, *viz.* the Scoping Report Phase.

2.3.1 Initial Application Phase

The Initial Application Phase entailed the submission of two EIA Application Forms to notify DEA of the project, submitted on 9 May 2012. Acknowledgements of receipts of the EIA Application Forms were received from DEA on 23 May 2012. The Application Forms and DEA's letters of acknowledgement are included in **Annexure A**.

Other tasks undertaken include:

- A Background Information Document (BID) (included in **Annexure B**), in English and Afrikaans, was sent to key Interested and Affected Parties (I&APs) to inform I&APs of the proposed projects and to invite I&APs to register on the database by 15 June 2012;
- Advertisements in English and Afrikaans were placed in a local newspaper, Die Plattelander, on 25 May 2012 notifying the broader public of the initiation of the EIA and inviting them to register as I&APs. Copies of the advertisements are included in **Annexure B**; and
- Site notices, in English and Afrikaans, were erected at the entrances to the farms and at the Springbok Public Library on 28 May 2012 (the site notices are included in **Annexure B**).

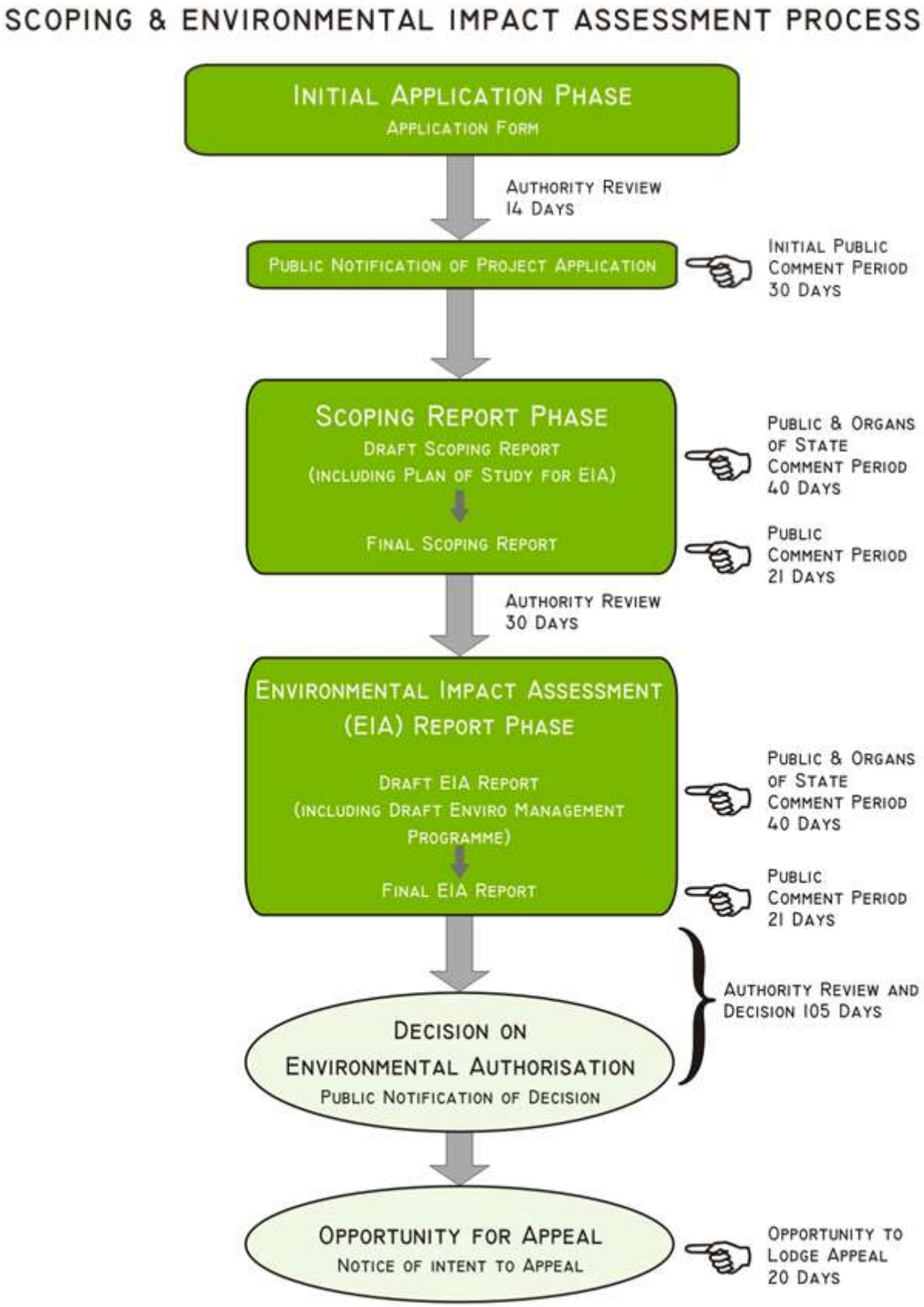

Figure 2.1: The EIA process in terms of NEMA

2.3.2 The Scoping Phase

Scoping is defined as a procedure for determining the extent of, and approach to, the EIA Report phase and involves the following key tasks:

- Involvement of relevant authorities and I&APs;
- Identification and selection of feasible alternatives to be taken through to the EIA Phase;
- Identification of significant issues/impacts associated with each alternative to be examined in the EIA Report; and
- Determination of specific Terms of Reference (ToR) for any specialist studies required in the EIA Report (Plan of Study for the EIA Report).

To date the Scoping Phase has involved a desktop review of relevant literature, including a review of previous environmental studies in the area. These included, *inter alia*, the following:

- Namakwa District Municipality (DM) Integrated Environmental Management Program (IEMP)(African EPA, 2007);
- Namakwa DM Spatial Development Framework (SDF) (2007);
- Nama Khoi Local Municipality LM SDF (Macroplan, 2007);
- Vegetation Map of South Africa (Mucina and Rutherford, 2006);
- Groundwater Resources in the Northern Cape Province (DWA, 2008).

An inception field trip of the site was undertaken on 25 November 2011 to inform a Fatal Flaw Analysis (FFA) for Mainstream. The main purpose was to familiarize the consultants with the site and to allow for a rapid survey of the site to identify potential areas of concern. Valuable information was also obtained from landowners, who have intimate knowledge of the farms and general area.

The information gathered during the site visit and subsequent report was used in refining the Plan of Study for the EIA process and ToR for the specialist studies which will be undertaken during the EIA Phase.

2.3.3 The EIA Phase

The Scoping Phase will be followed by the EIA Phase, during which the specialist investigations will occur, and will culminate in a comprehensive EIAR documenting the outcome of the impact assessments.

2.3.4 The public participation process

Consultation with the public forms an integral component of this investigation and enables I&APs (e.g. directly affected landowners, national, provincial and local authorities, environmental groups, civic associations and communities), to identify their issues and concerns, relating to the proposed activities, which they feel should be addressed in the EIA process. To create a transparent process and to ensure that I&APs are well informed about the project, as much information as is available has been included upfront to afford I&APs numerous opportunities to review and comment on the proposed project. A summary of the public participation process is provided in **Annexure B**.

Currently there are 53 I&APs registered on the project database (see **Annexure B** for a list of current I&APs).

Key issues raised by the public during the Initiation Phase are recorded and responded to in the Comments and Response Report CRR 1 which is included in **Annexure C**. Only two comments were received (included in **Annexure D**), from SAHRA with regards to the requirement to undertake the necessary heritage studies in terms of the NHRA and from WESSA commenting on the process that WESSA will follow.

2.3.5 Authority involvement

Two EIA Application Forms were submitted to DEA to notify them of the proposed projects. DEA acknowledged receipt of the EIA Application Forms and issued reference numbers for the proposed projects. The Application Form and DEA's letters of acknowledgement are included in **Annexure A**.

Where the need arises, Focus Group meetings will be arranged with representatives from the relevant national and provincial departments and local authorities. The purpose of these meetings will be to ensure that the authorities have a thorough understanding of the need for the project and that Aurecon has a clear understanding of the authority requirements. It is anticipated that beyond providing key inputs into the EIA, this authority scoping process will ultimately expedite the process by ensuring that the final documentation satisfies the authority requirements and that the authorities are fully informed with respect to the nature and scope of the proposed wind energy facilities.

Copies of the DSR (hard or electronic copies) were provided to the following authorities for comment, namely:

- Department of Environmental Affairs;
- Nama Khoi LM;
- Namakwa DM;
- Northern Cape DEANC;
- South African Heritage Resources Agency;
- Department of Agriculture (Northern Cape);
- Department of Water Affairs; and
- Eskom.

2.3.6 Decision making

The DSR will be made available to the public for a prerequisite 30 day comment period and a 40 day comment period for the authorities. All comments received during the comment period will be included in a Comments and Responses Report (CRR) and annexed to the FSR. Once the FSR has been completed, including the CRR, it will be submitted to DEA for review.

The competent authority (DEA) must, within 30 days of receipt of the FSR, or receipt of the required information, reports, or comments or an amended scoping report, consider it, and in writing –

(a) Accept the report and advise the Environmental Assessment Practitioner (EAP) to proceed with the tasks contemplated in the Plan of Study for EIA;
(b) Request the EAP to make such amendments to the report as the component authority may require, or
(c) Reject the Scoping Report if it

(i) Does not contain material information required in terms of these regulations, or
(ii) Has not taken into account guidelines applicable in respect of Scoping Reports and Plans of Study for EIA.

2.4 ASSUMPTIONS AND LIMITATIONS

2.4.1 Assumptions

In undertaking this investigation and compiling the Scoping Report, the following has been assumed:

- The strategic level investigations undertaken by the Department of Energy regarding South Africa's proposed energy mix prior to the commencement of the EIA process are technologically acceptable and robust;
- The information provided by the applicant is accurate and unbiased; and
- The scope of this investigation is limited to assessing the environmental impacts associated with the proposed wind and solar energy facilities and connections to the grid. The EIA does not include any infrastructure upgrades which may be required from Eskom to allow capacity in the local grid for the proposed projects.

2.4.2 Gaps in knowledge

This Scoping Report has identified the potential environmental impacts associated with the proposed activities. However, the scope of impacts presented in this report could change, should new information become available during the EIA Phase. The purpose of this section is therefore to highlight gaps in knowledge when the Scoping Phase of the project was undertaken.

The planning for the proposed projects is at a feasibility level and therefore some of the specific details are not available at this stage of the EIA process. This EIA process forms a part of the suite of feasibility studies, and as these studies progress, more information will become available to inform the EIA process. This will require the various authorities, and especially DEA, to issue their comments and ultimately their environmental decision to allow for the type of refinements that typically occur during these feasibility studies and detailed design phase of projects. Undertaking the EIA process in parallel with the feasibility study does however have a number of benefits, such as integrating environmental aspects into the layout and design and therefore ultimately encouraging a more environmentally sensitive and sustainable project.

This Scoping Report has identified the potential environmental impacts associated with the proposed activities. However, the scope of impacts presented in this report could change, should new information become available during the EIA Phase. The purpose of this section is therefore to highlight gaps in knowledge when the Scoping Phase of the project was undertaken, these include:

- Lack of confirmation of services capacity from the municipality; and
- Lack of exact source of water.

2.5 INDEPENDENCE

Aurecon nor any of its sub-consultants are subsidiaries of Mainstream, nor is Mainstream a subsidiary to Aurecon. Furthermore, all these parties do not have any interests in secondary or downstream developments that may arise out of the authorisation of the proposed project.

The Project Director, Mr Andries van der Merwe, Project Manager, Miss Louise Corbett, and the Project Staff, Mrs Cornelia Steyn and Mr Simon Clark, are appropriately qualified and registered with the relevant professional bodies. Mr van der Merwe is a certified Environmental Assessment Practitioners of South Africa (EAPSA), and Miss Corbett is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNSP). Aurecon is bound by the codes of conduct for EAPSA and SACNASP. The CV summaries of the key Aurecon staff are included in the Plan of Study for EIA contained in **Chapter 5**.

2.6 STRUCTURE OF THE SCOPING REPORT

Table 2.4 presents the structure of the Scoping report as well as the applicable sections that address the required information in terms of NEMA. Specifically, Section 28 (1) of the EIA Regulations requires that the following information is provided:

Table 2.4: NEMA requirements for Scoping Reports

REGULATION	CONTENT AS REQUIRED BY NEMA	SECTION /ANNEXURE
28(1)(a)	(i) Details of the EAP who prepared the report; and	***Section 5.9, page 69***
	(ii) Details of the expertise of the EAP to carry out scoping procedures.	***Section 5.9, page 69***
28(1)(b)	A description of the proposed activity.	***Section 3.2, page 27***
28(1)(c)	A description of any feasible and reasonable alternatives that have been identified.	***Section 3.4, page 38***
28(1)(d)	A description of the property on which the activity is to be undertaken and the location of the activity on the property.	***Chapter 4, page 43***
28(1)(e)	A description of the environment that may be affected by the activity and the manner in which the activity may be affected by the environment.	***Chapter 4, page 43***
28(1)(f)	An identification of all legislation and guidelines that have been considered in the preparation of the scoping report.	***Section 1.2, page 3***
28(1)(g)	A description of environmental issues and potential impacts, including cumulative impacts that have been identified.	***Section 4.3-4.5, page 51***
28(1)(h)	Details of the public participation process conducted in terms of regulation 27(a), including –	***Annexure B***
	(i) The steps that were taken to notify potentially interested and affected parties of the application;	***Annexure B***

REGULATION	CONTENT AS REQUIRED BY NEMA	SECTION /ANNEXURE
	(ii) Proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed or given;	***Annexure B***
	(iii) A list of all persons, organisations and organs of state that were registered in terms of regulation 55 as interested and affected parties in relation to the application; and	***Annexure B***
	(iv) A summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues.	***Section2.3.4, page 18 and Annexure C***
28(1)(i)	A description of the need and desirability of the proposed activity.	***Section 3.1, page 25***
28(1)(j)	A description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and on the community that may be affected by the activity.	***Section 3.4, page 38 and Section 4.3-4.5, page 51***
28(1)(k)	Copies of any representations, comments received in connection with the application or the scoping report from interested and affected parties.	***Annexure D***
28(1)(l)	Copies of the minutes of any meetings held by the EAP with interested and affected parties and other role players which record the views of the participants.	**-**
28(1)(m)	Any response by the EAP to those representations and comments and views.	***Annexure C***
28(1)(n)	A plan of study for environmental impact assessment which sets out the proposed approach to the environmental impact assessment of the application, which must include:	***Chapter 5, page 63***
	(i) A description of the tasks that will be undertaken as part of the environmental impact assessment process, including any specialist reports or specialised processes, and the manner in which such tasks will be undertaken;	***Section 5.3 and 5.4, page 64***
	(ii) An indication of the stages at which the competent authority will be consulted;	***Section 5.7, page 68***
	(iii) A description of the proposed method of assessing the environmental issues and alternatives, including the option of not proceeding with the activity; and	***Section 5.3.2, page 64***
	(iv) Particulars of the public participation process that will be conducted during the environmental impact assessment process.	***Section 5.7, page 68***
28(1)(o)	Any specific information required by the competent authority.	**-**

REGULATION	CONTENT AS REQUIRED BY NEMA	SECTION /ANNEXURE
28(1)(p)	Any other matters required in terms of sections 24(4)(a) and (b) of the Act.	**-**
28(2)	In addition, a scoping report must take into account any guidelines applicable to the kind of activity which is the subject of the application.	***Section 2.2.1, page 15***
28(3)	The EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) if the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation (1)(c), exist.	**-**

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3 THE PROPOSED ACTIVITY

This chapter considers the need for the proposed project, briefly outlines the nature of the proposed activities and then considers and screens the various project alternatives in order to focus the EIA Phase on the most feasible alternatives.

