4 *PROJECT DESCRIPTION*

4.1 *INTRODUCTION*

This Chapter provides an overview of the proposed Richtersveld Wind Farm. The need and desirability of the project and the consideration of alternatives is included in this section, as well as a discussion of the main project activities for the construction, operation and decommissioning phases.

4.2 *NEED AND DESIRABILITY*

Global dependence on fossil fuels, rising fossil fuel prices and concern regarding the impacts of climate change has resulted in increasing international pressure on countries around the world to increase their share of energy from renewable sources. Targets for the promotion of renewable energy now exist in more than 58 countries around the world and wind energy is emerging as an important component of the energy market in a number of countries. Globally, wind turbines currently generate more than 1 percent of global electricity.

In South Africa, the government has developed a policy framework (the White Paper on Renewable Energy) and set a target of sourcing 10,000 GWh (1) from renewable energy projects by 2013 (2). This amounts to approximately four percent of South Africa's total estimated energy demand by 2013. In the Western Cape, provincial government has also made a commitment to improving sustainability by setting a goal of generating 15 percent of all energy from renewable resources by 2014 (3). At the Copenhagen Conference in December 2009 South Africa's president also set a target for the reduction of CO_2 (4) emissions, as laid out in the Integrated Resource Plan (IRP 2010) (5) which sets a target reduction of CO_2 emissions by 34 percent by 2020, a goal that the renewable energy sector plays a major role in achieving. This goal was reiterated by Minister Edna Molewa at the December 2010 Climate Change Conference in Cancun, Mexico.

Emergency load shedding in South Africa during 2007 and 2008 highlighted the challenges facing South Africa in terms of electricity generation, transmission and distribution. The Integrated Resource Plan (IRP) for electricity supply, drafted at the time, acknowledged the role that independent power producers (IPPs) (including those harnessing renewable energy

(1) For wind farms running about 23% of the year a 1MW turbine will produce approximately 2GWh in a year. To meet this target with wind energy would require about 5000 turbines of 1MW each, although other sources of renewable energy is also being considered.
(2) National Energy Regulator of South Africa **South Africa Renewable Energy Feed-In Tariff** (2009) NERSA Publications.
(3) Western Cape Sustainable Energy Policy (2010) Western Cape Provincial Government..
(4)Carbon dioxide is generated as a by product of the combustion of fossil fuels such as coal, petroleum and natural gas and is referred to as a greenhouse gas . Increasing concentrations of greenhouse gases in the atmosphere are causing an unprecedented rise in global temperatures, with potentially harmful consequences for the environment and human health.
(5) Department of Energy Integrated Resource Plan (2010).

resources) can play in ensuring sustainable electricity generation, and sets a goal that 30 percent of all new power generation will be derived from IPPs (1) .

In 2009, the establishment of the Renewable Energy Feed in Tariff (REFIT) (2) in South Africa presented opportunities for the renewable energy industry, promoting competiveness for renewable energy with conventional energy generation technologies under an enabling market mechanism which offers a Feed-in-Tariff for each unit of energy that is produced from renewable resources. It was anticipated that through REFIT there would be a heightened demand throughout the renewable energy sector (wind, solar, hydro, biomass and geo-thermal) due to the set prices for electricity which were determined and licensed by the National Energy Regulator of South Africa (NERSA). The Department of Energy has recently released a request for proposals (RfP) under their renewable energy Independent Power Producer procurement programme (IPP Procurement Programme) to select IPPs. The aim of the programme is to contribute towards the renewable energy target of 3 725 megawatts and to stimulate the industry in South Africa. The bid selection process will consider the suggested tariff as well as socio-economic development opportunities provided by the project and the bidder.

The intention of G7 in establishing wind energy facilities is to contribute to South Africa's goal of developing wind resources to generate electricity, thereby reducing the country's dependence on non-renewable fossil fuel resources and contributing to climate change mitigation. The proposed Richtersveld 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.

