



Draft Environmental Impact Report

**Proposed Roggeveld Wind Farm, Western and
Northern Cape
DEA Ref: 12/12/20/1988**

G7 Renewable Energies (Pty) Ltd

Non Technical Summary

October 2011

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G7 Renewable Energies (Pty) Ltd

Non- Technical Summary for Draft
Environmental Impact Report

*Proposed Roggeveld Wind Farm, Western
and Northern Cape*

October 2011

Prepared by: Junaid Moosajee and Tania Swanepoel

DEA Reference: 12/12/20/1988

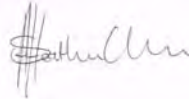
ERM Reference: 0144093

www.erm.com/G7_Renewable_Energies

For and on behalf of
Environmental Resources Management

Approved by: Stuart Heather-Clark

Signed:



Position: Partner

Date: 17 October 2011

This report has been prepared by Environmental Resources Management the trading name of Environmental Resources Management Southern Africa (Pty) Limited, with all reasonable skill, care and diligence.

Available in Afrikaans

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NON-TECHNICAL SUMMARY

INTRODUCTION

G7 Renewable Energies (Pty) Ltd, hereafter referred to as G7, appointed Environmental Resources Management Southern Africa (Pty) Ltd, hereafter referred to as ERM, as independent environmental consultants to undertake the Environmental Impact Assessment (EIA) process for the proposed development of a wind energy facility at the Roggeveld site, in the Western and Northern Cape (Central Karoo and Namakwa Districts respectively) (see *Figure 1.1*). The proposed facility will utilise wind turbines to generate electricity that will be fed into the National Power Grid. The facility will have an energy generation capacity of up to 750 MW.

PURPOSE OF THIS REPORT

This report is the non-technical summary of the draft Environmental Impact Report (EIR) for G7's proposed Wind Farm. The draft Environmental Impact Report has been compiled as part of the EIA process in accordance with the regulatory requirements stipulated in the EIA Regulations promulgated in terms of Section 24(5) of the National Environmental Management Act (NEMA) (Act No. 107 of 1998), as amended.

The report provides a summary of the proposed project activities, alternatives considered, the EIA methodology, and impacts identified and assessed.

EIA PROCESS, APPROACH AND METHODOLOGY

There are a number of legislative requirements that the project will need to adhere to, all of which are discussed in the draft Environmental Impact Report. The key legislation that drives the EIA process is the National Environmental Management Act (Act No. 107 of 1998), as amended and the NEMA EIA Regulations, 2006 (Government Notice R. 385, R. 386 and R. 387). The EIA regulations govern how the EIA process should be undertaken. This includes specific tasks that allow for I&APs to be involved in the EIA process.

Note that on 18 June 2010 new EIA Regulations (Government Notice No R. 543, 544, 545 and 546) were promulgated in terms of Section 24(5) of NEMA. These regulations came into effect on 1 August 2010, replacing the regulations of 21 April 2006. However the regulations provide for transitional situations and Section 76(1) states that: '*An application submitted in terms of the previous NEMA regulations and which is pending when these Regulations take effect, must despite the repeal of those regulations be dispensed with in terms of those previous NEMA regulations as if those previous NEMA regulations were not repealed*'. Therefore since the application for this project was submitted to the DEA on 16 July 2010, prior to the commencement of the new regulations, and no new

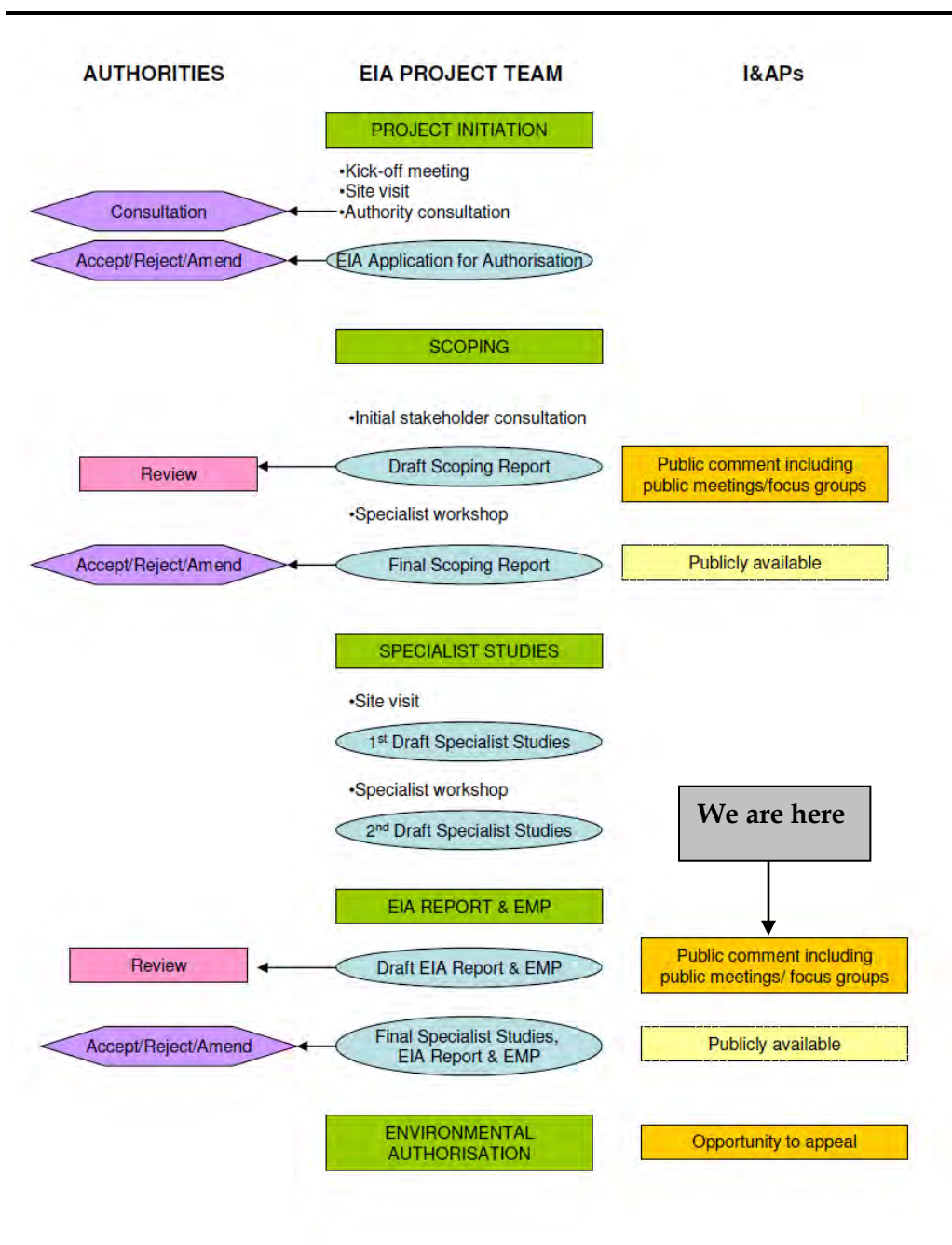
listed activities have been identified, the application will continue under the 2006 EIA Regulations as if they had not been replaced.