3.1 THE NEED FOR THE PROPOSED ACTIVITY

As can be seen by the numerous policies and legislation described in Chapter 2 the need for renewable energy is well documented. Reasons for the desirability of wind energy include:

- Creating a more sustainable economy;
- Reducing the demand on scarce resources such as water;
- Meeting nationally appropriate emission targets in line with global climate change commitments;
- Reducing and where possible eliminating pollution;
- Alleviating energy poverty by providing energy in rural areas;
- Local economic development;
- Local skills development; and
- Enhancing energy security by diversifying generation.

Furthermore, the IRP allows for an additional 20 409 MW of renewable energy in the electricity blend in South Africa by 2030. While there are a number of renewable energy options (including, *inter alia,* wind, solar and hydropower) being pursued in South Africa, many more renewable energy projects are required to meet the targets set by the IRP. Consequently, based on this requirement for renewable energy, Mainstream has identified a number of projects for both wind and solar energy generation and this proposed project forms one of many that require the necessary environmental studies.

Table 3.1: Specific questions as detailed in the Need and Desirability Guideline

QUESTION	RESPONSE
NEED (TIMING)	
1. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority i.e. is the proposed development in line with the projects and programmes identified as priorities within the IDP?	*The area proposed is currently zoned as Agricultural land. However the farmers have signed an option for a long term lease agreement with Mainstream for portions of their farms. The portions leased have a relatively low agricultural potential and grazing would continue below the turbines as such it would not affect the economic viability of the farm. Grazing would be excluded from the footprint of the solar energy facilities. However the additional income would safeguard the economic sustainability of the farms.* *The location of the proposed projects falls outside of the IDP and SDF areas, however the proposed facilities would create job opportunities for a wide skill level. In addition, commitment will be formalised when the project is tendered to the Department of Energy to sell energy to the national grid.*

QUESTION	RESPONSE
2. Should development, or if applicable, expansion of the town/ area concerned in terms of this land use (associated with the activity being applied for) occur at this point in time?	*Yes. The activity is in line with the Nama Khoi LM SDF which recognises the need for economic development to create a sustainable economy which creates employment opportunities for local people.*
3. Does the community/ area need the activity and the associated land use concerned (is it a societal priority)?	*Yes. The closing of mines in the municipality has also contributed to the high unemployment rate which has increased from 22.41 % in 1996 to 28.49 % in 2001 in the Namakwa District Municipality area (Namakwa District Municipality IDP, 2006 - 2011).* *The proposed wind and solar energy facilities in Springbok would not only be a source of income to the landowners, but it would create job opportunities for the local community as the construction and operation of the facilities require a wide range of skill levels which Springbok can, to a degree, supply.* *Secondary economic impacts may include an increase in service amenities through an increase in contractors and associated demand for accommodation, etc.*
4. Are there necessary services with appropriate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?	*The proposed project would feed into the national Eskom grid through an onsite connection.*
5. Is this development provided for in the infrastructure planning of the municipality, and if not, what will the implication be on the infrastructure planning of the municipality (priority and placements of services)?	*No. It should be noted that once the proposed project is operational, there would be a very limited requirement for municipal services.*
6. Is this project part of a national programme to address an issue of national concern or importance?	*Yes. The establishment of the proposed facilities would strengthen the existing electricity grid for the area. Moreover, the project would contribute towards meeting the national energy target as set by the Department of Energy (DoE), of a 30 % share of all new power generation being derived from independent power producers (IPPs).*
DESIRABILITY (PLACING)	
1. Is the development the best practicable environmental option (BPEO) for this land/ site?	*Yes. Springbok is a very arid region of the Northern Cape where agricultural potential is low and cattle, sheep and goat farming forms the predominant land use. The area, being proposed for the facilities has a low agricultural potential which is why the proposed facilities are well suited and the best practicable environmental option for this site.*
2. Would the approval of this application compromise the integrity of the existing approved Municipal IDP and SDF as agreed to by the relevant authorities.	*No. The projects are in line with the Nama Khoi IDP which recognizes the need for economic development to strengthen and improve the local economy to create a sustainable economy which creates employment opportunities for local people. The Namakwa District IDP pursues economic development through large*

QUESTION	RESPONSE
	programmes to build economic infrastructure.
3. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in Environmental Management Frameworks (EMFs)), and if so, can it be justified from in terms of sustainability considerations?	*No. Neither the Emthanjeni LM or the Nama Khoi LM have an EMF in place. Furthermore, the EIA process would ensure that the proposed facilities would be environmentally sustainable. Although a part of the site falls within a CBA the site layout will respond to this and specialist recommendations. Comment will also be sought from the relevant authorities to ensure that the application does not comprise the Namakwa District Biodiversity Sector Plan*
4. Do location factors favour this land use (associated with the activity applied for) at this place?	*Yes. The sites were selected based on the following criteria:* • *Wind resource based on historic data from the Springbok South African Weather Service Station (SAWS) and used to provide a comprehensive macro wind model of the area;* • *Grid connectivity and close proximity to strong grid access; and* • *Unpopulated and non-arable or low arable potential land.* *Desktop studies furthermore assessed potential sensitivities of fauna, flora and heritage.*
5. How will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/ natural environment)?	*Potential impacts associated with the proposed upgrade will be discussed and assessed during the EIA Phase. Refer to the Plan of Study for EIA in Chapter 5.*
6. How will the development impact on people's health and wellbeing (e.g. in terms of noise, odours, visual character and sense of place, etc.)?	*Potential impacts associated with the proposed upgrade will be discussed and assessed during the EIA Phase. Refer to the Plan of Study for EIA in Chapter 5.*
7.Will the proposed activity or the land use associated with the activity applied for, result in unacceptable opportunity costs?	*The socio-economic impacts will be assessed and discussed in the EIA Phase. Refer to the Plan of Study for EIA in Chapter 5.*
8. Will the proposed land use result in unacceptable cumulative impacts?	*Potential cumulative impacts associated with the proposed upgrade will be discussed and assessed during the EIA Phase. Refer to the Plan of Study for EIA in Chapter 5.*

3.2 DESCRIPTION OF THE PROPOSED ACTIVITIES

3.2.1 Wind Energy Facility project

The proposed wind energy facility would consist out of approximately 185 – 500 turbines of 1.5-4 MW capacity each and would have a maximum total installed capacity of 750 MW.

A wind turbine is a rotary device that extracts energy from the wind. If the mechanical energy is used directly by machinery, such as for pumping water, cutting lumber or grinding stones, the machine is called a windmill. If the mechanical energy is instead converted to electricity, the

machine is called a wind turbine. **Figure 3.1** shows a wind energy facility in Texas, United States of America.

3.2.2 Components of a wind turbine

Wind turbines can rotate about either a horizontal or a vertical axis. Turbines used in wind farms (see **Figure 3.1**) for commercial production of electricity are usually horizontal axis, three-bladed and pointed into the wind by computer-controlled motors, as is proposed for this project. These have high tip speeds of over 320 km/hour, high efficiency, and low torque ripple, which contribute to good reliability.

The main components a wind turbine is made up are listed and described below (see **Figure 3.2**):

- Rotor and blades;
- Nacelle;
- Generator;
- Tower; and
- Foundation.

Figure 3.1: Brazos Wind Ranch located in Texas, USA[14]

http://en.wikipedia.org/wiki/Wind_power_in_Texas

[14] (accessed 14/06/12)

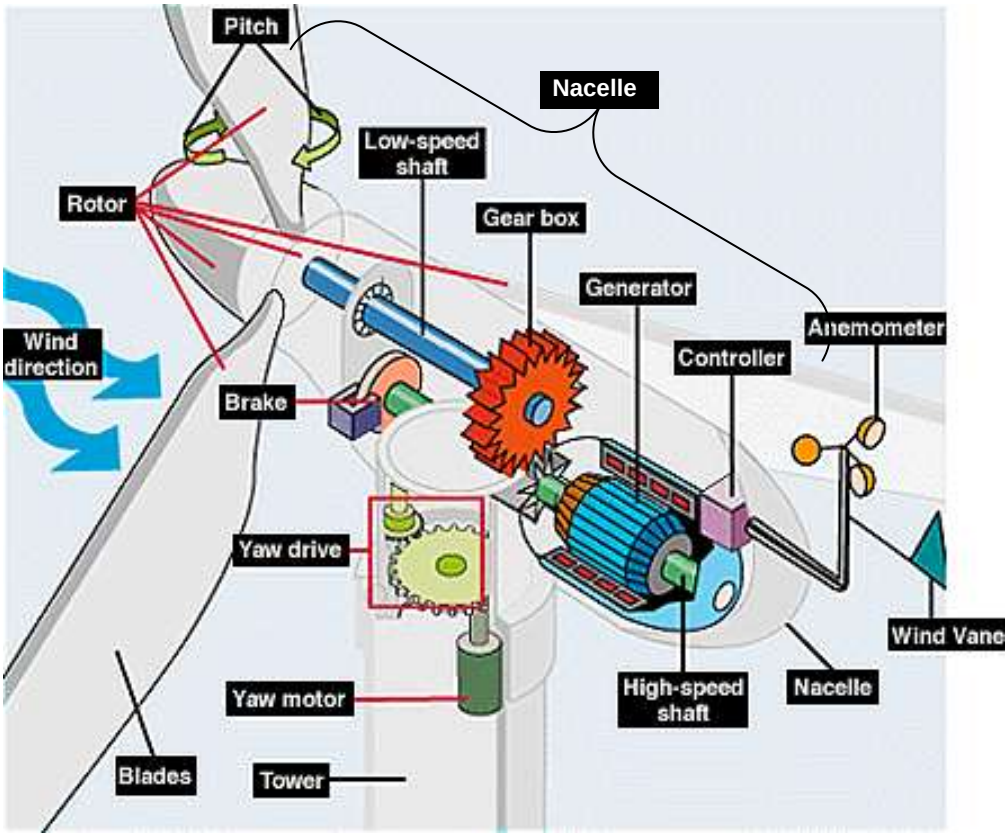


Figure 3.2: Typical components of a horizontal axis wind turbine[1]

3.2.2.1 Rotor and blades

The rotor has three blades that rotate at a constant speed, approximately 6-15 revolutions per minute (rpm) in the case of the turbines being considered at Springbok. The blades are usually coloured light grey and, in the case of the proposed project, would be approximately 40 – 60 m long (80 – 120m rotor m diameter).

3.2.2.2 Nacelle

Larger wind turbines are typically actively controlled to face the wind direction measured by a wind vane situated on the back of the nacelle. By reducing the misalignment between wind and turbine pointing direction (yaw angle), the power output is maximised and non-symmetrical loads minimised. The nacelle can turn the blades to face into the wind ('yaw control').

All turbines are equipped with protective features to avoid damage at high wind speeds. By turning the blades into the wind ('furling') the turbine ceases its rotation, accompanied by both electromagnetic and mechanical brakes. This would typically occur at very high wind speeds, typically over 72 km/h (20 m/s). The wind speed at which shut down occurs is called the cut-out speed. The cut-out speed is a safety feature which protects the wind turbine from damage. Normal wind turbine operation usually resumes when the wind drops back to a safe level. The turbine controls the angle of the blades ('pitch control') to make optimal use of the available wind and avoid damage at high wind speeds.

The nacelle also contains the generator, control equipment, gearbox and wind speed measure (anemometer) in order to monitor the wind speed and direction.

3.2.2.3 Generator

The generator converts the turning motion of the blades into electricity. A gear box is commonly used for stepping up the speed of the generator. Inside the generator, wire coils rotate in a magnetic field to produce electricity. Each turbine has a transformer that steps up the voltage to match the transmission line frequency and voltage for electricity evacuation/distribution.

3.2.2.4 Tower

The tower is constructed from tubular steel and supports the rotor and nacelle. For the proposed project the tower would be either 60 or 120 m tall, depending on the selected turbine. Wind has greater velocity at higher altitudes, therefore increasing the height of a turbine increases the expected wind speeds.

3.2.2.5 Foundation

Foundations are designed to factor in both weight (vertical load) and lateral wind pressure (horizontal load). Considerable attention is given when designing the footings to ensure that the turbines are adequately grounded to operate safely and efficiently. The final foundation design of the proposed turbines is dependent on a geotechnical investigation; however it is likely that the proposed turbine foundations would be made of reinforced concrete. The foundations would be approximately 20 m x 20 m and an average of 3 m deep. The foundation would be cast *in situ* and could be covered with top soil to allow vegetation growth around the 6 m diameter steel tower.

3.2.3 Construction and operation of the proposed wind energy facility

The turbine tower comprises sections, the first is bolted to the concrete foundation and subsequent sections are lifted on site by a crane, manoeuvred into position and bolted together (see **Figure 3.3**). A permanent hard standing made of compacted gravel of approximately 20 m x 50 m would be constructed adjacent to each turbine location for the crane.

The preliminary area within which turbines of the proposed wind energy facility would be located is indicated in **Figure 3.4**. Details of the proposed wind project are summarised in **Table 3.2.**

Table 3.2: Summary of aspects of the proposed wind energy facility on near Springbok in the Northern Cape.

Project	No. of turbines (approximate)	Turbine size (MW)	Project size (MW)	Size (ha)	Footprint (approximate)
Wind	185 to 500	1.5- 4 MW	750	46 535 (ha)	< 1 %)

Gravel surface access roads of approximately 6-10 m wide would also be required between each turbine. Cables connecting each turbine would interconnect and ultimately become a new overhead transmission line. The underground cables will run next to the wind turbine connection roads as far as possible.

Figure 3.3: A wind turbine in the process of being erected[15]

Each turbine would have a transformer that steps up the voltage from 690 Volt to a medium voltage +/- 33 kilovolt (kV). This transformer is housed within each turbine tower or immediately outside the turbine.

The electricity distribution infrastructure would comprise of one transmission line (132 or 220 kV). The proposed project could connect to the grid via up to four satellite substations that would link sectors of the facilities to a main substation which would connect to an overhead line. The proposed route to the substation is approximately 20 km long. At the substation (100 m x 100 m) the voltage would be increased and evacuated via the 220 kV Eskom power line crossing the northern portion of the site (see **Figure 3.4**). Further details on the grid connection will be provided in the EIR.

A preliminary approximation of the water requirements for the construction phase of the proposed wind energy facility is 1500 cubic meters (m^3) of water per month. Mainstream has indicated that water could be sourced from underground sources (if available) depending on legal agreements and compensation with the landowners. Water might also have to be permitted by DWA.

Between digger loaders/ bulldozers would be required for land clearing and for the assembly of the facility.