G7 has indicated that the Richtersveld site was particularly suited for wind energy development due to the strength of the prevailing wind resources. Topography such as hills and ridges has a significant influence on average wind speed and represent areas of greater electricity generation relative to the number of turbines and the disturbance footprint. G7 emphasises that since the environmental impact is often proportional to the number of wind turbines, the *environmental impact per unit of electricity generated* or the "environmental efficiency" is optimised where the wind farm is constructed in a particularly windy area. This is particularly relevant where the need to maximise the benefit of reducing harmful carbon dioxide emissions from coal fired power stations must be balanced by the need to minimise the negative consequences of wind farms, and this is best achieved by selecting sites with maximum environmental efficiency.

(1) REFIT is a renewable energy policy that obliges energy suppliers such as Eskom to buy electricity produced from renewable resources at a fixed price, usually over a fixed period. The original REFIT tariff was R1,15 /KWh for wind power. Comparing this with the normal electricity tariff of around 40c/KWh, one can see that through REFIT a significant premium is placed on renewable energy, with Eskom paying more for renewable energy than it can currently be sold for. However, the Department of Energy has since revised this tariff to be based on a maximum R1.15/kWh with full competitive price bidding, possibly affecting the viability of some renewable energy projects. G7 have advised that this potential reduction would not affect the viability of the proposed project.

(2) IEC 61400-1 Wind turbines – Part 1: Design requirements

G7 has been measuring the wind resources at the Richtersveld site for two years and has determined that the site is definitely viable for commercial electricity generation using wind turbines.

A summary of the project motivation is provided in *Box 4.1* below.

Box 4.1 ***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 CO_2 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 IRP goal of 30 percent of all new energy from IPPs

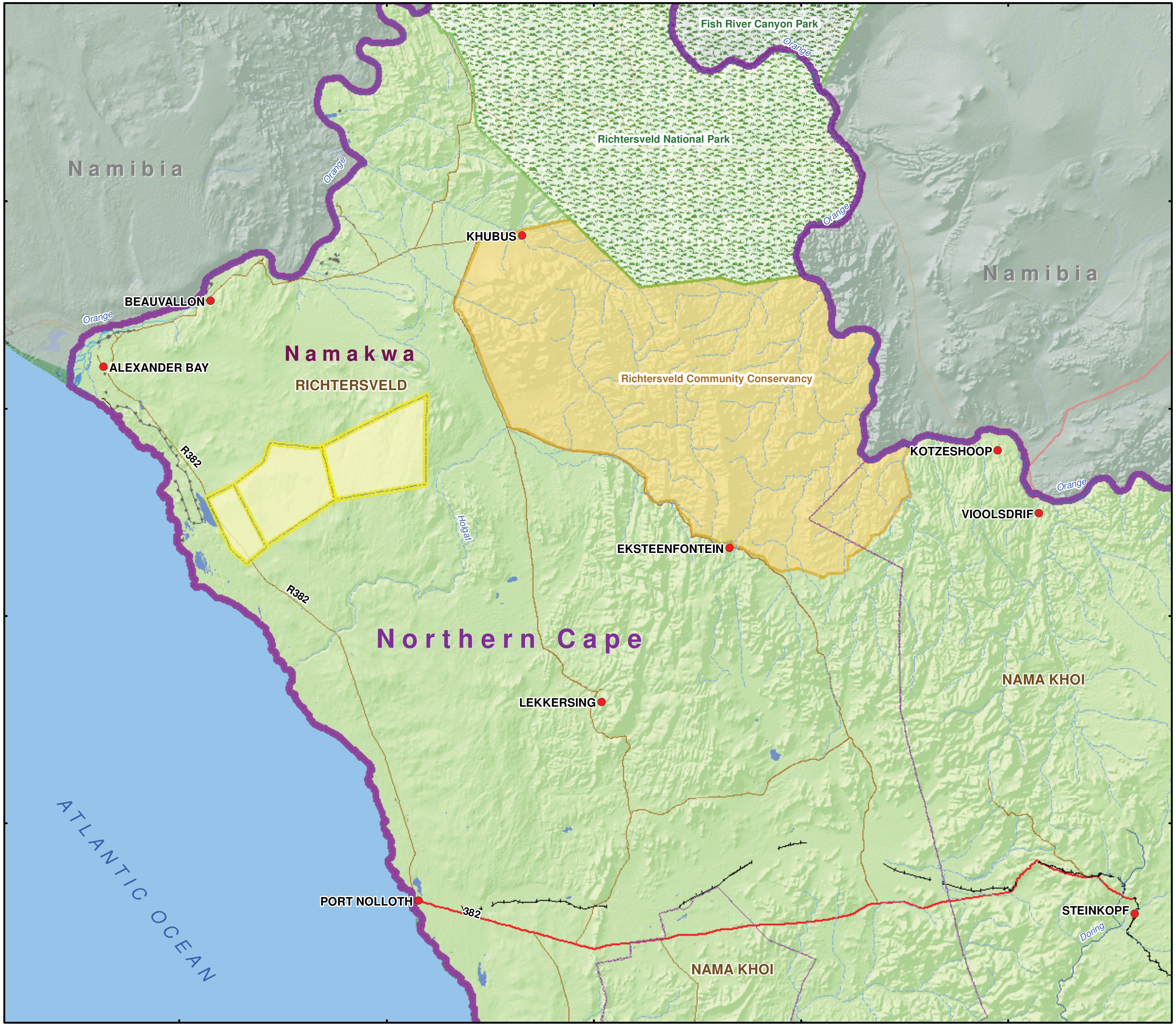
In addition to the energy benefits produced by the wind energy facility, the proposed project has the added advantage of income generation through the sale of the electricity produced, supplementation of the income of marginally productive farms, and contributing towards sustainable community development projects through funding of trust funds for this purpose.