The EIA process consists of the following phases:

- project initiation;
- scoping study phase; and
- integration and assessment phase.

The figure below provides an outline of the EIA process and indicates where you can be involved as an I&AP. All steps are described in more detail in the draft Environmental Impact Report (EIR).

EIA Process Flow Diagram



YOUR OPPORTUNITY TO COMMENT

The non-technical summary and draft Environmental Impact Report for G7's proposed wind farm have been made available for stakeholder comment. A hardcopy of the EIR has been made available at the Laingsburg and Sutherland Libraries and it can be accessed electronically at http://www.erm.com/G7_Renewable_Energies.

A notification letter has been sent to all registered and identified I&APs to inform them of the release of the EIR and where the report can be reviewed.

A public meeting will be held at the Sutherland Hotel on 08 November 2011 to present the findings of the impact assessment phase and facilitate the gathering of comments at this stage of the EIA. Newspaper adverts have been placed and notifications sent to I&APs, notifying members of the public and I&APs of the public meeting.

Comments should be forwarded to ERM at the address, tel. /fax numbers or e-mail address shown below. The deadline by which comments on the draft EIR are to reach ERM is 28 November 2011.

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PROJECT JUSTIFICATION

The intention of G7 in establishing wind energy facilities is to develop wind resources to generate electricity, reduce South Africa's dependence on non-renewable fossil fuel resources and contribute to climate change mitigation. The proposed Roggeveld Wind Farm project would contribute to providing a future of increased energy security and sustainability whilst providing energy to facilitate South Africa's continuing development.

In addition to the energy produced by the wind energy facility, the proposed project has the added advantage of income generation through the sale of the electricity produced, which can supplement the income of marginally productive farms and be used to contribute towards funding sustainable community development projects. As the proposed Roggeveld Wind Farm is

located in the central part of the country it also promotes grid support and may result in a more secure energy supply for energy users in the local area, as a generating facility increases the locality's priority in Eskom's distribution network and therefore potentially reduces the risks of future load shedding in the area.

Project Motivation

- Reduce South Africa's dependence on fossil fuel resources
- Improve reliability and range of electrical services
- Meet demand for diversified energy sources
- Ensure the future of sustainable energy use
- Reduce CO₂ emissions and the nation's carbon footprint
- Contribute to targets for emission reduction as outlined in IRP 2010
- Promote environmental, social and economically sustainable development
- Create long term jobs
- Contribute to reaching South Africa's goal of 10,000 GWh of renewable energy by 2013
- Contribute to meeting the NERP goal of 30 percent of all new energy from IPPs

PROJECT DESCRIPTION

The proposed wind energy facility is located to the west of the R354, approximately 45 km south of Sutherland and 30 km north of Matjiesfontein. The site is located in both the Western and Northern Cape Provinces, on parts of the following farms (see *Table 1.1*).

Table 1.1 *Roggeveld Wind Farm Location*

Farm Name	Farm Number	Province
Ekkraal	RE/199	Northern Cape
Bon Esperance	RE/73	Western Cape
Wilgebosch Rivier	188	Northern Cape
Rietfontein	197	Northern Cape
Karreebosch	RE/200	Northern Cape
Ek Kraal	2/199	Northern Cape
Klipbanks Fontein	RE/198	Northern Cape
Klipbanks Fontein	1/198	Northern Cape
Bon Esperance	1/173	Western Cape
Ek Kraal	1/199	Northern Cape
Barendskraal	1/76	Western Cape
Barendskraal	RE/76	Western Cape
Fortuin	1/74	Western Cape
Brandvalley	RE/75	Western Cape
Hartjies Kraal	1/77	Western Cape
Brandvalley	1/75	Western Cape
Fortuin	3/74	Western Cape
Fortuin	RE/74	Western Cape
Hartjies Kraal	RE/77	Western Cape
Nuwerus	RE/284	Western Cape
Kabeltouw	160	Western Cape
Appelsfontein	RE/201	Northern Cape

The key components of the proposed Roggeveld Wind Farm are listed and discussed below, and include the following:

- Wind turbines;
- Electrical connections;
- Substation complex;
- Access roads and site access; and
- Additional project infrastructure.