[15] Source http://www.windpowerninja.com/wind-power-government-industry-news/massive-opportunity-for-wind-turbine-production-in-us-66460/ (accessed 15/11/2010) and http://www.wind-energy-the-facts.org/en/part-i-technology/chapter-3-wind-turbine-technology/technology-trends/transport-and-installation.html (accessed 21/10/11)

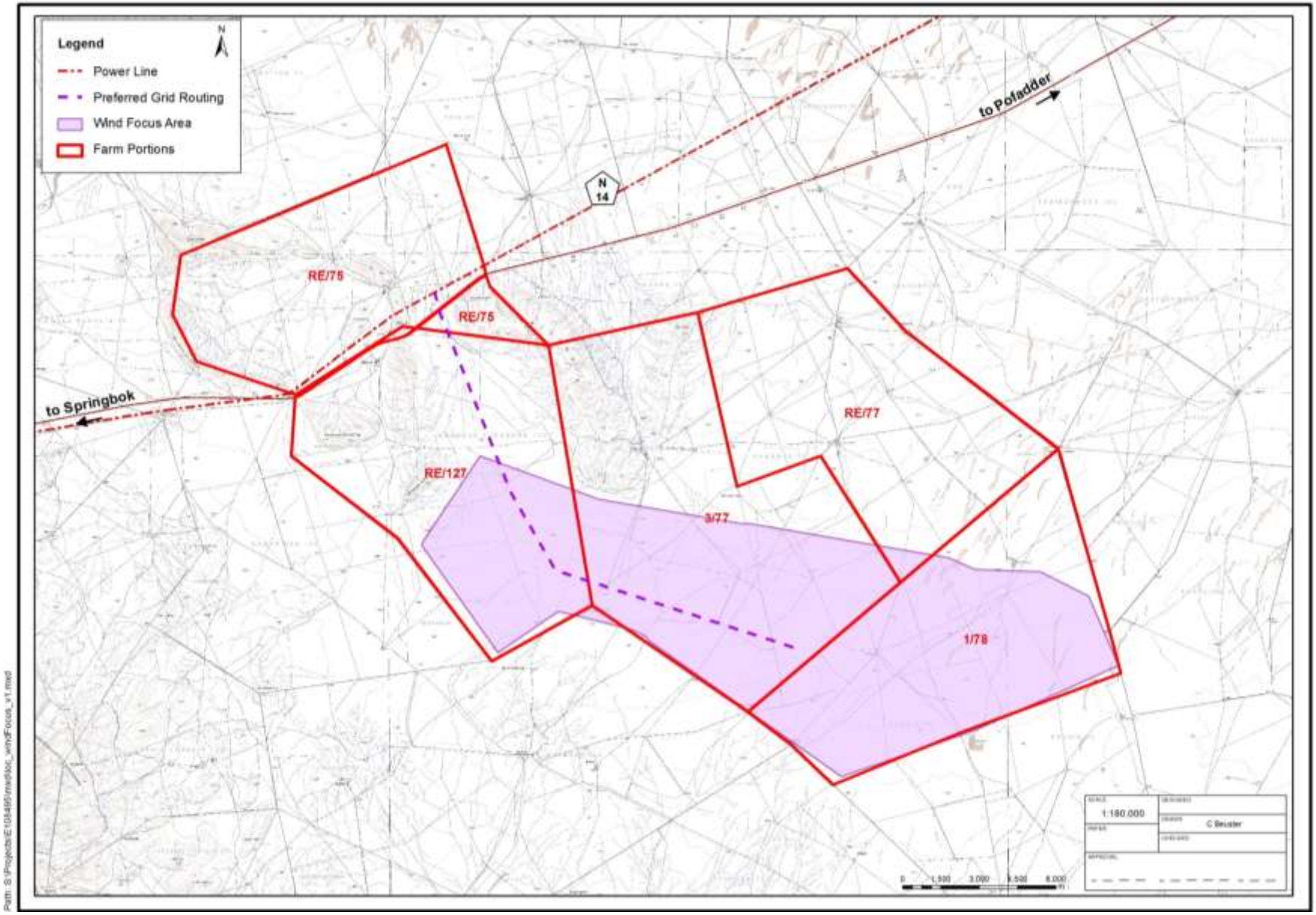


Figure 3.4: Preliminary area within which turbines of the proposed wind energy facility would be located on farms near Springbok in the Northern Cape.

Turbines are designed to operate continuously, unattended and with low maintenance for more than 20 years or greater than 120 000 hours of operation. Once operating, the proposed wind energy facilities would be monitored and controlled remotely, with a mobile team for maintenance, when required. There would be basic operation and maintenance including storage facilities on site.

A number of jobs during the construction phases and operational phases of the proposed wind facility would be created. The proposed project would make use of local labour as much as possible, and jobs would be preserved for local people as far as possible keeping in mind skills required of the jobs would be filled by people local to the community.

Training would be provided for technicians to operate the facilities by the suppliers of the turbines.

As per **Section 2.1.5**, Mainstream is planning to apply for an IPP contract in March 2013 and should this be awarded the proposed project would need to be constructed by 2016. The construction period is anticipated to last 18 – 36 months. Only Security and key staff will be housed on site. Electricity for construction would be obtained from temporary diesel generators and possibly small scale mobile PV units. Drinking water and basic sanitation will be provided during construction and septic tanks during operation.

3.2.4 Decommissioning of the proposed wind energy facility

The proposed projects have a project lifespan of approximately 20 - 35 years, based on the mechanical characteristics of the turbines. However, as all the infrastructure, such as roads, transmission, substations and foundations would already be established, and the energy source (wind) is a renewable one the proposed projects would continue to be operated after 20 years. Turbines would be upgraded to make use of the latest technology available. All redundant equipment that was replaced would be removed from site and would be sold off or recycled.

3.3 SOLAR ENERGY FACILITY PROJECT

The proposed solar energy facility (250 MW of PV and/or CPV) would have an approximate footprint of 1 000 ha (see **Figure 3.5).**

PV systems convert sunlight into energy. The smallest unit of a PV installation is a cell. The PV cells are made of silicone which acts as a semi-conductor. The cells absorb light energy which energizes the electrons to produce electricity. A number of solar cells electrically connected to each other and mounted in a support structure or frame, behind a glass sheet to protect the cells from the environment, is called a PV module. A number of cells form a module and a number of modules form an array (see **Figure 3.6**). Modules are arranged in section sizes of approximately 40x5m called tables and are installed on racks which are made of aluminum or steel. Modules are designed to supply electricity at a certain voltage. The current produced is directly dependent on how much light strikes the module. The arrays are arranged into rows that form the solar field.

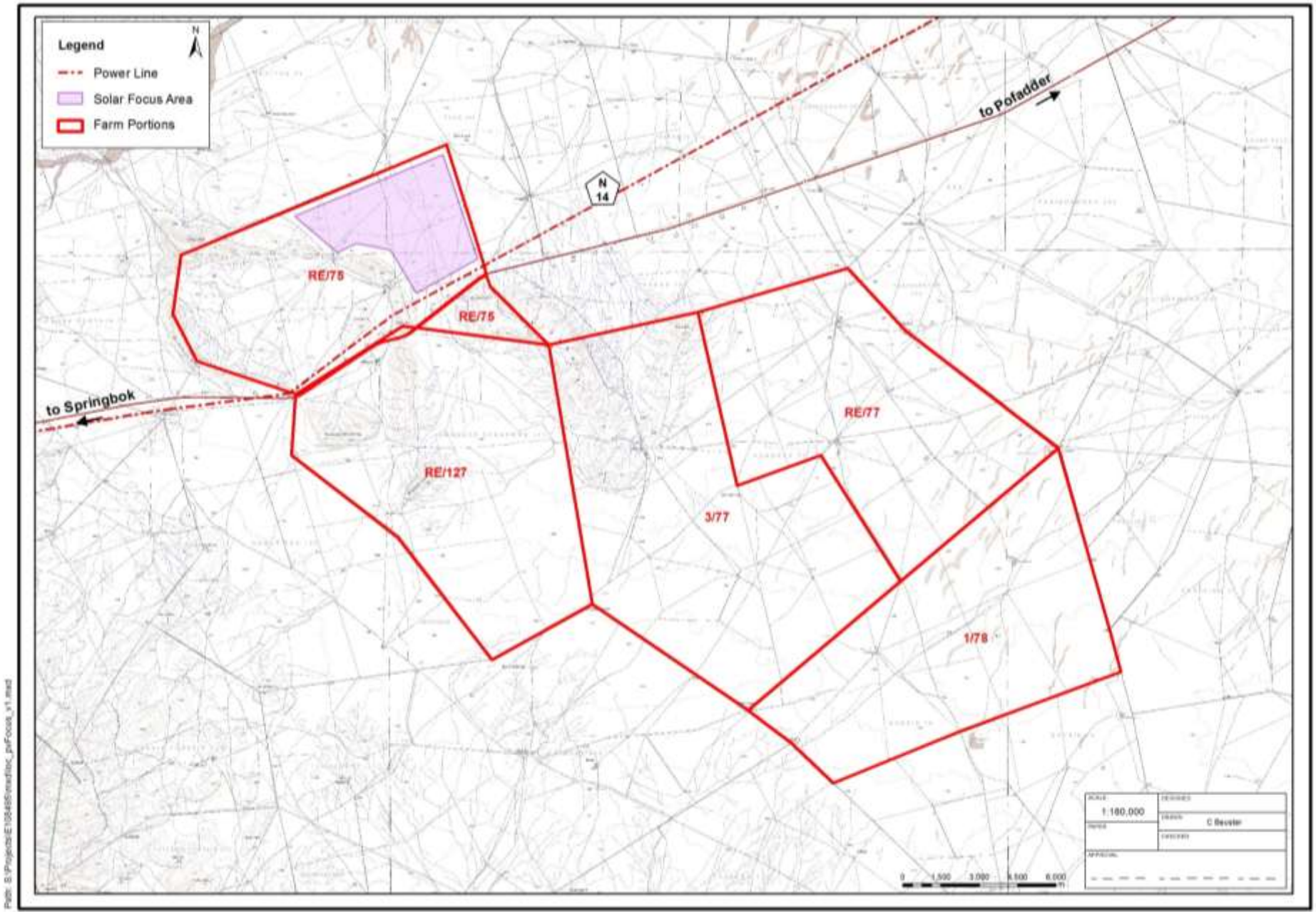


Figure 3.5: Preliminary focus area of the proposed solar energy facility on farms near Springbok in the Northern Cape.

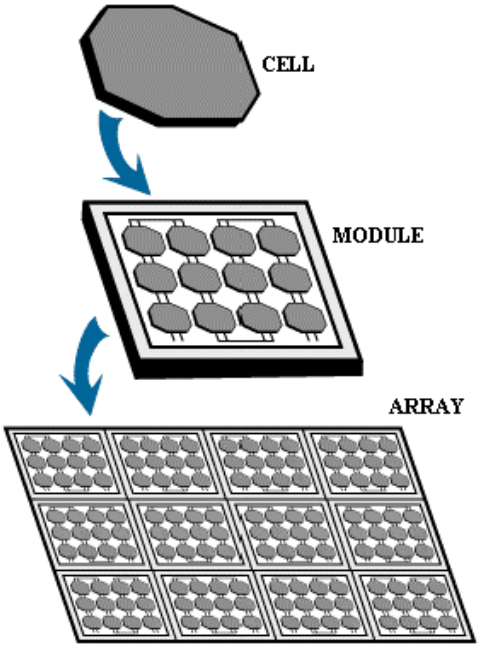
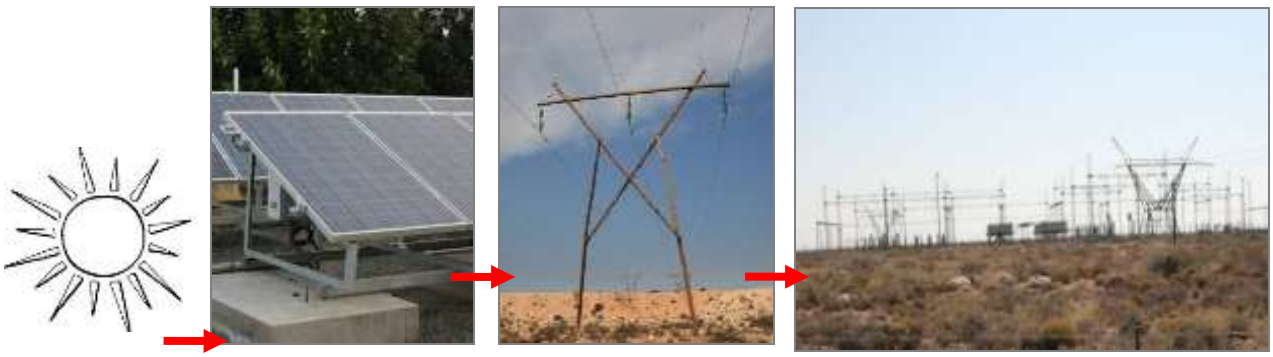


Figure 3.6: Components of PV technology: (i) Solar cell, (ii) module and (iii) array[16]

The arrays and racks are founded into the ground through either concrete, screw or pile foundations (see **Figure 3.8**). The arrays are wired to inverters that convert direct current (DC) into alternate current (AC) that can be fed into a national grid system.

[Source nasa/2002/solarcells/http://science.nasa.gov/science-news/science-atnasa/2002/solarcells/, http://en.wikipedia.org/wiki/Photovoltaics and http://en.wikipedia.org/wiki/Concentrated_photovoltaics (accessed 24/04/2012)]

Figure 3.7 below illustrates the components of the process of generating electricity from solar energy (sun) and fed into the grid.



Short wave sunrays **PV panels** **Transmission lines** **Substation / Grid**

Figure 3.7: Basic PV system layout

The fundamental difference between PV and CPV technology is that CPV uses optics such as lenses to concentrate a large amount of sunlight onto a small area of solar PV materials to

[16] (Source: http://science.nasa.gov/science-news/science-at-nasa/2002/solarcells/)

generate electricity. It is argued that CPV technology can reduce overall cost by using more advanced technologies with higher efficiencies. Using CPV technology does require tracking systems to ensur the sublight is focused on the small cell. Tracking systems do increase the capital cost and O&M cost of the project.

Figure 3.8: PV ground mounted system[17]

PV Panels can also be mounted on tracking systems which follow the path of the sun to maximize the benefit of each ray of sunlight and allowing for the land underneath to be utilized as well (see **Figure 3.9**). Shade crops can be cultivated under solar panels, increasing the diversity of crops that can be cultivated in sunny regions.

3.3.1 Construction and operation of the proposed solar energy facility

The preliminary focus area of the proposed solar energy facility is given in **Figure 3.5**. Details of the proposed project are summarised in **Table 3.3**.

Table 3.3: Summary of aspects of the proposed solar energy facility near Springbok in the Northern Cape.

Project	Maximum height	Project size (MW)	Size (ha)	Footprint (approximate)
Solar	4 m	250	1000	< X % (1000 ha)

A gravel surface access road of approximately 6-10 m wide would also be required to reach the array. Cables connecting the arrays would interconnect with overhead transmission lines that will follow the route of the access roads.

[17] (Source: http://en.wikipedia.org/wiki/Photovoltaicsystem)

Figure 3.9: CPV energy facilities in the southern area of Spain[18]

The array would have a transformer that steps up the voltage from 690 V to 22 kV. This transformer is housed immediately adjacent to the array. The electricity distribution infrastructure would comprise of one transmission line (220 kV) traversing the site. The proposed project would connect to the grid via an onsite substation. The proposed route to the substation is approximately 1 km long. At the substation the voltage would be increased and evacuated via the 220 kV Eskom power line crossing the northern portion of the site (see **Figure 3.5**). Further details on the grid connection will be provided in the EIR.

Mainstream has indicated that water could be obtained from underground water sources depending on the legal agreements and compensation with the landowners. Water might also have to be extracted and permitted by DWA.

A number of jobs during the construction phases and operational phases of the proposed wind facility would be created.The proposed project would make use of local labour as much as possible. If non-locals are employed they would be housed in temporary dwellings on site or in accommodation within Springbok. Apart from security and key staff housing there will be no other housing components. Electricity will be obtained from temporary diesel generators and possibly small scale mobile PV units. Drinking water and basic sanitation will be provided during construction and a septic tanks during operation.

The facility would be designed to operate continuously, unattended and with low maintenance for more than 20 years. Once operating, the proposed solar energy facilities would be monitored and controlled remotely, with a mobile team for maintenance, when required.

Training would be provided for technicians to operate the facilities by the suppliers of the PV panels.