As the proposed Richtersveld Wind Farm is located at the end of the national grid feeding line, it also promotes grid support and may result in a more secure energy supply for energy users in the local area.

4.3 *PROJECT LOCATION*

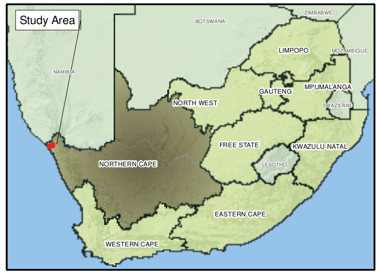
The proposed wind energy facility is located approximately 30 km southeast of Alexander Bay and 55 km north of Port Nolloth, on the West Coast of the Northern Cape, (see *Figure 4.1*). The site can be accessed from the R382.

The site is located on part of Korridor Wes Farm (Witbank (Farm 6/2), Korridor Wes Farm (Rooibank (Farm 7/2) which is owned by the Richtersveld Sida Hub Communal Property Association. The access road to the wind farm site passes though Farm Re/1 which is currently owned by Alexkor Ltd. This parcel of land is to be transferred to Richtersveld Sida Hub Communal Property Association as per the Deed of Settlement of the Land Claims Court (Case No. LCC 151/1998).



Legend

- Towns
- Provincial Boundaries
- Northern Cape
- Namibia
- District Municipalities
- Local Municipalities
- Transmission Line
- Main Road
- Secondary Road
- Railway
- Perennial River
- Non-Perennial River
- Inland Water
- National Park
- Richtersveld Land Parcel



SCALE:

0 5 10 15 20 25

Kilometres

N

TITLE:

Figure 4.1: Location of Richtersveld Wind Farm in relation to Municipal Areas

CLIENT:

G7 renewable ENERGIES

DATE: SEPT 2011	CHECKED: TS	PROJECT: 0134745
DRAWN: AB	APPROVED: SHC	SCALE: 1 : 500 000

DRAWING: Location of Richtersveld WF Municipal.mxd

REV: 0

ERM
Building 32,
The Woodlands,
Woodlands Drive,
Woodmead, 2148
Johannesburg, South Africa
Tel: +27 (0)11 798 4300
Fax: +27 (0)11 804 2289

Projection: Geographic, Datum: WGS84
Source: NGI, EnPAT, PPF
Inset Map, Esri Data & Maps

SIZE: A3

T:\GIS Project\0117424 G7 Wind Farms\Mapping\MXD\Richtersveld\Location of Richtersveld WF Municipal.mxd

4.4 *PROJECT COMPONENTS*

It is anticipated that once operational the facility will generate up to 225 MW of electricity which will be fed into the National Power Grid. The key components of the proposed wind farm include the following, which are discussed in more detail below:

- wind turbines;
- electrical connections;
- substation;
- access roads and site access; and
- additional project infrastructure.