The total site area is 37 000 hectares ha (37 km²) and it is estimated that less than 1% of the overall site area will be used for the proposed development.

Modern wind turbine designs incorporate tubular towers, three blades and a nacelle which houses a generator, gearbox and other operating equipment. An example of a typical wind turbine of the type envisaged for the site is shown in *Figure 2*, below. It was planned that the Roggeveld site would support 250 wind turbines under Layout Alternative 1 however based on specialist study findings and other technical reasons, the Final Layout (Alternative 2) consists of 228 wind turbines with an individual capacity of up to 3 MW. The turbines are to be supported on reinforced concrete foundations. There will be a gravel surfaced hard standing adjacent to each turbine for use by cranes during construction and retained for maintenance use throughout the life span of the project.

The turbines will be connected to each other, and the turbine rows will be connected to a new substation that would be built as part of the development. The electricity generated by the facility will be fed into the national grid network via existing 400 kV overhead lines that pass through the centre of the site. The existing 400 kV lines that pass through the site are the Komsberg/Muldersvlei and Baccus/Komsberg lines, which link with the Droerivier/Komsberg 1 and Droerivier/Komsberg 2 lines at the Komsberg 400 kV booster station, which is located roughly 200m from the southeastern boundary of the proposed wind farm site.

One main 400kV substation near the centre of the site is proposed with up to six smaller 132kV substations closer to the turbines collecting capacity from groups of turbines. The smaller substations would be connected to the main one via 132kV overhead lines.

The site will be accessed via the R354. Some public roads may need to be upgraded to facilitate the transport of the turbines and other construction materials to the site. Within the site area existing farm tracks would be upgraded and new gravel roads may be constructed. These gravel roads will be used by construction vehicles and the network of roads will be retained throughout the lifetime of the facility for use by maintenance vehicles.

Additional temporary infrastructure required during construction will include the following:

- Four wind measuring masts (lattice structure, 60 m high) have been erected to collect data on wind conditions for at least a 12 month period and an expected maximum period of 3 years. This will likely be followed by up to five more 60m masts in 2012. Higher 80 m masts would have to be erected before erection of the turbines.
- Site fencing (as required).
- A temporary site compound (during construction) for the storage of chemicals, equipment, with additional worker facilities, is envisaged to occupy approximately 2500 m².
- A temporary construction lay-down area adjacent to each turbine of approximately 2500 m² (hard-standing) for the temporary lay-down of the turbine and to provide a level surface for a crane pad.
- It is likely that borrow pits (subject to the appropriate permits) would be required within the site area to obtain aggregate material for construction of the internal roads and possibly turbine foundations.
- An on-site batching plant will also be developed (subject to the appropriate permits) to mix concrete on site, located on previously disturbed land adjacent to the R354 next to the entrance gate of the Fortuin farm (approximately 90m by 70m). This location is currently being used as the batching plant for the concrete required for Eskom's new Kappa Omega 765kV currently under construction on the site (DEAT reference 12/12/20/99/10).

The project activities can be divided into five phases as follows:

- Site selection- pre-feasibility / screening study;
- Detailed development design;
- Construction;
- Operation (including maintenance and repair); and
- Decommissioning.

Prior to the initiation of the EIA process G7 Renewable Energies (Pty) Ltd (G7) commissioned Coastal & Environmental Services (CES) to conduct a pre-feasibility/ screening assessment for 14 potential wind energy facility locations throughout South Africa ⁽¹⁾. The Roggeveld Wind Farm site was included in this assessment as it was considered as a potentially suitable site from a wind resource perspective. This site selection process has been conducted based on a number of criteria including environmental and socioeconomic criteria, site extent, landowner support as well as wind availability amongst others. Given the size of the proposed wind farm, construction will be undertaken in several phases and phase of the project is

(1) Coastal & Environmental Services, December 2009: Pre-Feasibility Assessment for 14 proposed wind energy facility sites in South Africa, CES, Grahamstown.

estimated to take approximately 15 to 18 months to complete, and will include the following activities:

- Vegetation clearance;
- Subcontractor mobilisation;
- Erection of fencing;
- Construction/upgrading of on-site access roads;
- Construction of site office and storage facilities;
- Levelling of hard-standing areas;
- Laying of turbine foundations;
- Laying of underground cables; and
- Substation construction.

Once construction of the facility is complete and it becomes operational it is expected that the wind farm would have a minimum life span of up to 25 years. Once the facility has reached the end of its life the turbines may be refurbished and continue operating as a power generating facility, or the facility can be closed and decommissioned.