As per **Section 2.1.5**, Mainstream is applying for an IPP contract in March 2013 and should this be awarded the proposed project would need to be constructed by June 2016.The construction

[18] (Source: http://www.ecofriend.com/entry/concentrated-photovoltaics/)

period is anticipated to last 24 months for the solar energy facility and 36 months for the wind energy facility months.

The project will last the full period of the PPA which is acurrently 20 years. Regular cleaning of the panels to remove dust, dirt, pollen, and bird excretions would be required to ensure that the maximum quantity of sunrays can be captured by the PV panels (Ibrahim, 2010). The frequency of panel cleaning would depend on the site conditions. Panels would be washed with water and a mild, organic, and non-abrasive detergent.

3.3.2 Decommissioning phase of the proposed solar energy facility

The PV site could be decommissioned at the end of the PPA (20 years from the date of commissioning). The decommissioning is expected to take 6 months for the solar energy facility and 12 months for the wind energy facility. The module components would be removed and recycled as the silicon and aluminum can be re-used in the production of new modules.

3.4 CONSIDERATION OF ALTERNATIVES

3.4.1 Introduction

NEMA requires that alternatives are considered during the EIA process. An important function of the Scoping Phase is to screen alternatives to derive a list of feasible alternatives that need to be assessed in further detail in the EIA Phase. An alternative can be defined as a possible course of action, in place of another, that would meet the same purpose and need (DEAT, 2004).

"alternatives", in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

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

The alternatives most pertinent to the proposed project include the following:

- Location alternatives - alternative locations for the entire project proposal or for components of the project proposal;
- Activity (type) alternatives - also referred to as project alternatives. Requires a change in the nature of the proposed activity. This category of alternatives is most appropriate at a strategic decision-making level;
- Layout alternatives- site layout alternatives permit consideration of different spatial configurations of an activity on a particular site; and
- Technology alternatives – technology alternatives permit consideration of different types of technology used in the project.

The above categories of alternatives are the ones most pertinent to this EIA process, and will be explored in detail below. The purpose of this section of the report is to identify (scope) and

describe all potential alternatives and determine which alternatives should be carried through to the EIA Phase of the project for further assessment.

3.4.2 Location alternatives

South Africa is on the verge of increasing the percentage contribution made by renewable energy power generation to the existing energy mix. In response to this potential for the implementation of a large scale renewable energy production, and in particular the 1 850 MW and 1 450 MW which is required from wind and PV energy respectively, Mainstream has identified many potential sites across the country and is currently pursuing the best suited locations for wind and PV energy production.

Mainstream undertook a fatal flaw analysis of four sites in the Northern and Western Cape, of which the current site was one. These sites were identified by considering the following technical aspects:

The fatal flaw analysis considered the following environmental aspects:

- Surrounding land uses;
- Existing services infrastructure;
- Climate;
- Topography, geology and soils;
- Botany;
- Fauna;
- Avifauna;
- Freshwater ecology;
- Archaeology and palaeontology;
- Visual landscape;
- Socio-economic aspects;
- Agricultural production and potential; and
- Planning consistency.

The sites were visited and desktop studies were undertaken to identify potential issues and fatal flaws from an EIA perspective. Input was provided by the following specialists:

- Dr Dave McDonald, Bergwind Botanical Tours & Surveys (botany);
- Mr Doug Harebottle, Private Consultant (avifauna);
- Mr Kurt Barichievy, SiVEST (agriculture);
- Dr Tim Hart, ACO & Associates (heritage); and
- Mr Werner Marais, Animalia Zoological and Ecological Consultation (bats).

Based on the Fatal Flaw Analysis, Mainstream decided to pursue two of the four sites, namely the Kangnas site and a site closer to Pofadder (currently the subject of a separate EIA process).

Given the favourable technical characteristics of the site and the ready market for renewable energy it was decided to pursue wind and solar energy facilities on the site. Based on the selection process undertaken by Mainstream in selecting the site, no other site location alternatives will be assessed in the EIAR.

3.4.3 Activity alternatives

As can be seen by the numerous policies and legislation described in Chapter 2 he need for additional energy generation in South Africa is well documented. Furthermore, numerous policies and legislation have been promulgated indicating the mixture of renewable and non-renewable energy which South Africa wishes to pursue. These strategic documents provide the road map for the activity alternatives available to South Africa. The IRP2010 allows for an additional 20 409 MW of renewable energy in the electricity mix in South Africa by 2030 and based on this requirement for renewable energy Mainstream has identified a number of projects for wind and solar energy generation.

The sites are suitable for solar and wind power given the high level of solar radiation experienced and favourable wind regime at Springbok. As such only solar energy generation will be considered for the proposed solar energy facility and only wind energy generation will be considered for the proposed wind energy facility.

The no-go alternative is the baseline against which all alternatives are assessed. It consists of the *status quo*, and as such will not be explicitly assessed.

3.4.4 Site layout alternatives

One site layout per project has been compiled based on *inter alia* the following criteria:

- Technical constraints
    - Spatial orientation requirements of turbines and solar panels and associated infrastructure (e.g. roads); and
    - Layout relative to other existing infrastructure, such as power lines.
- Environmental constraints
    - Wind resource profile;
    - Solar irradiation;
    - Topographical constraints, including surface and groundwater;
    - Botanical and avifaunal constraints (presence of sensitive or protected plant communities or avifauna); and
    - Aesthetics.

One location has been proposed for the onsite substation as indicated in **Figure 1.1**. Note that the EIA specialist studies will inform the location of preferred and alternative substation locations.

Where necessary, the site layouts will be amended during the EIA Phase in response to any environmental sensitivities or technical constraints identified, and will be presented and assessed in the Draft EIAR.

3.4.5 Technology alternatives

3.4.5.1 Wind turbines

The most important factors that need consideration when selecting a turbine for any site is the annual average wind speed, reference wind speed, the return period for extreme wind conditions and wind direction (i.e. wind resource profile). Other determining factors when

selecting the preferred turbine are efficiency, full load hours and the capacity factor. Based on these characteristics Mainstream would ultimately select a turbine which is best suited to the sites. Mainstream has indicated that the turbines ultimately selected are likely to range between 60–120 m in tower height and 80 - 120m rotor diameter. In order to assess the potential impacts of the turbines a minimum and maximum tipheight of 100 - 180m will be considered. It should however be borne in mind throughout the EIA process that the turbine dimensions could be anything between this range.

3.4.5.2 Solar technology

Various technology alternatives were considered in terms of the following:

- Solar panel type: PV vs. Concentrating PV (CPV);and
- Mounting system: trackers vs. fixed mount

3.4.5.3 Solar panel type

Two solar panel types, i.e. PV solar cells and CPV, were considered for the proposed solar plant. The CPV technology use mirrors or lenses to concentrate sunlight onto a small area to generate electricity directly onto the collector PV cells. Both PV and CPV will be considered in the EIA phase.

3.4.5.4 Mounting system

Solar panels can be mounted in various ways to ensure maximum exposure of the PV panels to sunlight. In a fixed axis system the PV panels are installed at a set tilt and cannot move, whereas in a one or two (dual) axes tracking system the panels follow the sun to ensure maximum exposure to sunlight[19]. These systems are illustrated in **Figure 3.10**.

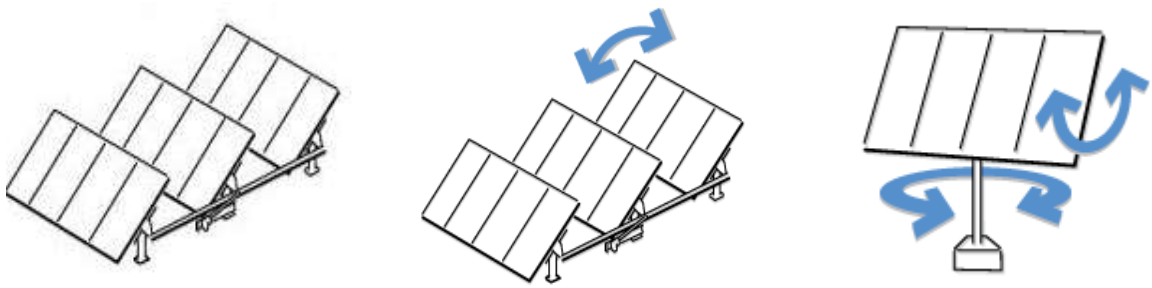


Figure 3.10: Solar panels can be mounted via (a) fixed axis photovoltaic systems, (b) single axis tracking PV systems and (c) dual axis tracking systems[20]

Mainstream will investigate all three these alternative mounting options for the PV panels.

3.4.5.5 Foundation options

There are various methods for anchoring PV panels. However the preferred foundation option would be dependent on the soil characteristics of the area, as these anchoring structures would need to withstand climatic conditions, as well as the response of the soil to these changes, to

[19] Source: http://en.wikipedia.org/wiki/Solar_tracker#Tracker_type_selection (Accessed on: 24 October 2011)
[20] Source: www.solar-tracking.com/ (Accessed on: 24/10/2011)

prolong the lifespan of the panels. A geotechnical assessment would however be required to determine the soil conditions and the type of anchoring required.

3.4.6 Summary of alternatives

To summarise, the feasible alternatives which will be assessed in the EIAR include the following:

Proposed wind energy facility:

- Location alternatives:
    - One location for the proposed wind energy facility;
- Activity alternatives:
    - Wind energy generation via wind turbines; and
    - "No-go" alternative to wind energy production.
- Site layout alternatives:
    - One layout alternative per site;
    - One main substation location, with four satellite substations.
- Technology alternatives:
- A minimum and maximum tipheight of 100 – 180m

Proposed solar energy facility:

- Location alternatives:
    - One location for the proposed PV plant.
- Activity alternatives:
    - Solar energy generation via a PV plant; and
    - "No-go" alternative to solar energy production.
- Site layout alternatives:
    - One layout alternative (250 MW with 1000 ha footprint
- Technology alternatives:
    - Two technology alternatives in terms of the solar panel type (PV vs CPV); and
    - Mounting system: trackers vs. fixed mount.

4 DESCRIPTION OF THE AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

The purpose of this Chapter is to provide a brief description of the affected environment and the potential impacts that could result from the proposed project. Where additional information is required for detailed assessment in the EIAR, the ToR for specialist studies are given.

4.1 INTRODUCTION

The description of the affected environment provided below draws on existing knowledge from published data, previous studies, site visits to the area and discussions with various role-players. The identification of potential impacts which may occur as a result of the proposed activities described in **Chapter 3** of this report is broad, to cover the operational phase as well as the construction phase of the project. In cases where there is currently inadequate information to facilitate assessment of the potential impact, a draft ToR and proposed specialist consultant is provided. Impacts of lesser importance are also screened out, with reasons provided, to ensure that the EIAR is focused on the potentially significant impacts.

4.2 BROAD DESCRIPTION OF THE AFFECTED BIOPHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT

4.2.1 Description of site

The proposed site is situated in the Nama Khoi LM in the Northern Cape approximately 48 km east of Springbok. The site is accessed via the N14 (see **Figure 1.1**). The site is approximately 46 535 ha in extent and consists of five portions of four farms. The landowners of the farms comprising the sites have entered into a long term agreement with Mainstream for the proposed projects. The farms are zoned Agriculture and are currently used for grazing sheep, and cattle.

The farms comprising the sites are tabulated below:

Table 4.1: List of farms comprising the sites and the respective landowners

FARM	LANDOWNER
Kangnas Trust (Portion 3 and Remaining portion of Farm No. 77)	Mr Weich van Niekerk
Farm Koeris (Portion 1 of Farm No. 78)	Mr Weich van Niekerk
Farm Areb (remaining portionof Farm No. 75)	Mr Frank John Agenbag
Farm Smorgenschaduwe (Portion 0 of Farm No. 127)	Mr J Kennedy

4.2.2 Climate

Kangnas falls within the Nama Karoo Biome which experiences highly unpredictable late summer to early autumn rainfall that varies between 50 and 200 mm per year. These rainfall events are often localized, violent thunderstorms (Mucina & Rutherford, 2006; DENC, 2008). According to the Rainfall Atlas for South Africa, the Mean Annual Precipitation for the site is approximately 195 mm per year

(SiVEST, 2012). Temperatures can vary between 43ºC in the summer and 25ºC during the daytime in the winter months. Night frost can occur, with temperatures averaging below 0 ºC and -3.3 ºC as the minimum (McDonald, 2012).

Bushmanland Inselberg Shrubland areas receive lower rainfall than the plains, but experiences less mean annual potential evaporation. Mean annual temperatures are also marginally lower (McDondald, 2012).

4.2.3 Topography, geology and soils

The proposed Kangnas site is mostly low-lying flat country with granite inselbergs (isolated rocky hills rising abruptly from a flat plain) occurring in the northwest. The site is underlain by bedrock of the Namaqua-Natal Metamorphic Province. Tertiary to recent sand deposits and tillite (comprising consolidated unweathered blocks and unsorted glacial till) mostly covers the area (McDonald, 2012; SiVEST, 2012).

Soils are apedal (lacking individual natural soil aggregates) and are weakly structured. Due to the general climatic conditions, calcium carbonate is expected to occur in the area. Furthermore, soils are expected to have a low water holding capacity according to the Southern African Agricultural Geo-referenced Information System (AGIS) database. Effective soil depths of less than 0.45 m are expected on site, with marginally deeper soils near the northwestern boundary of the Kangnas site (SiVEST, 2012).

4.2.4 Flora

The predominant vegetation type at the Kangnas site is Bushmanland Arid Grassland, which is widespread in the Bushmanland Bioregion of the Nama Karoo and is considered to be least threatened. This vegetation is characterized by ‘white grasses’ of the *Stipagrostis* genus, but also includes low shrubs with *Salsola sp*. Another characteristic feature of the landscape is ‘heuweltjies’ which explains the ‘pock-marked’ appearance that can be seen on the aerial images of the Kangnas site. Heuweltjies result from the activity of termites and have different vegetation compositions than the surrounding area. This effect is most easily observed in the growing and flowering season when the heuweltjies stand out against the less conspicuous surrounding vegetation (McDondald, 2012).

In the northwestern section of the site, a granite inselberg complex, Bushmanland Inselberg Shrubland, is located. This is botanically important with many succulent species and notably *Aloe dichotoma* (quiver tree or kokerboom) and *Aloe gariepensis* (Orange River aloe) A ‘quartz patch’ is found in this area and is of importance due to the possibility of endemic *Lithops* sp. (living stones) occurring in this area (McDonald, 2012). During the site visit, no *Lithops* sp. were found despite the assurance of the landowner that they do occur in this area. Specimens of the endemic *Avonia* sp. were however identified.