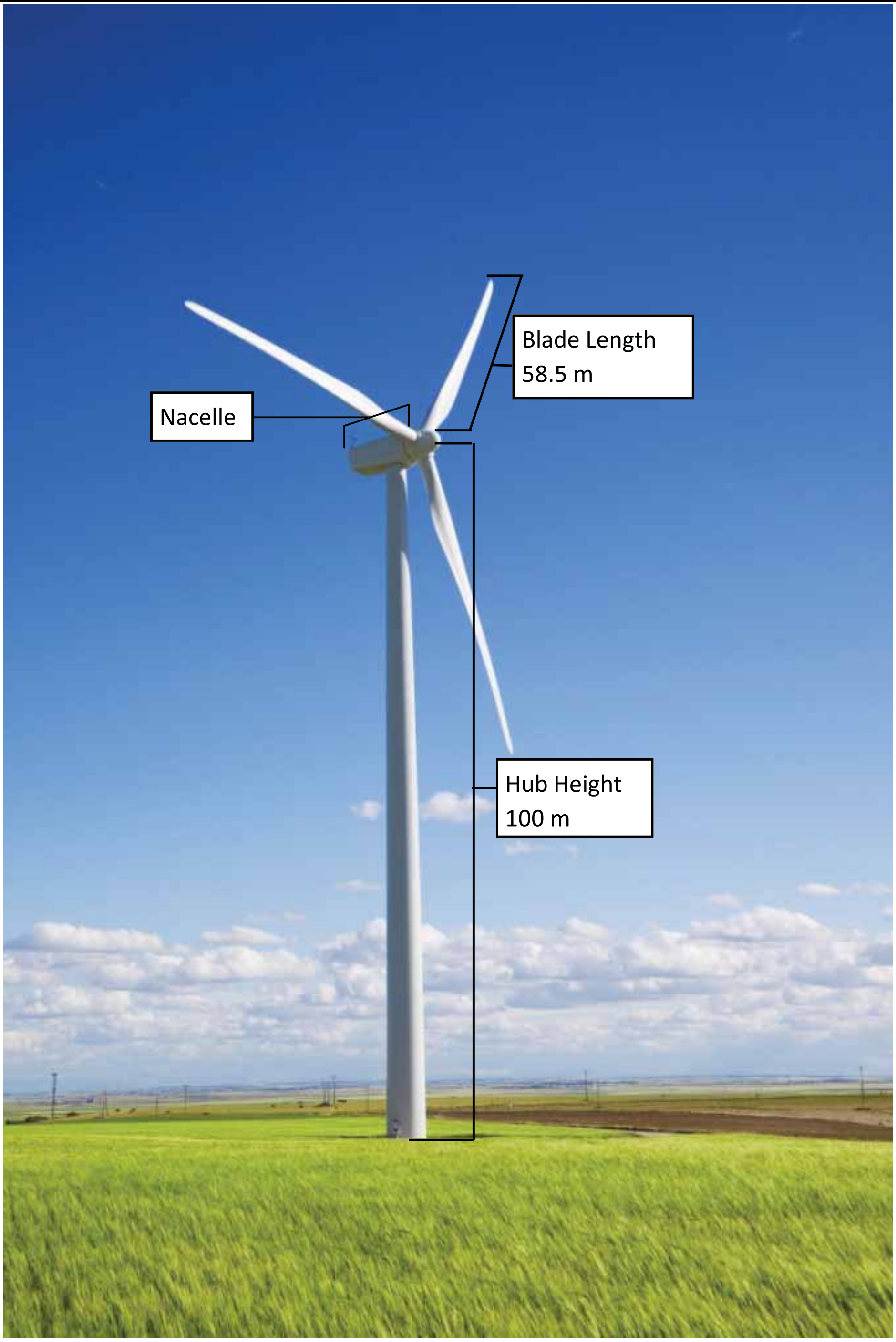
4.4.1 *Wind Turbines*

A total of 75 wind turbines are proposed for the site and each turbine will have an output of 2MW – 3MW however, based on specialist study findings the Final Layout (Alternative 2) consists of a total of 69 wind turbines. *Figure* 4.2 below shows a typical wind turbine similar to the type envisaged for the Richtersveld Wind Farm. Modern wind turbine designs include a tubular tower, three blades and a nacelle which houses a generator, gear box and other operating equipment. Each of the turbines at the Richtersveld Wind Farm will have an individual capacity of up to 3 MW. The turbines will be approximately 100 m high (to the turbine hub), with a rotor diameter from tip of blade to tip of blade of 117 m. Total height from ground to highest blade tip would be approximately 158 m.