Figure 1 Site Location

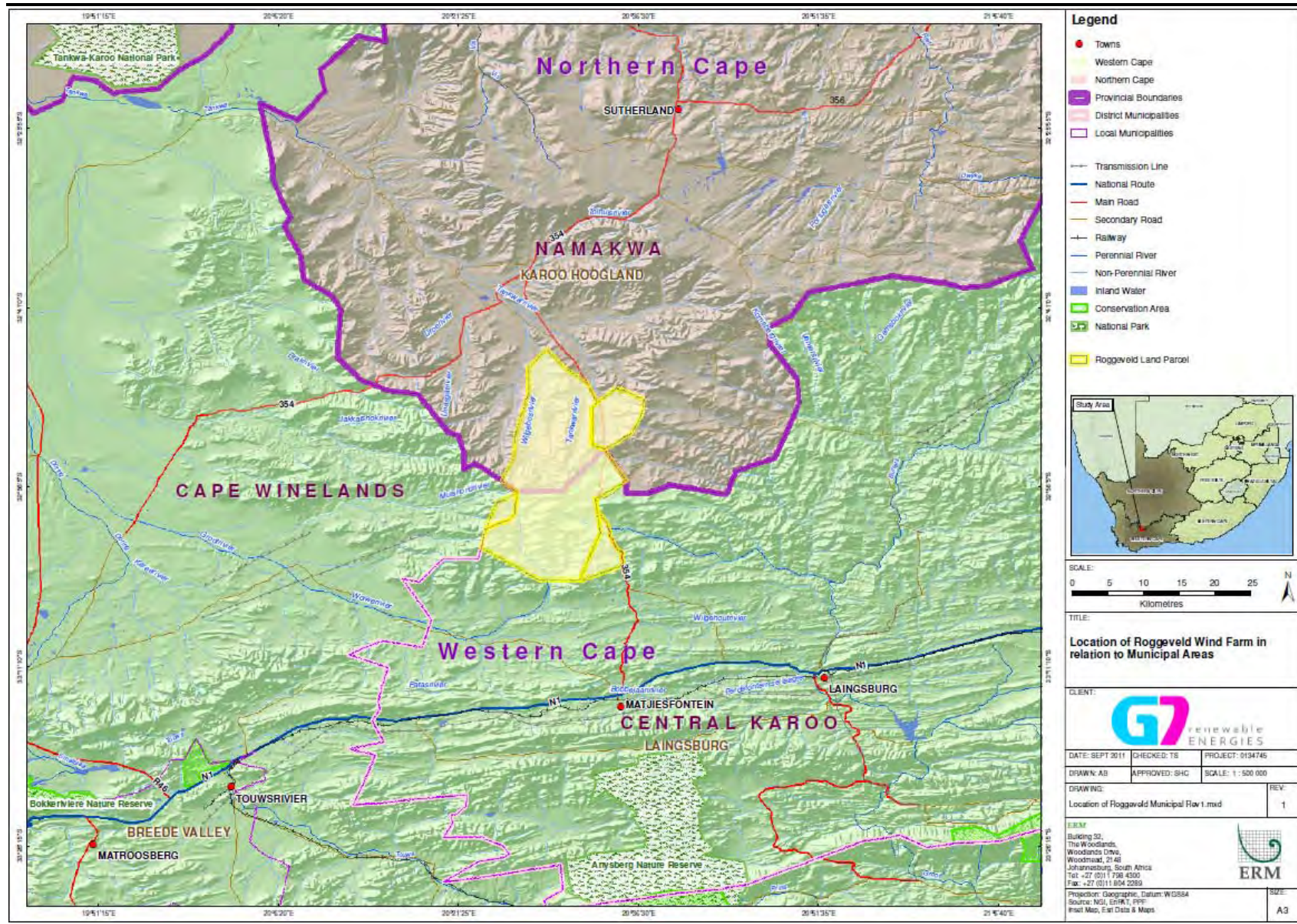


Figure 2 *Typical Wind Turbine*



CONSIDERATION OF ALTERNATIVES

As mentioned previously, G7 commissioned CES to conduct a pre-feasibility/ screening assessment for 14 potential wind energy facility locations throughout South Africa ⁽¹⁾. The fourteen selected sites were considered highly desirable from a technical perspective. An analysis of the following factors led to the selection of five priority sites, including the selection of the Roggeveld site:

- wind resource;
- site extent;
- grid access;
- land suitability;
- proximity to aerodromes;
- landowner support; and
- environmental and social high-level screening.

(1) Coastal & Environmental Services, December 2009: Pre-Feasibility Assessment for 14 proposed wind energy facility sites in South Africa, CES, Grahamstown.

No further site location alternatives will be considered in the EIA process. The EIA process has considered preferred locations on the site and layout alternatives, with possible revised locations and site layouts informed by the EIA process, as well as the No-Go alternative.

The G7 technical team generated an indicative turbine layout design, Site Layout Alternative 1 (see *Figure 3*) for the proposed project using the limited wind resource data available at the time. After field surveys, each specialist identified sensitive areas and advised which turbines require relocation or removal, this input was used to develop a revised layout, Site Layout Alternative 2 (see *Figure 4*) taking these constraints into consideration. This process has encompassed the consideration of layout alternatives in the EIA process and **Site Layout Alternative 2** is the preferred alternative.

It should be noted that the suitability of the indicative turbine layout design will be re-evaluated once sufficient wind resource data and ecological monitoring has been acquired at the site. Any revision of the design will be within the allowable zones prescribed by the EIR.