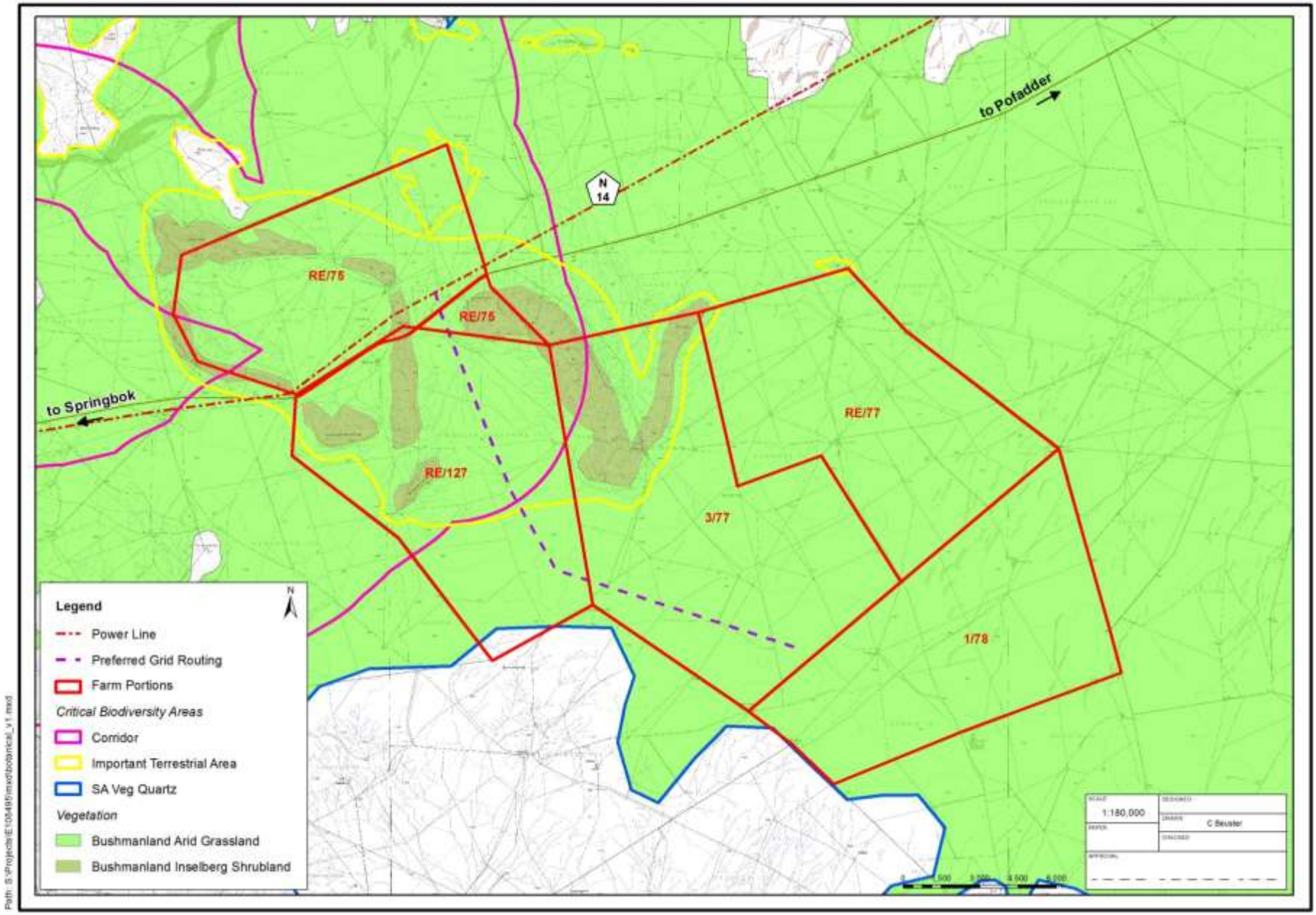


Figure 4.1: Vegetation map of the Kangnas site (McDonald, 2012)

4.2.5 Fauna

According to the landowner, Mr Weich van Niekerk (pers. comm. 2011), the following fauna species have been seen on the farm: springbok, aardvark, bat-eared fox, caracal, ground squirrel, klipspringer, hyraxes and baboons. Reptiles include the puff adder, Cape cobra and the Many-horned adder. Various other mammals, reptiles, amphibians and invertebrates are also likely to occur.

Bats are generally found in areas with suitable roosting space, sufficient hunting / foraging areas and open water bodies to drink from and / or hunt insects (Animalia, 2012). Potential suitable roosting space occurs in the north-western section of the farm where rocky outcrops with caves are located, as well as farm buildings where bats can often be found in the roofs. Surface water is however limited to a small still water body, watering points for sheep and non-perennial drainage channels. As a result, foraging activities would most likely also be limited (Animalia, 2012).

A total of 11 bat species have been identified that could potentially occur on site. Of these, seven have a high probability of being located on Kangnas (refer to **Table 4.2**). The Near Threatened *Cistugo seabrae* (Angolan wing-gland bat) is listed as potentially occurring in the area (Animalia, 2012). However, the Angolan wing-gland bat is considered to be a low-flying bat specie and should thus be less vulnerable to wind energy facilities.

Table 4.2: Potential bat species that have a high to moderate potential of occuring at the Kangnas site (Animalia, 2012)

Species	Common name	Probability of occurrence	Conservation status	Possible roosting habitat to be utilized in study area
Cistugo seabrae	Angolan wing-gland bat	**High**	**Near Threatened**	It is restricted to the arid western parts of southern Africa, typically in desert and semi-desert conditions.
Eptesicus hottentotus	Long-tailed serotine	**High**	Least Concern	Roosts in caves and rock crevices, usually netted near rocky outcrops.
Myotis tricolor	Temmink's myotis	**High**	Least Concern	Cave-dependent. May use small caves as day roost.
Neoromicia capensis	Cape serotine	**High**	Least Concern	Roosts under bark of trees, at the base of aloe leaves and under the roofs of houses.
Nycteris thebaica	Egyptian slit-faced bat	**High**	Least Concern	Roosts in caves, aardvark burrows, road culverts, and trunks of large trees. It appears to occur throughout savannah and Karoo biomes.
Sauromys petrophilus	Roberts's flat-headed bat	**High**	Least Concern	Roost in narrow cracks and under slabs of exfoliating rock. Species is closely associated with rocky habitats in dry woodland, mountain fynbos and arid scrub.
Tadarida aegyptiaca	Egyptian free-tailed bat	**High**	Least Concern	Roost in caves, rock crevices, under exfoliating rocks, in hollow trees, behind the bark of dead trees, and in roofs of houses.

Species	Common name	Probability of occurrence	Conservation status	Possible roosting habitat to be utilized in study area
Miniopterus natalensis	Natal long-fingered bat	Medium	**Near threatened**	Cave-dependent. May use small caves on site for night stops. Current caves too small for day roosting, but possibility remains for larger unknown chambers.

4.2.6 Avifauna

The following bird species have been seen by the landowner, Mr van Niekerk, on site (pers. comm. 2011): Spur-winged goose, various eagle species, Pied crow, Black crow, Secretary bird (listed as Near-threatened on the Red Data List), Rock falcon and Nesting swallows.

According to available datasets 66 bird species, of which 40 are endemic, could potentially occur in the study area. Five of these species are on the Red Data List[21] (Harebottle & Van der Westhuizen, 2012):

- Ludwig's Bustard – Vulnerable
- Secretarybird – Near-threatened
- Lanner Falcon – Near-threatened
- Red Lark – Vulnerable
- Sclater's Lark – Near-threatened

In addition, 11 of these bird species are listed on the Birdlife South Africa database as being vulnerable to wind energy developments (Harebottle & Van der Westhuizen, 2012).

4.2.7 Freshwater ecology

Kangnas is located in the D82C quaternary catchment (BGIS, 2012) and includes numerous non-perennial drainage channels and low-lying depressions / pans. Two prominent pans were identified during the site visit by Aurecon, i.e. a “granite pan” (marked as “A” on **Figure 4.2**) and Steenbok Pan, and are considered to be important in the landscape (McDonald, 2012).

Figure 4.2: Photographs of the granite pan (left) and Steenbok Pan (right) (taken on: 22 November 2012)

[21] Images of these species are available in Annexure I.

In addition to the pans, there is also a drainage area in the northwestern portion of the inselberg complex on Kangnas (refer to **Figure 4.1**) that is considered to be sensitive, especially in terms of botany (McDonald, 2012).

4.2.8 Heritage, archaeology and palaeontology

Kangnas is one of few areas in Namaqualand where pre-colonial rock paintings occur. The heritage value / significance of these sites are currently unknown as they have not been formally described or researched. Historic records have also identified the Kangnas area as a well-known hunting spot where animals were cornered in the narrow kloof of the northwestern portion of the site (ACO, 2012).

Heritage resources observed on site included scatters of Stone Age artifacts, rocks hollowed from being used to sharpen arrows (i.e. a whetstone), ostrich eggshell, rock paintings, grindstones and graffiti from the late 1800s (see **Figure 4.3**).

Other heritage features that are of importance and / or are likely to occur are (ACO, 2012):

- Rock shelters and outcrops that contain shelters, rock paintings and archaeological deposits;
- Colonial heritage related to mining, stock farming and *trekboere*;
- Concentrations of Late Stone Age artefacts close to seasonal water;
- Archaeological sites of Nama herders and their ancestors;
- Scatters of Middle and Early Stone age artefacts;
- Rock engraving sites;
- Graves;
- Cultural landscape (including impact craters); and
- Paleontology.

In terms of palaeontology, the Kangnasaurus was found at a depth of 34 m in a well on the Farm Kangnas (not the same portion as the site) in 1915. No other remains were found in the area[22].

Two areas were pointed out by a landowner, Mr van Niekerk, that he believes are meteorite impact sites / craters. Meteorite impact sites are considered to be rare geological features and as such are protected under the National Heritage Resources Act (No. 25 of 1999) (NHRA) (ACO, 2012). Professor Chris Harris of the University of Cape Town's (UCT) Department Of Geological Sciences undertook a site visit to investigate the two sites on 2 April 2012 (the site visit report is included in **Annexure E**)(see **Figure 4.4**). The smaller potential crater showed little evidence of being a crater and is probably a depression where a thicker than normal sequence of calcrete developed. By contrast, the large crater (Kalkkom) consisted of a distinct depression about 1 km in diameter and it is therefore possible that it is a crater.

Desktop research indicated that it was likely that the Kalkkom 'crater' was formed by the eruption of an olivine melilitie pipe about 55 million years ago (Ma). This is the opinion of de Wit (1993) and is consistent with the presence of numerous olivine melilitite pipes in Namaqualand. A series of such pipes is found about 10 – 30 km to the east of Kalkkom. It is much less likely

[22] Source: http://en.wikipedia.org/wiki/Kangnasaurus (Accessed on: 15/02/12)

that the crater was the result of a kimberlite pipe. These are found north of the Orange River and Kalkkom is situated over 50 km from the area where kimberlites are found.

Figure 4.3: Heritage features found at Kangnas, including rocks indented by bushman sharpening their arrows ("whetstones")(top left), ostrich eggshell (top right), graffiti from the late 1800s (bottom left) and bushman rock art (bottom right) (taken on: 22 November 2011)

However, there is no physical evidence to prove that the Kalkkom Crater is an olivine melilitite pipe. Neither the geological map nor de Wit *et al* (1993) mention the presence of olivine melilitite in the immediate vicinity. There are numerous other explanations for the presence of a pan, for example related to structures in the underlying gneiss. The geological map (see **Figure 4.4**) indicates that Kalkkom is situated at or near a synform[23] whose axis trends east-west. The 'crater' might therefore represent a pan developed at a depression where surface water was unable to drain away as a result of the underlying structure. One other possible explanation is the depression was caused by a meteorite impact. The Kalkkom Crater bears a superficial resemblance to the Kalkkop Crater in the Easter Cape which was shown to be the result of a meteorite impact about 250 000 years ago (Reimold *et al*., 1998). Although the crater shape at Kalkkop is more obvious than at Kalkkom, this may be due to a difference in age or rate of erosion. The meteorite origin of Kalkkop was only proved as a result of drilling, which intersected shocked brecciated material below the base of the calcrete in the centre of the crater (at > 90 m depth).

[23] A structure formed by the downward bending of rock strata onto earlier and steeper folds of smaller size (http://encyclopedia2.thefreedictionary.com/Synform, accessed on: 06/06/12)

It was not possible to examine the bedrock that would have been the 'target' were this a meteorite impact crater due to the lack of bedrock exposures as a result of a 10 m of calcrete covering. According to Mr van Niekerk, the calcrete is typically about 10 m thick in the area, but is at least 80 m thick in the large crater.

The only way to distinguish between these possible origins would be to undertake drilling (preferable core drilling) in the centre of the crater through the calcrete into the underlying bedrock.

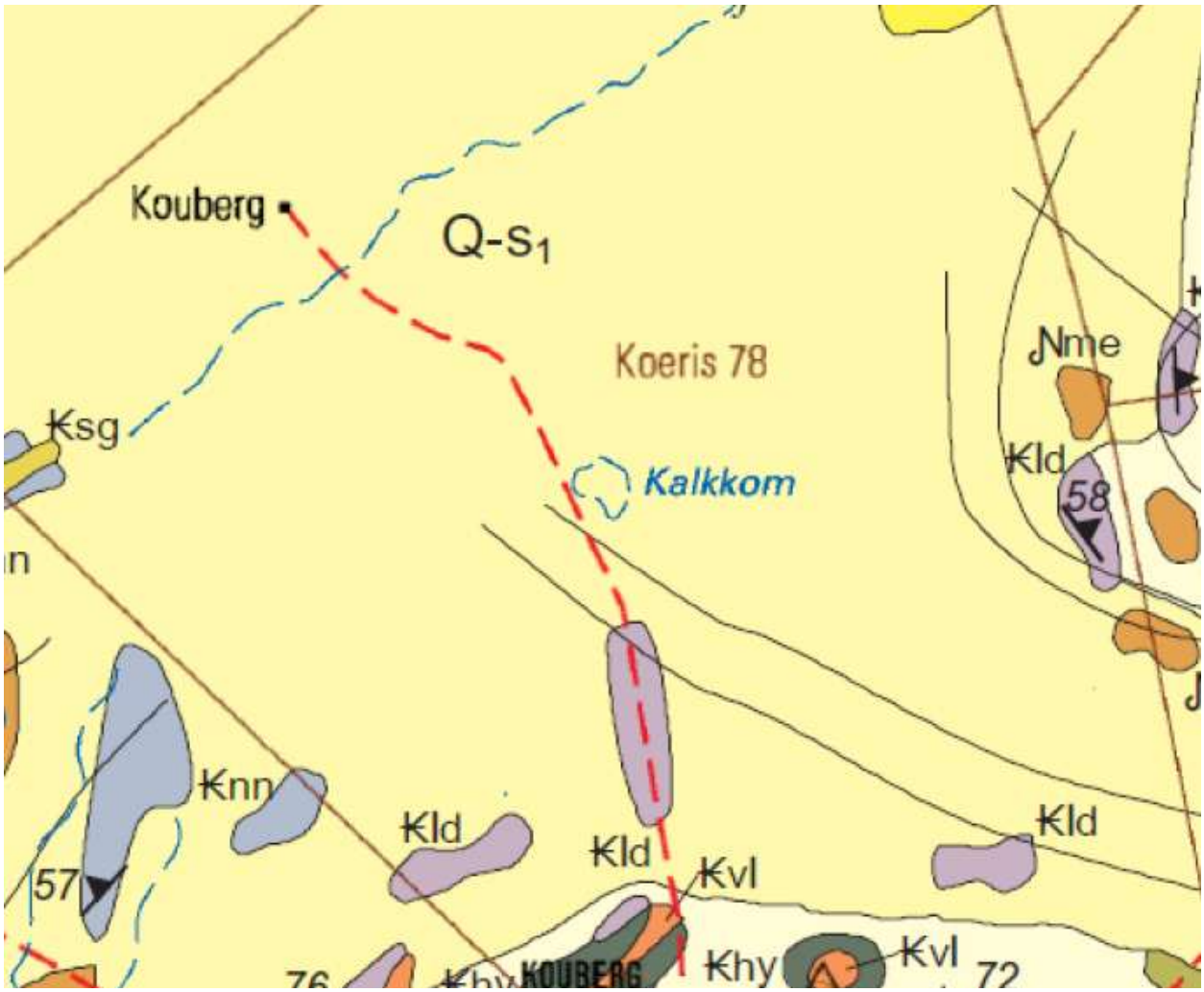


Figure 4.4: Geological map indicating the "crater" Kalkom

4.2.9 Visual landscape

The Kangnas site has a rural, agricultural sense of place and is considered to be rich in cultural history (see **Section 4.2.8**).