Each turbine will have an aboveground, visible concrete foundation of approximately 5 m x 5 m and an underground, non-visible concrete foundation of approximately 20 m x 20 m x 3.5 m (depth) at its base and a gravel hard standing and lay-down area (of approximately 2,500 m^2 [(1)]) adjacent to the turbine foundation. The hard standing area would be used for construction activities and for turbine maintenance during operation. The hard-standing would be compacted in order to facilitate the use of a crane during construction and maintenance activities. Each turbine would be accompanied by an electrical transformer. Some turbines may need to be lit to meet the Civil Aviation Authority's safety standard requirements[2].

(1) The area required for all hard standing, lay-down areas and access roads will be kept to the minimum practicably possible (given technical and health and safety constraints) in order to minimise impacts on the environment.
(2) Marking of Obstacles SA-CATS AH 139.01.33

Figure 4.2 Typical Wind Turbine



4.4.2 *Electrical Connections*

The turbines would be connected to each other, and the turbine rows would be connected to a new substation that would be built as part of the development (see below). The electricity generated by the facility would be fed into the national grid network via an existing 220 kV overhead transmission line that passes northwest-southeast through the eastern portion of the site.

A number of different electrical connection options have been considered as part of the development and although a final design has been selected, some minor changes may still be required. Installation of underground cables would require excavation of trenches, approximately 1m to 1.5m below ground, within which cables would be laid, following internal access roads as far as possible to minimise the development footprint. The electrical infrastructure of the proposed Wind Farm would consist of the following:

- Connections between the turbines using medium voltage (≤ 33kV) underground electrical cabling.
- Connection of the turbine rows to the substation using medium voltage (≤ 33kV) underground electrical cabling.
- Connection of the substation to the National Grid using a short 220kV overhead transmission line (approximately 4.9km) between the substation and the existing transmission lines further east.
- A small linking station at the point of intersection with the existing transmission lines.

4.4.3 Substation

A new substation facility would be built as part of the development, to facilitate connection of the wind farm to the national grid network via the existing transmission facilities as outlined above. The new substation may be located in the centre of the site or close to the existing transmission facilities in the east of the site. Depending on the final location of the substation, an overhead electrical connection may be built to connect the substation to the existing transmission lines (see above). The substation would be a single-storey building of approximately 160x160m in size. It would house electrical equipment and would be fenced for security and safety. The substation complex would also house site offices, storage areas and ablution facilities.

4.4.4 Access Roads and Site Access

The site would be accessed via a public road from the R382. Some existing 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 to facilitate movement of construction and maintenance vehicles. These gravel roads would be used by construction vehicles and the network of roads would be retained throughout the lifetime of the facility for use by maintenance vehicles. Due to the planned use of very large crawler cranes for erection of the turbines these roads, connecting each turbine to the next, will be approximately 12m wide but may be wider in sections to allow for turning.

4.4.5 *Additional Project Infrastructure*

Additional infrastructure that would be required for the project includes the following:

- Two wind measuring masts (lattice structure, 80 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. Additional 80m 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 2500m^2. It is not yet known where this would be located. Within the site storage area there would be bunding (1) for transformers or any other oil containing equipment to ensure full containment in the event of any oil leakage.

- A temporary construction lay-down area adjacent to each turbine of approximately 2,500 m^2 (hard-standing) for the temporary lay-down of the turbine and to provide a level surface for a crane pad. A portion of the lay-down area not required for future maintenance would be rehabilitated after construction.