Figure 3 Site Layout Alternative 1

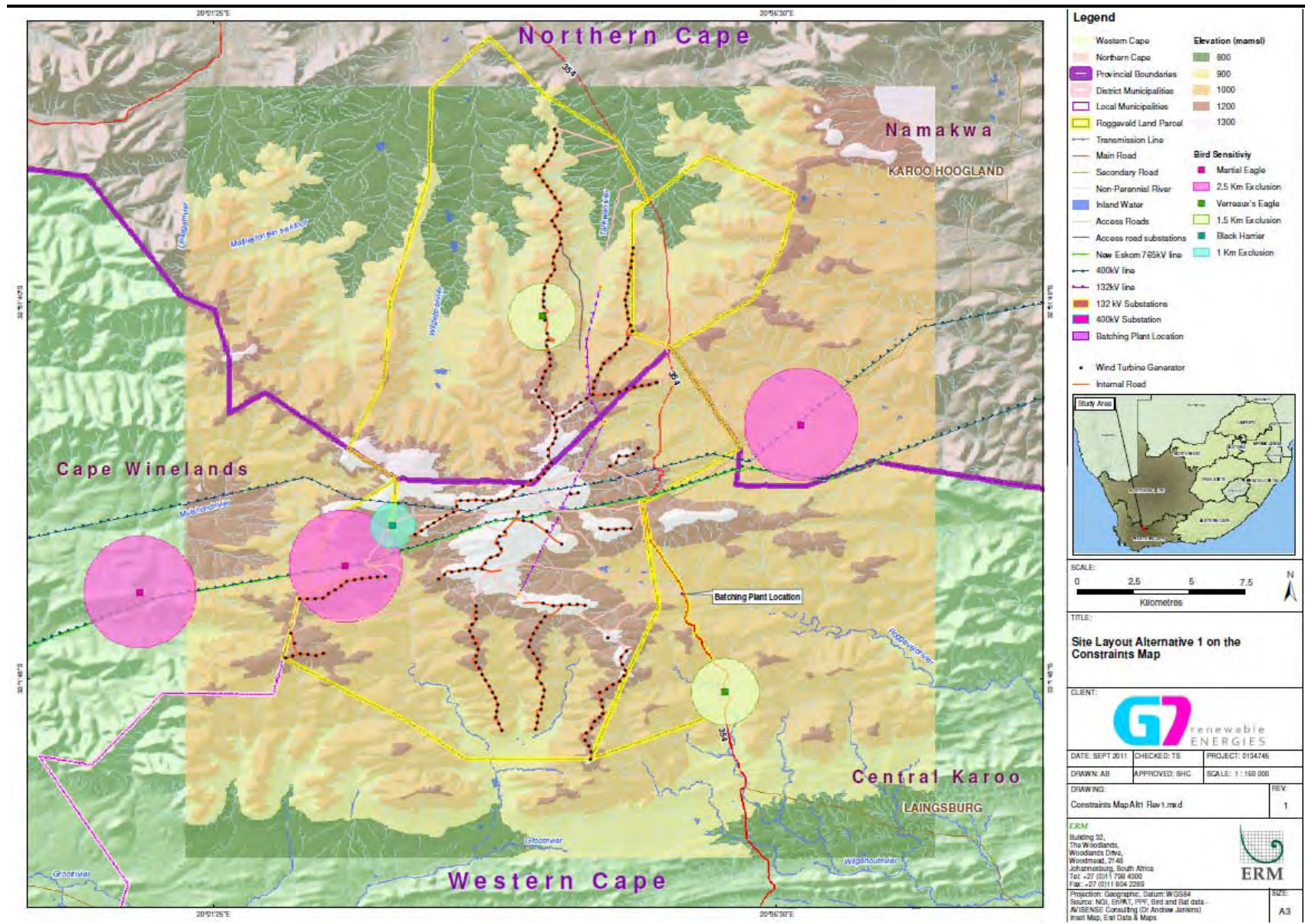
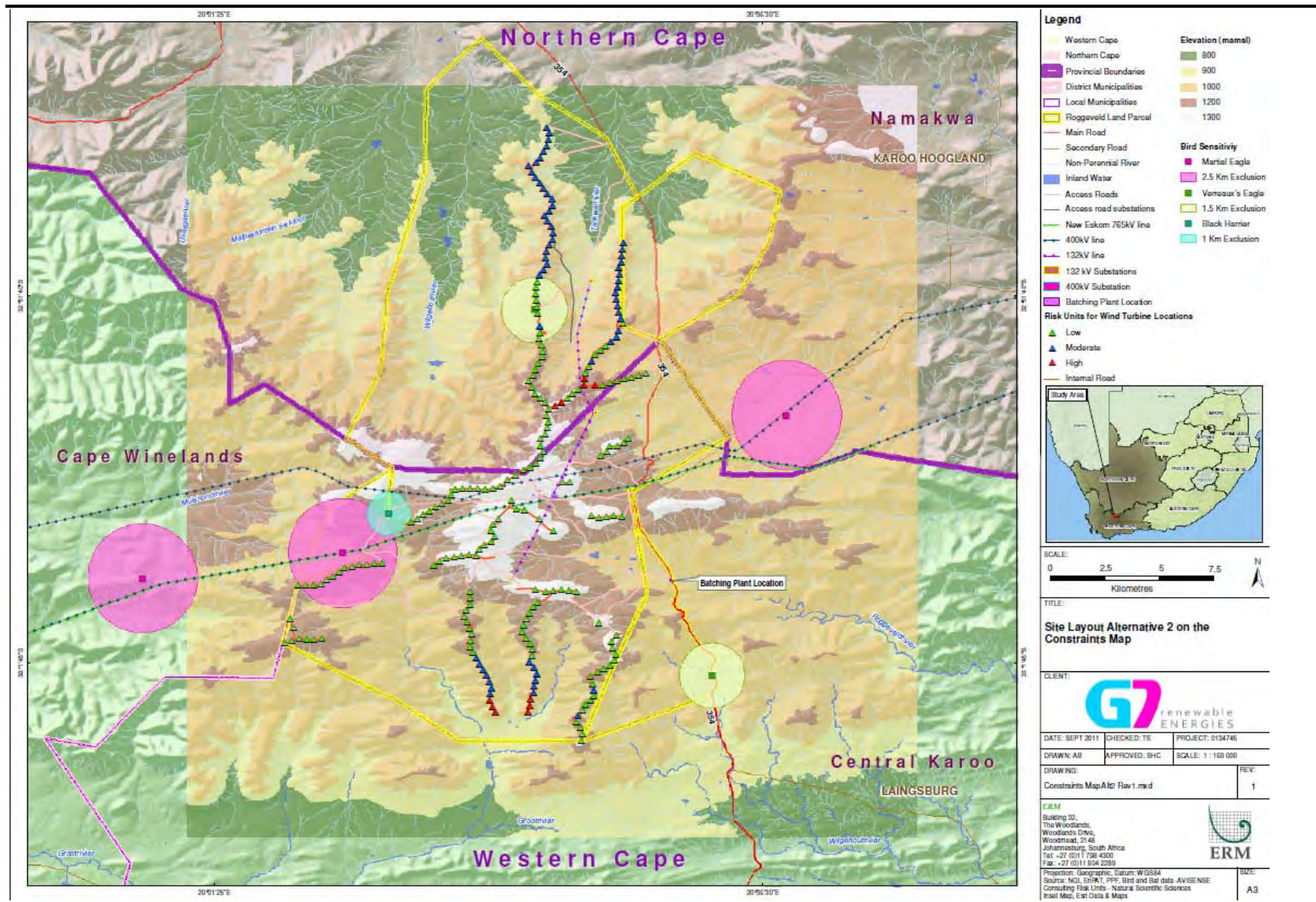