4.2.10 Socio-economic aspects

Kangnas falls within the Namakwa District Municipality. Limited job opportunities have resulted in a large portion of the young, economically active population immigrating to cities outside the Northern Cape and other centres of activity. The closing of mines in the municipality has also contributed to the high unemployment rate which has increased from 22.41 % in 1996 to

28.49 % in 2001 in the Namakwa District Municipality area (Namakwa District Municipality IDP, 2006 - 2011).

4.2.11 Agricultural production and potential

Based on the average gradient of the area, the site should be ideal for intensive agriculture, with high potential for large scale mechanisation. However, no sign of formal agricultural fields or cultivation was found on the Kangnas Site. This can be explained by taking into consideration the local climatic conditions which entails highly unpredictable late summer to early autumn rainfall that varies between 50 and 200 mm per year,, geology, land use and vegetation cover, slope and soil conditions. Soils are apedal (lacking individual natural soil aggregates) and are weakly structured. Furthermore, soils are expected to have a low water holding capacity according to the Southern African Agricultural Geo-referenced Information System (AGIS) database. As a result of these factors, the study area has an extremely low crop production potential, whereas the grazing potential is considered to be moderately high (SiVEST, 2012).

4.2.12 Surrounding land uses

The surrounding land use is dominated by agricultural activities, consisting mostly of sheep and cattle grazing. The site is currently used for agriculture (grazing)

4.3 OPERATIONAL PHASE IMPACTS ON THE BIOPHYSICAL ENVIRONMENT

This section of the report describes the biophysical environment and considers the long-term or operational phase impacts on the biophysical environment that may be associated with the proposed activities, including the following:

- Impact on flora;
- Impact on fauna (including avifauna and bats); and
- Impact on surface water.

Long-term impacts on the socio-economic environment are described in **Section 4.4**, while the construction phase impacts are outlined in **Section 4.5**.

4.3.1 Impact on flora

As noted in **Section 4.2.4** the predominant vegetation type found at the Kangnas site is Bushmanland Arid Grassland and considered as not sensitive. The vegetation is in good condition with relatively few alien invasive plant species present.

The proposed project could have impacts on flora through the footprint of infrastructure, particularly access roads and the PV plant. Disturbance to the site could also result in the increase spread of invasive vegetation such as mesquite (*Prosopis glandulosa*). Although the majority of the vegetation on site is not considered sensitive it is recommended that a specialist terrestrial botanical assessment be undertaken, focused within the site, due to the possible extent of potential impact. The proposed ToR for this specialist study are as follows:

Undertake the requisite field work and compile a report which includes the following aspects:

- A broad description of the botanical characteristics of the site and surrounds;
- Identification and description of biodiversity patterns at community and ecosystem level (main vegetation type, plant communities in vicinity and threatened/ vulnerable ecosystems species), at species level (Red Data Book species, presence of alien species) and in terms of significant landscape features;
- An assessment of the potential direct and indirect and cumulative impacts resulting from the proposed development (including the wind turbines, associated infrastructure e.g. access roads), both on the footprint and the immediate surrounding area during construction and operation;
- Comment on whether or not biodiversity processes would be affected by the proposed project, and if so, how these would be affected;
- A detailed description of appropriate mitigation measures that can be adopted to reduce negative impacts and improve positive impacts for each phase of the project, where required; and
- Cognisance must be taken of the Department of Environmental Affairs and Development Planning guideline: "Guideline for involving biodiversity specialists in EIA processes" (Brownlie, 2005) as well as the requirements of the Botanical Society of South Africa (BotSoc) and CapeNature in developing an approach to the botanical investigation.

It is proposed that Dr Dave MacDonald of Bergwind Botanical Surveys' and Tours cc undertake the requisite assessment. Dr MacDonald is a botanical ecologist with 19 years of experience in the field of vegetation science. Dr MacDonald is registered as a Professional Natural Scientist with the South African Council of Natural Scientific Professions (SACNASP).

4.3.2 Impact on fauna (including avifauna and bats)

As noted in **Section 4.2.5** a number of small to medium sized animals are found on the proposed site. These animals are likely to breed and forage on the site and surrounds. Furthermore, as noted in **Section 4.2.6** a large number of red listed birds may be found on site.

The proposed project could disturb animals through noise and physical barriers, and may cause animals to leave the area. Footprint impacts from the turbines, PV plant and associated infrastructure such as roads could also impact on fauna. The moving blades of turbines are known to have some impact on birds, although the extent of the impact varies depending on the bird species present in an area.

As no rare or endangered fauna were noted on site, the botanical study will be used as a proxy for potential impacts on fauna. This is based on the assumption that impacts on the botanical environment, which forms the habitat of the fauna are indicative of the impacts on fauna. As such the EAP will use the botanical study and available literature to assess the impacts on fauna. It is however recommended that a specialist avifaunal study be undertaken to ascertain potential impacts on avifauna. The proposed ToR for this specialist study are as follows:

- Undertake the requisite field work to directly assess the habitats present within the inclusive impact zone, and to determine the *in situ* avifauna and identify any significant bird flight corridors present in the area;
- Integrate the-site information with the Southern African Bird Atlas Project (SABAP 1 & 2) and any other relevant bird data available for the general area to develop an inclusive, annotated list of the avifauna expected to occur on the site;

- Highlight Red Data species, endemic, restricted-range or other species of particular concern which may be present in the study area;
- Identify, describe and assess potential direct and indirect and cumulative impacts resulting from the proposed development both on the footprint and the immediate surrounding area during construction and operation; and
- Recommend mitigation measures to reduce or eliminate potential negative impacts on avifauna and improve positive impacts.

It is proposed that Mr Doug Harebottle undertakes the requisite assessment. He is an avifaunal specialist with a Masters in conservation biology. He is the project manager for the Second Southern Bird Atlas Project at the University of Cape Town. Mr Harebottle has furthermore been involved in co-ordinating and managing various national bird programmes.

International literature has indicated a growing need to ascertain impacts of wind energy facilities on bats. Furthermore, due to the increasing numbers of wind energy facilities proposed in South Africa, the cumulative impacts on bats should be considered. Due to the fact that bats reproduce relatively slowly and can aggregate in large numbers in a small area, they are vulnerable to any major impact in that small area. The most common threat of wind turbines on bats is mortalities due to collisions with turbine blades or barotrauma. Barotrauma is when a bat's lung collapses due to low air pressure pockets forming on the lee side of a moving turbine blade. As such, it is recommended that a bat study be undertaken to determine the potential impacts on bats from the proposed projects. The proposed ToR for this specialist study are as follows:

- Undertake the requisite field work to directly assess the habitat types present and make predictions of the species of bats that may reside in different parts of the proposed wind energy site.
- Highlight Red Data species, endemic, restricted-range or other species of particular concern which may be present in the study area;
- Identify, describe and assess potential direct and indirect and cumulative impacts resulting from the proposed development both on the footprint and the immediate surrounding area during construction and operation; and
- Recommend mitigation measures to reduce or eliminate potential impacts on bats.

It is recommended that Mr Werner Marais of Animalia Zoological and Ecological Consultation cc be appointed to undertake the bat study. Mr Marais has an MSc in Biodiversity and Conservation and is a Professional Natural Scientist with SACNSP. Mr Marais has published papers and presented conference papers on bats and is currently undertaking a doctorate in Biodiversity and Conservation. Mr Marais has extensive experience in undertaking bat studies.

4.3.3 Impact on surface water

The Kangnas site is located in the D82C quaternary catchment (BGIS, 2012) and includes numerous non-perennial drainage channels and low-lying depressions / pans. The proposed projects could disturb these wetland areas through footprint impacts as well as changing run off characteristics through hardening of areas on site or diverting run off to other areas. As such it is recommended that a specialist study be undertaken to ascertain the potential impacts on the surface water. The proposed ToR for this specialist study are as follows:

- Undertake the requisite field work;

- Summarise of available information pertaining to surface water (streams, dams and wetlands) in close vicinity to the sites;
- Undertake water quality and biotic assessments/ sampling for stream, wetland and dam condition assessments;
- Describe and determine importance, functionality and trophic state of the water resources;
- Assess the potential impact of the change in site hydrology (quantity) and water chemistry (quality) on any streams, dams and wetlands during the construction and operational phases;
- Evaluate (a) magnitude, frequency of occurrence, duration and probability of impacts, (b) the local, regional, and national significance of predicted impacts, (c) the level of confidence in findings relating to potential impacts, (d) the degree to which the impact can be reversed, and (e) cumulative impacts that may occur as a result of the activities which include mining and associated overburden dumping;
- Recommend mitigation measures aimed at minimising the potential negative impacts and enhancing potential positive impacts while retaining reasonable operational efficiencies;
- List additional or required permitting and/or licensing requirements; and
- Take cognisance of the Wetland Delineation Guideline Document of the Department of Water, and if applicable the DEA&DP draft guideline: "Guideline for involving biodiversity specialists in EIA processes"[24].

It is proposed that Mrs Antonia (Toni) Belcher undertake the aquatic ecology assessment. Mrs Belcher is a Professional Natural Scientist (Aquatic scientist) with SACNSP and holds an MSc in Environmental Management. She has extensive knowledge and experience in water education, aquatic ecosystem monitoring and assessments, EIAs, river classification and environmental water requirements, Integrated Water Resource Management, river, wetlands and estuary management, water resource legislation and water resource institutions.

The surface water study will inform a hydrology study to determine requirements for stormwater. Should this information be available prior to completion of the EIR it will inform the EIR.

4.4 OPERATIONAL PHASE IMPACTS ON THE SOCIO-ECONOMIC ENVIRONMENT

This section of the report describes the socio-economic environment and considers the long-term or operational phase impacts on the social environment that may be associated with the proposed activities, including the following:

- Impact on heritage resources (including palaeontology);
- Impact on visual aesthetics;
- Impact on energy production;
- Impact on local economy (employment) and social conditions;
- Impact on agricultural land; and
- Impact of noise.

[24] Brownlie, S. 2005. Guideline for involving biodiversity specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 053 F. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning.

4.4.1 Impact on heritage resources

Heritage resources include archaeological material (e.g. rock paintings, stone tools), paleontological material (e.g. fossilised materials) and cultural heritage material (e.g. old graveyards, fences or ruins of buildings). Since some potential heritage material is buried, it is often only found during the construction phase of a project.

Kangnas is one of few areas in Namaqualand where pre-colonial rock paintings occur. The heritage value / significance of these sites are currently unknown as they have not been formally described or researched. Due to the relatively undisturbed nature of the site, and the findings from an inception site visit, it is likely archaeological or cultural material would be found on site. A large scale development such as the proposed project could have a negative impact on the archaeological and cultural heritage resources (including visual, landscape and sense of place impacts) by damaging or destroying such material or by requiring the material to be removed and stored *in situ*. It is therefore necessary to assess the potential impacts of the proposed development at an early stage in order to best determine the course of action for heritage resources on site. It is therefore recommended that an HIA, including input on archaeological and heritage and considerations be undertaken. Furthermore, as noted in **Section 1.2.3** "*any development … which will change the character of a site exceeding 5 000 m^2 in extent*", *"the construction of a road…powerline, pipeline…exceeding 300 m in length"* or *"the rezoning of site larger than 10 000 m^2 in extent…"* must be subjected to a heritage study in terms of NHRA, and be approved prior to the commencement of the construction process. The ToR for the cultural heritage and archaeology assessment and palaeontology assessment are provided below.

Undertake a Heritage and Archaeological Impact Assessment of the site in accordance with the requirements of Section 38(3) of the NHRA which would include:

- Conducting a detailed desk-top level investigation to identify all archaeological, cultural and historic sites in the proposed development areas;
  - Undertaking field work to verify results of desktop investigation;
  - Document (GPS coordinates and map) all sites, objects and structures identified on the candidate sites;
  - Submit the relevant application form, as required by South African Heritage Resources Agency and Northern Cape Provincial Heritage (Boswa ya Kapa Bokone);
  - Compile a report which would include:
    - Identification of archaeological, cultural and historic sites within the proposed development areas;
    - Assess the sensitivity and significance of archaeological remains in the site;
    - Evaluation of the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources, in terms of the scale of impact (local, regional, national), magnitude of impact (low, medium or high) and the duration of the impact (construction, up to 10 years after construction (medium term), more than 10 years after construction (long term));
    - Recommendation of mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance;
  - The preparation of a heritage resources management plan which includes recommendations on the management of the objects, sites or features, and also

guidelines on procedures to be implemented if previously unidentified cultural resources are uncovered during later developments in the area;
- Consideration of relevant guidelines; and
- Cognisance must be taken of the Department of Environmental Affairs and Development Planning guideline: "Guideline for involving heritage specialists in EIA processes"[25].

It is recommended that the HIA be undertaken by Mr Jayson Orton of ACO Associates. ACO Associates was established in 2008 as an allied operation to the Archaeology Contracts Office at UCT. With 22 years of accumulated experience, and having completed over 800 projects, members of ACO Associates cc are equipped to handle assignments ranging from detailed, sensitive excavations, to large-scale field surveys and assessments of historic places.

The site has a general low palaeontological sensitivity, but there is a possibility that important fossil assemblages preserved in ancient drainage courses or buried crater lake sediments and cretaceous dinosaur remains may be discovered. A large scale development such as the proposed project could have a negative impact on any paleontological resources by damaging or destroying such material or by requiring the material to be removed and stored *in situ*. It is therefore necessary to determine the likelihood of finding palaeontological resources in order to best determine the course of action for heritage resources on site. It is therefore recommended that a desktop study be conducted for the site to determine the likelihood and need for detailed paleontological assessment.

It is recommended that Dr John Almond of Natura Viva cc be appointed to undertake the field-based palaeontology study. Dr Almond has a doctorate in Earth Sciences (Palaeontology) and over 25 years' experience in the palaeontology.

As noted in **Section 4.2.8**, it is possible that the Kalkkom 'Crater' formed as a result of an olivine melilitite eruption, a meteorite impact or as a synform in the underlying gneiss. The only way to distinguish between these possible origins would be to undertake drilling (preferable core drilling) in the centre of the crater through the calcrete into the underlying bedrock. Prof Harris has noted that while this would be of scientific interest it is not justified in the context of this environmental impact study. As such Mr Harris will be asked to comment on the layout of the proposed facilities to determine if any buffer is required from the potential crater.

4.4.2 Visual impacts

The Kangnas study area is mostly low-lying flat country with granite inselbergs (isolated rocky hills rising abruptly from a flat plain) occurring in the northwest.

Any tall structures, such as existing powerlines, are visible for many kilometres. The potential therefore exists that the proposed wind turbines, the PV plant and associated infrastructure would be visible from many kilometres away. As such it is recommended that a specialist Visual Impact Assessment (VIA) be undertaken to ascertain potential impacts on visual aesthetics. The proposed ToR for this specialist study are as follows:

[25] Winter, S. & Baumann, N. 2005. Guideline for involving heritage specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 053 E. Republic of South Africa, Provincial Government of the Western Cape, DEA&DP.