Figure 4 Site Layout Alternative 2



The options of the connection of the wind energy facility to Eskom's national grid are subject to on-going discussions between G7 and Eskom. The only connection option which is considered viable for the site is a connection directly into the transmission facilities that traverse the site. The alternative grid connection scenario would involve a longer overhead transmission line to an alternative grid connection point which is not considered technically, financially or environmentally preferable given the availability of an existing grid connection option within the site area. The preferred infrastructure supplier has not yet been selected. The turbines considered suitable for installation have an output of up to 3 MW, a hub height of 100 m and a rotor diameter from blade tip to blade tip of up to 117m.

The no-go alternative implies that the proposed project would not be executed. Assuming that the wind energy facility would not be developed at the proposed site, there would be no increase in electricity generation from the facility, no CO₂ ⁽¹⁾ offsets associated with the proposed development and no economic benefit to the landowners associated with the potential income generated through the operation of the facility, no job creation and there would be no contribution to meeting South Africa's targets for renewable energy generation. There would also be no negative environmental and social impacts associated with the development of the wind energy facility.

BIOPHYSICAL AND SOCIAL BASELINE

The site features areas of high topographic relief, as it includes the Klein Roggeveld Mountains (Snydersberg, Rooiberg, Spitskop, Skurweberg), as well as the lower-lying areas of the Wilgebos and Tankwa River valleys to the west and east respectively. The highest point within the site is 1450 m above sea level.

The climate is arid to semi-arid, rainfall occurs throughout the year although the peak seasons are autumn and winter. Mean annual precipitation is approximately 290 mm, ranging from 180 – 410 mm rainfall per year. The hottest month in the summer is January and the coldest month in the winter is July. The predominant wind direction is from the northwest. The incidence of frost is relatively high with between 20 to 50 frost days recorded per year.

The proposed site is located at the junction of the Fynbos and Succulent Karoo biomes, and more specifically, at the interface between the Karoo Renosterveld and Rainshadow Valley Karoo bioregions (Mucina & Rutherford 2006). The natural vegetation is dominated by Central Mountain Shale

(1) Carbon dioxide is generated amongst others as a by-product of the combustion of fossil fuels. Carbon dioxide is one of the greenhouse gases that contributes to global warming, causing the average surface temperature of the Earth to rise in response, which most scientists agree will cause major adverse effects. Carbon dioxide is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle. Fossil fuels such as coal, petroleum and natural gas are non-renewable resources as they take millions of years to form. Hence the global movement toward the generation of renewable energy such as wind to help meet increased energy needs.

Renosterveld (tall shrubland, dominated by renosterbos) in the southern two-thirds of the site, and Koedoesberge-Moordenaars Karoo (low succulent scrub with scattered tall shrubs) in its northern reaches (Mucina & Rutherford 2006).

The site is presently used mainly for small stock (sheep) farming, with limited cultivation of crops, mostly confined to the immediate vicinity of occupied farmhouses. There are at least ten farmsteads within the development area, with a number of farm dams of varying sizes (most notably those at Rietfontein and Klipbanksfontein along the Wilgebos River). The site is accessed via the R354 running north/south between Matjiesfontein and Sutherland. A number of gravel roads and farm tracks connect adjoining land parcels. The site is traversed by Eskom's Droërivier-Muldersvlei and Bachus-Droërivier 400 kV transmission lines, aligned east/west through the southern half of the site.

At least 50 mammal species potentially occur at the site. Larger carnivores such as jackal and caracal are relatively common in the area. The uplands provide suitable habitat for species which require or prefer rock cover such as Cape Rock Elephant Shrew, *Elephantulus edwardii*, Smith's Red Rock Rabbit, *Pronolagus rupestris*, Namaqua Rock Mouse *Micaelamys namaquensis* and Rock Hyrax, *Procavia capensis*. The lowlands are likely to contain an abundance of species associated with lowland habitats such as deeper soils and floodplain habitats, which includes Brants's Whistling Rat *Parotomys brantsii*, the Bush Vlei Rat *Otomys unisulcatus*, Hairy-footed Gerbil *Gerbillurus paeba* and Common Duiker *Sylvoicapra grimmia*.

More than 210 bird species could possibly occur on the site (see *Appendix 1 of the Bird Specialist Report in Annex D*) including up to 14 red-listed species, 69 endemics or near-endemics, and three red-listed endemics (Ludwig's Bustard *Neotis ludwigii*, Blue Crane *Anthropoides paradiseus* and Black Harrier *Circus maurus*).

There is a wide range of environments suitable for reptiles at the site, including rocky uplands and cliffs, open lowlands and densely vegetated riparian areas. As a result the site has a rich reptile fauna which is potentially composed of 7 tortoise species, 20 snakes, 17 lizards and skinks, two chameleons and 10 geckos.

The living arrangements of the farmers and their workers vary considerably from one farm to the next. Most farmers have more than one farm and therefore generally do not live permanently on the site. Only four of the farmers, and their workers, live permanently on the farms that form part of the project area. The majority of the farmers stay permanently off-site and visit the farms intermittently when the livestock activities are based at the site. The workers spend more time on the farms with livestock than the farmers do. The workers generally live on the farm during the week and visit their family homes on weekends in Laingsburg. The number of workers living on the farms varies depending on the seasons and the farming activities.

Due to the remote location of the farms in relation to schools, many of the farmers' children (who are of school going age) attend boarding school and only visit the farm during the school holidays. Usually if the workers have young children then the wives and the children generally live on the farm, but as soon as the children start school, the wives and children generally move to Laingsburg in order to be closer to schools.

IMPACTS IDENTIFIED AND ASSESSED

The bio-physical and socio-economic impacts during the Construction Phase that have been identified and assessed in the EIR include the following:

Table 1 *Summary of Pre-mitigation and Residual Impacts during Construction*

Environmental Aspect	Section	Impact	Pre-mitigation Significance	Residual Impact Significance
Flora and Fauna	7.1	Destruction & Loss of Vegetation	MODERATE-MAJOR (-)	MODERATE MINOR(-)
	7.2	Protected Plant Species	MODERATE-MAJOR (-)	MODERATE MINOR(-)
	7.2	Faunal impacts - Construction Disturbance	MODERATE (-)	MODERATE (-)
Birds	8.1	Habitat loss	MODERATE-MAJOR (-)	MODERATE (-)
	8.1	Disturbance	MODERATE-MAJOR (-)	MODERATE (-)
Bats	9.1	Habitat loss, destruction, disturbance and displacement	MODERATE (-)	MINOR (-)
Soils, Surface and Groundwater	10.1	Loss of topsoil, compaction and erosion	MODERATE (-)	MINOR (-)
	10.2	Impact on surface and groundwater	MINOR (-)	MINOR (-)
Noise Impact	11.1	Construction noise	MODERATE (-)	MODERATE-MINOR (-)
Visual	12.2	Visual impact on fixed receptors	MODERATE(-)	MODERATE (-)
Cultural Heritage	13.1	Disturbance or damage to paleontological resources	MODERATE (-)	MODERATE (-)
	13.1	Disturbance or damage to archaeological resources	MINOR (-)	MINOR (-)
	13.1	Disturbance or damage to cultural heritage resources	MODERATE (-)	MINOR (-)
	13.1	Disturbance or damage to buried graves	MODERATE (-)	MINOR (-)
Socio-economic	14.1	Benefits to the local economy	MODERATE (+)	MODERATE (+)
	14.2	Increased social ills	MODERATE (-)	MINOR (-)
	14.3	Disruption to agricultural activities	MODERATE (-)	MINOR (-)
		Loss of agricultural land	MINOR (-)	MINOR (-)
	14.4	Tourism activities	MINOR (-)	NEGLIGIBLE
	14.5	Property prices and desirability of property	MINOR (-)	MINOR (-)
		Sense of place	MINOR (-)	NEGLIGIBLE
		Road infrastructure	MODERATE (-)	MINOR (-)
Other Impacts	15.1	Dust	MINOR (-)	MINOR (-)
	15.2	Traffic	MODERATE (-)	MINOR (-)
	15.3	Waste and effluent	MINOR (-)	MINOR (-)

Environmental Aspect	Section	Impact	Pre-mitigation Significance	Residual Impact Significance
	15.4	Health and safety	MINOR (-)	NEGLIGIBLE

The bio-physical and socio-economic impacts during the Operational Phase that have been identified and assessed in the EIR include the following:

Table 2 *Summary of Pre-mitigation and Residual Impacts during Operation*

Environmental Aspect	Section	Impact	Pre-mitigation Significance	Residual Impact Significance
Flora and Fauna	7.1	Erosion Potential	MODERATE-MAJOR (-)	MINOR (-)
	7.2	Alien Plant Invasion	MODERATE (-)	MINOR (-)
	7.2	Hunting and Collecting of Fauna & Flora	MODERATE (-)	MINOR (-)
	7.2	Loss of landscape connectivity for fauna	MINOR (-)	MINOR (-)
		Maintenance impact on vegetation	MODERATE MINOR(-)	MINOR (-)
		Impact on Critical Biodiversity Areas	MODERATE-MAJOR (-)	MODERATE (-)
Birds	8.1	Displacement	MODERATE (-)	MODERATE MINOR(-)
	8.2	Mortality	MODERATE (-)	MODERATE MINOR(-)
Bats	9.1	Habitat loss – Destruction, disturbance and displacement	MODERATE (-)	MINOR (-)
	9.2	Collision of bats with turbines	MODERATE (-)	MINOR (-)
	9.3	Barotrauma	MAJOR (-)	MODERATE (-)
Soils, surface and groundwater	10.1	Loss of topsoil, compaction and erosion	MINOR (-)	MINOR (-)
	10.2	Impact on surface and groundwater	MINOR (-)	MINOR (-)
Noise Impact	11.2	Wind turbine noise during operation (at the boundary)	MODERATE (-)	MODERATE-MINOR (-)
Visual Impact	12.2	Visual impact on fixed receptors (wind turbines)	MAJOR (-)	MAJOR (-)
	12.2	Visual impact on fixed receptors (substation complex)	MODERATE (-)	MODERATE-MINOR (-)
	12.2	Visual impact on fixed receptors (at night)	MODERATE (-)	MODERATE-MINOR (-)
	12.3	Visual impact on temporary receptors (day time)	MODERATE (-)	MODERATE (-)
	12.3	Visual impact on temporary receptors (night time)	MODERATE (-)	MODERATE-MINOR (-)
Cultural Heritage	13.2	Cultural heritage visual or sense of place	MODERATE (-)	MODERATE (-)
Socio-economic	14.1	Benefits to the local economy	MODERATE (+)	MODERATE (+)
	14.2	Social Ills	MINOR (-)	MINOR (-)
	14.3	Disruption to agricultural land	MINOR (-)	NEGLIGIBLE
		Loss of agricultural land	MINOR (-)	MINOR (-)
	14.4	Tourism activities for local traders	MINOR (+)	MODERATE (+)
	14.4	Impact on tourism activities of lifestyle farmers and reserves	MINOR (-)	NEGLIGIBLE
	14.5	Property prices and desirability of property	MINOR (-)	MINOR (-)