- Identify issues relating to visual, aesthetic and scenic resources through a desktop study of existing literature and a site visit;
- Describe the receiving environment and the proposed projects in terms of landscape types, landscape character and land use patterns;
- Establish the view catchment area, view corridors, viewpoints and receptors;
- Indication of all potential visual impacts using established criteria
- Inclusion of potential lighting impacts at night
- Undertake an assessment of the visual impacts at the site in terms of the scale of impact (local, regional, national), magnitude of impact (low, medium or high) and the duration of the impact (construction, up to 10 years after construction, more than 10 years after construction). The assessment is to indicate the potential cumulative impacts;
- Describe potential mitigation measures to reduce or eliminate the potential visual impacts identified;
- Assessments must take into account the expected community response as well as the applicable South African standards; and
- Cognisance must be taken of the Department of Environmental Affairs and Development Planning guideline: "Guideline for involving visual and aesthetic specialists in EIA processes" [26].

It is recommended that the VIA be undertaken by Mr Stephen Stead of Visual Resource Management Africa (VRMA) cc. Mr Stead has six years of experience in the field of Geographic Information Systems mapping and spatial analysis working as a consultant for the KwaZulu-Natal Department of Health and then with an EIA company based in the Western Cape. In 2004 he set up the company VRMA which specializes in visual resource management and visual impact assessments in Africa.

4.4.3 Impact on energy production

Historical trends in electricity demand in South Africa have shown a consistent increase in demand. There are some years where the demand levels off or decreases but over the long term there is still an increase. Such a decrease in demand was seen in 2009 in line with the global recession, demand growth has since resumed. As a result, the reserve margin still remains low and Eskom is still short of capacity, a situation that is expected to continue until new base load capacity can be brought online from 2012 onwards. The reserve margin will again be constrained after 2018 should no new base load power stations be constructed. The proposed wind energy facility would be able to provide power to assist in meeting the energy demand within South Africa.

Given that there is a large body of literature with regards to energy demand in South Africa, it is proposed that the EAP assess the potential impact of the proposed project on energy production in South Africa.

[26] Oberholzer, B. 2005. Guideline for involving visual & aesthetic specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 053 F. Republic of South Africa, Provincial Government of the Western Cape, DEA&DP.

4.4.4 Impact on local economy (employment) and social conditions

As noted in **Section 4.2.10** the site is located in a rural area with a very low population density, with neighbours located kilometres away. Employment opportunities in the immediate area stem from farming.

The establishment of the proposed facilities would provide a number of direct, indirect and induced jobs. Direct jobs are created during manufacturing, construction and installation, operation and maintenance. As such it is recommended that a specialist Socio-economic Impact Assessment (SIA) be undertaken to ascertain potential impacts on the socio-economic level for the area. The proposed ToR for this specialist study is as follows:

- Provide a baseline socio-economic analysis to provide an understanding of the current socio-economic environment;
- Undertake an in-depth analysis of proposed positive and negative socio-economic impacts resulting from the proposed projects;
- Describe potential impacts on socio-economic aspects. The following impacts should be focussed on:
    - Contribution to economic growth in the region (Direct and Indirect) – Gross Domestic Product per Region (GDPR)
    - Impact on regional development (business and other)
    - Impact on productivity and production (sales, etc.) of existing firms in the region,
    - Impact on infrastructure and resources in the region
    - Impact on employment and income
    - Impact on social lives of local communities
    - Improved competitiveness of the region
    - Change in the size of the local economy
    - Implications to local agriculture.

  Economic impacts of the proposed project should be considered by applying one or a combination of the following procedures, depending on the availability and applicability of economic and econometric models:
- Utilise existing national Social Accounting Matrix (SAM) tables to undertake the indirect impacts
- Derive multipliers to apply to direct impacts
- Apply industry standard production parameters related to the relevant sectors.
- Recommend mitigation measures to improve positive and decrease negative impacts as a result of the proposed projects.

It is recommended that the SIA be undertaken by Alex Kempthorne of Urban-Econ. Ms Kempthorne has gained considerable experience in development economics since her appointment at Urban Econ's Cape Town office 14 years ago. She is currently a Director and the Office Manager of the Cape Town Office.

4.4.5 Impact on agricultural land

As noted in **Section 4.2.11** the site is considered to have extremely low crop production potential, whereas the grazing potential is considered to be moderately high. Portions of the site will be removed from agricultural use due to footprint impacts of the proposed projects.

Therefore it is recommended that an Agricultural Impact Assessment be undertaken to confirm the potential impacts on agriculture. The ToR for the study is provided below:

- Undertake a detailed soil assessment of the sites, incorporating a radius of 50 m surrounding the site, on a scale of 1:10 000 or finer. The soil assessment should include:
    - Identification of the soil forms present on sites;
    - The size of the area where a particular soil form is found;
    - GPS readings of soil survey points;
    - The depth of the soil at each survey point;
    - Soil colour;
    - Limiting factors;
    - Clay content
    - Size of the site
    - Slope of the sites; and
    - A detailed map indicating the locality of the soil forms within the specified areas.
- Exact locality of the site
- Describe current activities on the sites, developments and buildings;
- Describe surrounding developments/ land uses and activities in a radius of 500 m of the sites, access routes and the condition thereof, the current status of the land (including erosion, vegetation and a degradation assessment) and possible land use options for the sites;
- Possible land use options for the site
- Describe water availability, source and quality (if available);
- Detailed descriptions of why agriculture should or should not be the land use of choice;
- Undertake an assessment of the potential impacts on agriculture at the site in terms of the scale of impact (local, regional, national), magnitude of impact (low, medium or high) and the duration of the impact (construction, up to 10 years after construction, more than 10 years after construction). The assessment is to indicate the potential cumulative impacts;
- Describe potential mitigation measures to reduce or eliminate the potential agricultural impacts identified; and
- Provide a shape file containing the soil forms and relevant attribute data as depicted on the map.
- Provide an erosion management plan for monitoring and rehabilitating of erosion events associated with the facility.

It is recommended that Mr Kurt Barichievy of SiVEST undertake the agricultural assessment. Mr Barichievy is a registered Professional Natural Scientist (Registration No. 400129/11) and holds a MSc. Degree in Hydrology from the University of Pietermaritzburg . Mr Barichievy has undertaken a number of soil surveys, agricultural assessments and provided specialist input during the past ten years Mr Batichievy is currently working on a number of energy facilities.

4.4.6 Impact of noise on sensitive receptors

The area surrounding the proposed site consists predominantly of relatively flat grazing lands. As such, the rural atmosphere generates little noise. The potential exists for noise from the proposed turbines to affect surrounding landowners. However, due to the rural landscape and remote location of the site there are few nearby sensitive receptors.

It is recommended that a noise study is undertaken to assess the potential noise impacts of the proposed projects on sensitive receptors. The proposed ToR for this study are provided below:

- Undertake noise propagation modelling for both the construction and operational phases;
- Compare the calculated noise levels LAeq against the measured background noise level as well as the appropriate SABS rating level to determine the potential impact on the surrounding environment, focusing on potential sensitive receptors;
- Compile a report for the EIA Phase as per SANS 10328:2003 which would include:
    - Evaluation of the potential impacts of construction, operation and maintenance of the proposed development on the ambient noise levels, in terms of the scale of impact (local, regional, national), magnitude of impact (low, medium or high) and the likely duration of the impact.
    - The assessment is to indicate the potential cumulative impacts (noise impacts in context of the surroundings);
    - Recommendation of mitigation measures to minimise or eliminate predicted impacts on noise receptors. This will include providing input into the construction and operational phase EMP to be developed for the proposed projects.
- All aspects of the investigation are to conform to the requirements of relevant environmental legislation and noise impact assessment procedure and standards.

It is recommended that Mr Morné de Jager of M2 Environmental Connections cc Menco be appointed to undertake the noise study. Mr de Jager has a B.Ing (Chemical Engineering) from the Pretoria University and is an Associate at the Southern African Acoustics Institute. Mr de Jager has over five years of Noise Impact assessment experience and is currently working on a number of wind energy facilities projects.

4.5 CONSTRUCTION PHASE IMPACTS ON THE BIOPHYSICAL AND SOCIAL ENVIRONMENTS

The construction phase is likely to result in a number of potential impacts on the biophysical and the socio-economic environment. These could potentially include:

- Disturbance of flora and fauna (including avifauna and bats);
- Sedimentation and erosion of water ways;
- Impact on local economy (employment) and social conditions;
- Impact on traffic;
- Storage of hazardous substances on site;
- Noise pollution; and
- Dust impact.

The significance of construction phase impacts is likely to be limited by their relatively short duration, since the construction phase would last approximately 36 months and 24 months for the proposed wind and solar energy facilities, respectively. Many of the construction phase impacts could be mitigated through the implementation of an appropriate Environmental Management Plan (EMP). During the EIA Phase, the construction phase impacts on the biophysical and socio-economic environment will be assessed, in terms of the methodology outlined in the Plan of Study for EIA (see Chapter 5). Furthermore, an EMP will be compiled as part of the EIA process, and submitted as part of the EIAR, to provide mitigation and ascribe responsibilities for many of the construction phase impacts.

The potential construction phase impacts listed above are described in more detail below.

4.5.1 Disturbance of flora and fauna

This impact considers impacts beyond the permanent footprint impacts of the proposed wind energy facility. Alien plant seeds could be introduced with construction material such as sand or other materials, with any disturbed areas being particularly vulnerable.

During the construction phase the vegetation within the footprint of the activity would be cleared. This might result in a loss of habitat and or habitat fragmentation. Any affected fauna or avifauna would generally be largely mobile and would relocate during the construction phase and are likely to recolonise the area, once the construction phase has been completed and the disturbed areas rehabilitated.

4.5.2 Sedimentation and erosion

The sediment loads of any drainage depressions or pans may increase due to the excavations on the site, the laying of linear infrastructure across drainage lines and other construction related activities. This would be exacerbated during the wet season and during any intense rainfall events.

4.5.3 Impact on local economy (employment) and social conditions

As noted in **Section 4.2.10** the site is located in a rural area with a very low population density, with neighbours located kilometres away. Employment opportunities in the immediate area stem from farming.

The establishment of the proposed facilities would provide a number of direct, indirect and induced jobs. Direct jobs are created during manufacturing, construction and installation, operation and maintenance. The SIA will provide input into the construction phase impacts on the local economy and social conditions.

4.5.4 Impact on traffic

A number of construction vehicles would be required onsite, including bakkies, excavators, trucks and other earth moving equipment. Construction vehicles are likely to make use of the existing roads, including the N14, to transport equipment and material to the construction site. Due to the large size of many of the facility's components (e.g. tower and blades) and the need for them to be transported via "abnormal loads" from Cape Town or Port Elizabeth harbour, construction related traffic could impact negatively on the traffic flow in the vicinity and on the integrity of the affected roads. The necessary clearances from the respective Roads Authorities would need to be in place prior to the transporting of these loads.

4.5.5 Storage of hazardous substances on site

As at any construction site, various hazardous substances are likely to be used and stored on site. These substances may include amongst other things, diesel, curing compounds, shutter oil

and cement. Utilisation of such substances in close proximity to the aquatic environment such as pans is of greater concern than when used in a terrestrial environment.

Use of hazardous substances at a construction site is controlled by various pieces of legislation. The management and protection of the environment would however be achieved through the implementation of an EMP, which would *inter alia* specify the storage details of hazardous compounds and the emergency procedures to follow in the event of a spillage.

4.5.6 Noise pollution

An increase in noise pollution would be expected from the operation of heavy machinery during the construction period, as well as due to the increased traffic. The severity of this impact is likely to be reduced due to the low numbers of people in close proximity to the site.

4.5.7 Dust impacts

Construction vehicles are likely to make use of the existing farm roads to transport equipment and material to the construction site. Earthworks would also be undertaken. These activities would exacerbate dust especially in the dry winter months. The dust impact would be managed through the EMP, which would include procedures for dealing with dust pollution events including watering of roads, etc.

5 PLAN OF STUDY FOR EIA

The purpose of this Chapter is to detail the Plan of Study for the EIA Phase to ensure that this EIA process satisfies the requirements of NEMA.

5.1 PURPOSE OF THIS PLAN OF STUDY FOR EIA

The Scoping process has been documented in this Scoping Report, which has identified various potential environmental impacts and project alternatives that require detailed investigation. This Plan of Study is the culmination of the Scoping Phase and its purpose is to ensure that the EIA Phase of this EIA process satisfies the requirements of NEMA. Accordingly, this Plan of Study for EIA outlines the anticipated process and products for the EIA Phase.

This Plan f Study for EIA has been compiled in terms of GN No. R.33306 of 18 June 2010 of NEMA and will be submitted to DEA for their consideration.

5.2 DESCRIPTION OF THE ACTIVITY

The nature of the activity is described in detail in **Chapter 3**, but in brief includes the following:

Proposed wind energy facility:

- Location alternatives:
    - One location for the proposed wind energy facility;
- Activity alternatives:
    - Wind energy generation via wind turbines; and
    - “No-go” alternative to wind energy production.
- Site layout alternatives:
    - One layout alternative per site;
    - One main substation location, with four satellite substations.
- Technology alternatives:
- A minimum and maximum tipheight of 100 – 180m

Proposed solar energy facility:

- Location alternatives:
    - One location for the proposed PV plant..
- Activity alternatives:
    - Solar energy generation via a PV plant; and
    - “No-go” alternative to solar energy production.
- Site layout alternatives:
    - One layout alternative (250 MW with 1000 ha footprint
- Technology alternatives:
    - Two technology alternatives in terms of the solar panel type (PV vs CPV); and
    - Mounting system: trackers vs. fixed mount.

5.3 DESCRIPTION OF TASKS TO BE PERFORMED

5.3.1 Potential environmental impacts identified during Scoping

Chapter 4 has identified the range of potential environmental impacts associated with the proposed project. During this scoping exercise a shortlist of potentially significant environmental impacts was identified for further, more detailed investigation during the EIA Phase. Specifically the following potential environmental impacts have been identified:

- Construction phase impacts on the biophysical and socio-economic environments:
  - Disturbance of flora and fauna;
  - Sedimentation and erosion of water ways;
  - Impact on local economy (jobs) and social conditions;
  - Impact on traffic;
  - Storage of hazardous substances on site;
  - Dust impacts;
- Operational phase impacts on the biophysical environment:
  - Impact on flora;
  - Impact on fauna (including avifauna and bats); and
  - Impact on surface water.
- Operational phase impacts on the socio-economic environment:
  - Impact on heritage resources (including palaeontology);
  - Visual impacts;
  - Impact on energy production;
  - Impact on local economy (employment) and social conditions;
  - Impact on agricultural land; and
  - Impact of noise.

5.3.2 Method of assessing the significance of potential environmental impacts

This section outlines the proposed method for assessing the significance of the potential environmental impacts outlined above. As indicated, these include both operational and construction phase impacts.

For each impact, the EXTENT (spatial scale), MAGNITUDE and DURATION (time scale) would be described. These criteria would be used to ascertain the SIGNIFICANCE of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place. The mitigation described in the EIAR would represent the full range of plausible and pragmatic measures but does not necessarily imply that they would be implemented.[27]

The tables on the following pages show the scale used to assess these variables, and defines each of the rating categories.

[27] The applicant will be requested to indicate at the Draft EIAR stage which alternative and mitigation measures they are prepared to implement.