Environmental Aspect	Section	Impact	Pre-mitigation Significance	Residual Impact Significance
		Sense of place	MODERATE (-)	MINOR (-)
		Road infrastructure	MINOR (-)	MINOR (-)
Other Impact	15.1	Dust and emissions	NEGLIGIBLE	NEGLIGIBLE
	15.2	Traffic	MINOR (-)	NEGLIGIBLE
	15.3	Waste and effluent	MINOR (-)	NEGLIGIBLE
	15.4	Health and safety	MINOR (-)	NEGLIGIBLE
	15.5	Shadow flicker	NEGLIGIBLE	NEGLIGIBLE

The available information gathered during the EIA process was considered adequate to assess the impacts identified with a sufficient degree of certainty. A systematic assessment of the potential impacts was undertaken, in terms of pre-mitigation impact significance and residual impact significance, as ranging from a significance rating of negligible to moderate to major. The residual impacts are based on G7's commitment to the implementation of mitigation measures outlined in the EMP and the preferred site layout, Site Layout Alternative 2.

The most significant negative residual potential impacts in the construction phase relate to the visual impact of the large equipment and machinery on site, as well as the loss of vegetation and potential impacts on fauna associated with disturbance. The most significant positive residual potential impact in the construction phase relates to the socio-economic benefits to the local economy. The most significant negative residual potential impacts in the operational phase relate to the visual impact on fixed positions and temporary receptors. The most significant positive residual potential impacts in the operational phase relate to the socio-economic benefits to the local economy. Uncertainty associated with potential bird and bat impacts associated with the proposed project necessitates pre- and post-construction monitoring and this is described in the EMP. Monitoring will assist in refining mitigation measures and will contribute to improving knowledge of the movement of receptors such as birds and bats in the area.

Cumulative impacts and benefits on various environmental and social receptors will occur to varying degrees with the development of several renewable energy facilities in South Africa. The potential cumulative impacts of all known proposed wind farms within a 75 km radius of the Roggeveld site were assessed. The degree of significance of these cumulative impacts is difficult to predict without detailed studies based on more comprehensive data/information on each of the receptors and the site specific developments. In addition, as there is uncertainty as to whether all the above mentioned developments will be implemented, it is difficult to quantitatively assess the potential cumulative impacts.

While the potential for cumulative impact is uncertain, and assuming site specific mitigation can avoid sensitive habitats, it is unlikely that the negative cumulative impact on fauna (excluding bats and birds) and flora resulting from the development of several wind farms in proximity to the Roggeveld

site will be significant. However, should farming intensity increase (additional stock or increase in crops lands/orchards) because of the increase in income, this could have a significant negative cumulative impact as additional land take may impact sensitive habitats. Benefits to the local, regional and national economy through employment and procurement of services could be substantial, while the cumulative impact in terms of loss of agricultural land is unlikely to be significant due to the limited land take and in most cases agricultural activities would be allowed to proceed.

The combined effect of the wind farms could have a significant cumulative visual impact and impact on the landscape character, especially considering turbines are often located in prominent positions along ridgelines. There is a potential for cumulative impacts on birds and bats to be significant and more research is required to understand the uncertainties.

ENVIRONMENTAL MANAGEMENT PROGRAMME (EMP)

The EMP is a set of committed mitigation actions to avoid, minimise and reduce negative environmental and social impacts associated with the Roggeveld Wind Farm. An EMP provides a mechanism for ensuring that the measures outlined in this report are implemented and assist in ensuring continuing compliance with national and international legislation, and industry best practice. The EMP provides comprehensive listing of the mitigation measures (actions) that will be implemented during the various phases of the project. It defines the parameters that will be monitored to track how effectively actions and mitigation are implemented. Roles and responsibilities are defined in the EMP in order to ensure implementation of specific actions and timing for implementation of the action has also been included to ensure that the objectives of mitigation are fully met.

The EMP is included in *Annex L* of the Draft EIR. The project proponent will be obligated to implement the management actions defined in the EMP through the inclusion of this requirement as a condition in the Letter of Authorisation.

RECOMMENDATIONS

The implementation of the mitigation measures outlined in the EIR and included in the EMP, including additional pre-construction monitoring will provide a basis for ensuring that the potential positive and negative impacts associated with the establishment of the Roggeveld Wind Farm are enhanced and mitigated to a level which is deemed adequate for the development to proceed. Uncertainties around cumulative impacts associated with similar developments in the greater vicinity of Roggeveld and the growth of the renewable energy sector requires strategic planning and cooperation on a provincial and national level with input from developers, organisations such

as the Endangered Wildlife Trust, Bird Life South Africa and other stakeholders. This however falls beyond the scope of this study.

Based on the findings of this assessment, there is no reason why the proposed Wind Farm proposed at Roggeveld should not be authorised contingent that the mitigations and monitoring for potential environmental and social impacts as outlined in the EIR and EMP are implemented.

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