Table 5.1: Assessment criteria for the evaluation of impacts

CRITERIA	CATEGORY	DESCRIPTION
Extent or spatial influence of impact	**Regional**	Beyond a 10 km radius of the candidate site.
	Local	Within a 10 km radius of the candidate site.
	Site specific	On site or within 100 m of the candidate site.
Magnitude of impact (at the indicated spatial scale)	**High**	Natural and/ or social functions and/ or processes are *severely* altered
	Medium	Natural and/ or social functions and/ or processes are *notably* altered
	Low	Natural and/ or social functions and/ or processes are *slightly* altered
	Very Low	Natural and/ or social functions and/ or processes are *negligibly* altered
	Zero	Natural and/ or social functions and/ or processes remain *unaltered*
Duration of impact	**Construction period**	Up to 3 years
	Short Term	Up to 5 years after construction
	Medium Term	5-15 years after construction
	Long Term	More than 15 years after construction

The SIGNIFICANCE of an impact is derived by taking into account the temporal and spatial scales and magnitude. The means of arriving at the different significance ratings is explained in **Table 5.2.**

Table 5.2: Definition of significance ratings

SIGNIFICANCE RATINGS	LEVEL OF CRITERIA REQUIRED
High	• High magnitude with a regional extent and long term duration • High magnitude with either a regional extent and medium term duration or a local extent and long term duration • Medium magnitude with a regional extent and long term duration
Medium	• High magnitude with a local extent and medium term duration • High magnitude with a regional extent and construction period or a site specific extent and long term duration • High magnitude with either a local extent and construction period duration or a site specific extent and medium term duration • Medium magnitude with any combination of extent and duration except site specific and construction period or regional and long term • Low magnitude with a regional extent and long term duration
Low	• High magnitude with a site specific extent and construction period duration • Medium magnitude with a site specific extent and construction period duration • Low magnitude with any combination of extent and duration except site specific and construction period or regional and long term • Very low magnitude with a regional extent and long term duration
Very low	• Low magnitude with a site specific extent and construction period duration • Very low magnitude with any combination of extent and duration except regional and long term
Neutral	• Zero magnitude with any combination of extent and duration

Once the significance of an impact has been determined, the PROBABILITY of this impact occurring as well as the CONFIDENCE in the assessment of the impact, would be determined

using the rating systems outlined in **Table 5.3** and **Table 5.4** respectively. It is important to note that the significance of an impact should always be considered in concert with the probability of that impact occurring. Lastly, the REVERSIBILITY of the impact is estimated using the rating system outlined in **Table 5.5**.

Table 5.3: Definition of probability ratings

PROBABILITY RATINGS	CRITERIA
Definite	Estimated greater than 95 % chance of the impact occurring.
Probable	Estimated 5 to 95 % chance of the impact occurring.
Unlikely	Estimated less than 5 % chance of the impact occurring.

Table 5.4: Definition of confidence ratings

CONFIDENCE RATINGS	CRITERIA
Certain	Wealth of information on and sound understanding of the environmental factors potentially influencing the impact.
Sure	Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact.
Unsure	Limited useful information on and understanding of the environmental factors potentially influencing this impact.

Table 5.5: Definition of reversibility ratings

REVERSIBILITY RATINGS	CRITERIA
Irreversible	The activity will lead to an impact that is in all practical terms permanent.
Reversible	The impact is reversible within 2 years after the cause or stress is removed.

5.4 NEED FOR ADDITIONAL INFORMATION: SPECIALIST STUDIES

In reviewing the potential environmental impacts, all impacts initially identified during the Scoping Phase have been identified as being of concern and requiring further investigation. Accordingly, we propose to undertake the specialist studies listed in **Table 5.6**, in order to address a suite of potential environmental impacts.

Table 5.6: Specialist investigations proposed and recommended consultant

Study	Consultant (Organisation)
Agricultural Potential Assessment	Mr Kurt Barichievy (SiVEST)
Archaeological & Heritage Assessment	Mr Jayson Orton (ACO Associates cc)
Aquatic Ecology Assessment	Mrs Antonia Belcher (Private)
Avifauna Assessment	Dr Doug Harebottle (Private)
Bats Sensitivity Assessment	Mr Werner Marais (Animalia Zoological and Ecological Consultation)
Botanical Assessment	Dr Dave MacDonald (Bergwind Botanical Surveys)
Noise Impact Assessment	Mr Morne de Jager (Menco)
Paleontological Assessment	Dr John Almond (Natura Viva cc)
Socio – Economic Assessment	Me Alex Kempthorne (Urban – Econ Development Economics)

Study	Consultant (Organisation)
Visual Impact Assessment	Mr Stephen Stead (VRMA)

The ToR for these investigations as well as the identified specialists are outlined **Chapter 4**. A short summary of the various specialist consultants is given below the ToR in **Chapter 4**. CVs are available upon request.

5.5 REASONABLE PROJECT ALTERNATIVES IDENTIFIED DURING SCOPING

Chapter 3 reviewed a range of project alternatives associated with the proposed activities. Pursuant to this Scoping exercise, which was based on input from the authorities, I&APs and various specialists, a shortlist of reasonable project alternatives has been identified for further, more detail investigation during the EIA Phase, namely:

Proposed wind energy facility:

- Location alternatives:
    - One location for the proposed wind energy facility;
- Activity alternatives:
    - Wind energy generation via wind turbines; and
    - “No-go” alternative to wind energy production.
- Site layout alternatives:
    - One layout alternative per site;
    - One main substation location, with four satellite substations.
- Technology alternatives:
- A minimum and maximum tipheight of 100 – 180m

Proposed solar energy facility:

- Location alternatives:
    - One location for the proposed PV plant..
- Activity alternatives:
    - Solar energy generation via a PV plant; and
    - “No-go” alternative to solar energy production.
- Site layout alternatives:
    - One layout alternative (250 MW with 1000 ha footprint
- Technology alternatives:
    - Two technology alternatives in terms of the solar panel type (PV vs CPV); and
    - Mounting system: trackers vs. fixed mount.

Other potential alternatives were considered and screened out in **Chapter 3**. These are documented in **Section 3.4**.

5.6 THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

The purpose of the EIAR would be to undertake a comparative assessment of the relative significance of the potential environmental impacts for each of the proposed wind and sola energy facilities location and activity alternatives. The EIAR would thus include the following:

- A brief overview of the potential environmental impacts and reasonable alternatives identified during the Scoping investigation.
- A summary of the key findings of the various specialist studies as they pertain to the affected environment.
- An overview of the public participation process conducted during the compilation of the EIAR.
- A detailed assessment of the significance of the potential environmental impacts for the various project alternatives. This assessment, which would use the methodology outlined in **Section 5.3.2**, would be informed by the findings of the specialist studies, and professional judgement.
- An overview of the full range of mitigation measures including an indication of how these would influence the significance of any potential environmental impacts, together with a lifecycle EMP. The mitigation measures would be informed by the specialist studies, professional experience and comment received from I&APs.
- A set of recommendations regarding the way forward would be provided, should any of the proposed alternatives be authorised in terms of NEMA.

5.7 PUBLIC PARTICIPATION PROCESS

The purpose of the public participation process would be to provide I&APs with adequate opportunity to have input into the environmental process. The public participation process would include the following:

5.7.1 Public comment on the Draft EIAR

Following the completion of the Draft EIR (refer to **Section 5.6** above), it will be lodged at the Springbok and Pofadder Public Libraries and on Aurecon's website (www.aurecongroup.com[28]). I&APs will be notified of the lodging of the reports by means of letters, and given 30 days in which to comment on the report. During the comment period a public meeting may be held with I&APs, should sufficient interest be shown in the proposed projects, to enable I&APs to provide feedback on the draft report. Registered I&APs would be notified of the focus group meeting, should one be held, by way of a letter.

Executive summary and letters would be in English and Afrikaans.

The public comments would be consolidated into an annexure of the EIAR. This would take the form of a CRR, which would summarise the issues raised and provide the project team's responses thereto. The draft report would also be revised in light of feedback from the public, where necessary.

5.7.2 Public comment on the Final EIAR

Once the EIAR has been finalised, it will be made available for a 21 day comment period. The report will be made available in the same locations in which the Draft EAIR was made available, and I&APs will be notified of the availability of the Final EIAR in writing. Any comments

[28] indicate "Current Location" as "South Africa" and follow the Public Participation link

received will not be included in a CRR but will instead be collated and forwarded directly to DEA.

5.7.3 Opportunity for appeal

All registered I&APs would be notified in writing of the release of the Environmental Authorisation. They would be reminded of their right to appeal against DEA's decision to the Minister of Environmental Affairs in terms of NEMA.

5.8 PROPOSED PROGRAMME

A summary of the proposed programme is given in **Table 5.7** below.

Table 5.7: Proposed EIA programme

Activity	Proposed date	Deliverable
2nd round of public engagement:		
• Letter to I&APs	June 2012	Informed I&APs
• Lodge draft SR in public venues and with Authorities	June 2012	DSR in libraries, websites etc.
• Focus group meeting	July 2012	Public engagement
• Public comment period ends	July 2012	Updated CRR
Submit final SR (incl. Plan of Study for EIA) to environmental authority	Aug 2012	Approved SR & Plan of Study EIA
Specialist studies	Aug – Sept 2012	Specialist reports
3rd round of public engagement:		
• Letter to I&APs	Sept 2012	Informed I&APs
• Lodge draft EIAR in public venues	Sept 2012	Draft EIAR in libraries, website etc.
• Focus group meeting, if necessary	Oct 2012	Public engagement
• Public comment period ends	Oct 2012	Updated CRR
Submit final EIAR to environmental authority	Nov 2012	Environmental Authorisation

5.9 PERSONNEL

As for the Scoping phase, Aurecon's Louise Corbett would provide strategic guidance to the EIA process and Corlie Steyn would undertake the management of the EIA process and the requisite reporting. A short summary of these consultants is given below. CVs are available upon request.

Miss Louise Corbett an Associate in the Cape Town office has a Bachelor's of Science (Hons) degree in Environmental and Geographical Science, specialising in Environmental Management, from the University of Cape Town. Louise is registered as a Professional Natural Scientist with SACNSP. Louise has over six years' experience in the environmental field and has compiled and managed numerous environmental investigations including EIAs, Environmental Management Plans and Programmes throughout South Africa.

Mrs Corlie Steyn holds a BA degree, Higher Education Diploma and Honours degree in Geography (Cum Laude) (1997) from University of Pretoria. She has had extensive experience in environmental management, research projects, and lectures part-time at Nelson Mandela Metropolitan University for the Department Nature Conservation. She spent a number of years as an environmental officer with DEA&DP of the Western Cape provincial government where she was primarily responsible for the evaluation and review of EIAs, as well as advising on law enforcement and environmental matters. Corlie is currently studying towards an MPhil in Environmental Management at the University of Stellenbosch, South Africa.

6 CONCLUSIONS AND WAY FORWARD

The purpose of this Chapter is to briefly summarise and conclude the Scoping Report and describe the way forward.

6.1 CONCLUSIONS

As per the requirements of NEMA, this Scoping investigation has reviewed a range of project alternatives and contemplated the array of potential environmental impacts associated with the following proposed activities in Springbok:

Proposed wind energy facility:

- Construction of between 250 and 500 wind turbines of 1.5-3 MW capacity;
- Associated infrastructure including:
    - Hard standings of 20 m x 40 m alongside turbines;
    - Access roads of 4 – 10 m wide between turbines;
    - Overhead transmission lines connecting turbines;
    - One main substation connecting the proposed energy facilities to the Eskom line; and
    - Four satellite substations that would link sectors of the facility to a main substation with overhead lines.

Proposed solar energy facility:

- Construction of 250 MW of PV and/or CPV;
- Associated infrastructure including:
    - Access roads of 4 – 10 m wide to the PV plant; and
    - Four satellite substations that would link sectors of the facility to a main substation with overhead lines.

The following feasible alternatives have been identified for further consideration in the EIAR:

Proposed wind energy facility:

- Location alternatives:
    - One location for the proposed wind energy facility;
- Activity alternatives:
    - Wind energy generation via wind turbines; and
    - “No-go” alternative to wind energy production.
- Site layout alternatives:
    - One layout alternative per site;
    - One main substation location, with four satellite substations.
- Technology alternatives:
- A minimum and maximum tipheight of 100 – 180m

Proposed solar energy facility:

- Location alternatives:
    - One location for the proposed PV plant..
- Activity alternatives:

  - Solar energy generation via a PV plant; and
  - "No-go" alternative to solar energy production.
- Site layout alternatives:
  - One layout alternative (250 MW with 1000 ha footprint
- Technology alternatives:
  - Two technology alternatives in terms of the solar panel type (PV vs CPV); and
  - Mounting system: trackers vs. fixed mount.

Specifically the following potential environmental impacts have been identified for further consideration in the EIAR:

- Operational phase impacts on the biophysical environment:
  - Impact on flora;
  - Impact on fauna (including avifauna and bats); and
  - Impact on surface water.
- Operational phase impacts on the socio-economic environment:
  - Impact on heritage resources (including palaeontology);
  - Visual impacts;
  - Impact on energy production;
  - Impact on local economy (employment) and social conditions;
  - Impact on agricultural land; and
  - Impact of noise.
- Construction phase impacts on the biophysical and socio-economic environments

The specialist studies and specialists who will be commissioned to provide more detailed information on those environmental impacts which have been identified as potentially being of most concern, and/or where insufficient information is available, are listed in **Table 6.1**.

Table 6.1: Specialist investigations and recommended consultant

Study	Consultant and Organisation
Agricultural Potential Assessment	Mr Kurt Barichievy (SiVEST)
Archaeological & Heritage Assessment	Mr Jayson Orton (ACO Associates)
Aquatic Ecology Assessment	Me Antonia Belcher (Private)
Avifauna Assessment	Dr Doug Harebottle (Private)
Bats Sensitivity Assessment	Mr Werner Marais (Animalia Zoological and Ecological Consultation)
Botanical Assessment	Dr Dave MacDonald (Bergwind Botanical Surveys)
Meteorite Assessment	Prof Chris Harris (Private)
Noise Impact Assessment	Mr Morne de Jager (Menco)
Paleontological Assessment	Dr John Almond (Natura Viva)
Socio – Economic Assessment	Me Alex Kempthorne (Urban – Econ Development Economics)
Visual Impact Assessment	Mr Stephen Stead (VRMA)

The rationale for these specialist investigations and the ToR has been outlined under the relevant impacts in **Chapter 4** of this report.

The approach to the EIA Phase should be conducted in terms of the guidelines outlined in the Plan of Study for EIA in **Chapter 5**.

6.2 THE WAY FORWARD

The initial stage of the public participation process involves the lodging of this DSR on Aurecon's website (www.aurecongroup.com change "Current Location" to "South Africa" and follow the "Public Participation" link) and the Springbok and Pofadder Public Libraries.

I&APs have been invited to a public meeting on **3 July 2012** to present and discuss the findings of the DSR at Springbok Show Hall (Skousaal) at 17h00-19h00. I&APs are requested to RSVP by 25 June 2012 and should the number of RSVP's be insufficient the meeting would be cancelled and I&APs would instead be contacted telephonically/electronically to discuss any issues and concerns they may have.

I&APs have 30 days, until **23 July 2012**, to submit their written comments on the DSR. Cognisance will be taken of all comments in compiling the final report and the comments, together with the project team and proponent's responses thereto, will be included in the final report.

Comments should be directed to:

Aurecon

Corlie Steyn	or	Louise Corbett
P O Box 509, George, 6530		PO Box 494, Cape Town, 8000
Tel: 044 805 5421		Tel: 021 526 6027
Fax: 044 805 5454		Fax: 021 526 9500
Email: cornelia.steyn@aurecongroup.com		Email: louise.corbett@aurecongroup.com

Once the FSR has been completed and all I&AP comments have been incorporated into the report, as necessary, and the client has approved the report, it will be submitted to DEA and the Northern Cape DEANC for their review and comment, respectively. DEA will either reject the application or instruct the applicant to proceed to the EIA Phase, either as proposed in the Plan of Study for EIAR, or direct that amendments are made before continuing.

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7 REFERENCES

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7.4 PERSONAL COMMUNICATION

Personal communication between Louise Corbett of Aurecon and Sandile Vilakazi of DEA on 13/09/2011 via e-mail

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