- 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. Final road capping may, however, have to be obtained from a commercial quarry and transported to the site, to ensure the materials meet the quality requirements for the road surface layer. Siting of the borrow pits would require a separate geotechnical investigation which will prioritise sourcing of material from previously impacted habitats as far as possible. This will require additional investigations involving an ecologist to provide advice on potential ecological risks and remediation. The size and location of the borrow pit(s) would depend on the terrain, suitability of the subsurface soils and the requirement for granular material for access road construction and other earthworks. Should borrow pits be required they would be reinstated as far as possible at the end of construction using surplus material excavated from foundations or other site excavations. An on-site batching plant may also be developed (subject to the appropriate permits) to mix concrete on site, and this would require additional on-site ecological investigations to determine a suitable location and to confirm remediation measures.

(1) A concrete spill containment area

4.4.6 *Summary of Project Infrastructure*

The table below provides a summary of the individual infrastructure components of the wind farm:

Table 4.1 Summary of Wind Farm Infrastructure Components and Land Requirements

Component	**Size**	**Footprint**	**Land Requirement (ha)**
75 x 3MW wind turbines	100m hub height Total height: 158m	5 x 5m = $25m^2$ per turbine = $1875m^2$	0.1875ha
Lay down areas for each turbine	$2500m^2$	187,500 m^2	18.75ha
Access Roads	12m wide x ~25km	12,000m^2 per km x 25 km = 300,000m^2	30ha
Substation	160m x 160m	$25600m^2$	2.56ha
Linking Station	80 x 80m	$6400m^2$	0.6ha
Operation and Maintenance Building	40x24m	$960m^2$	0.09ha
Mini substations at each turbine	1m x 1m	$40m^2$	0.04ha
Cable trenches*	2m wide x 14 km	28,000m^2	2.8ha
Construction Camp & storage area	$2500m^2$		0.8ha
Borrow pits / quarry**	40m x 250m	10,000m^2	1ha
Excavated material (turbine footprint)	20 x 20 x 3.5	$1400m^3$	

*Assuming the worst case scenario that this area would be required in addition to the road infrastructure
** subject to further geotechnical investigations

4.5 PROJECT PHASES AND ACTIVITIES

The project life-cycle 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.

These phases are outlined in the sections below.

4.5.1 *Pre-feasibility / Screening Study - Site Selection and Alternatives*

Prior to ERM's appointment as the independent environmental consultant and before the EIA process was initiated, the Richtersveld Wind Farm site was selected by G7 amongst a number of other potential sites in the area as potentially suitable from the establishment of a wind farm from a wind resource perspective. Once landowner agreements had been granted the wind measurement campaign commenced with the erection of a temporary wind monitoring mast as well as a permanent 80 m wind monitoring mast(1). During the site selection phase G7 commissioned an environmental and social pre-feasibility assessment of the site and several others. This study, which was undertaken by Coastal and Environmental Services (CES) (2009) included a high-level screening of potential environmental and socio-economic issues or 'fatal flaws'. The Richtersveld site was selected by G7 as one of five priority sites and the EIA and other permitting processes were initiated.

4.5.2 *Detailed Development Design*

The site has been chosen by G7 based on a number of technical, financial, environmental and socio-economic criteria. The design of the facility including the preferred and final turbine layout and location of other project components presented in this report has been determined using information gathered from the wind measuring masts, the information gathered during the specialist studies phase and environmental and socio-economic considerations established so far during the EIA phase.

The detailed development layout has considered key parameters such as topography used as a criterion to determine turbine positions, road layout, substation location and dimensions etc. The developer does not anticipate that any of the turbine locations would shift by more than the 50 m from the positions provided in this EIA (see *Section 4.6.3*).

4.5.3 *Construction*

Construction Activities

Prior to the installation of the wind turbines, the site would be prepared as required, this would 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;
- excavation, laying and concreting of turbine foundations;
- piecewise erection of the individual turbines with a specialised crane;
- digging of trenches and laying of underground cables;
- stringing of overhead lines; and
- substation construction.

(1)The 80 m mast does not require approval as part of the EIA process according to the new regulations under which it was built. Should this be required, a land use status that gives the mast the same lifetime as the project will be applied for through the land-use planning authorisation of the wind farm.

Total construction time is envisaged to take approximately 24 months, largely depending on weather conditions. The site preparation activities may take up to 9 months. The turbines and other construction materials would be delivered to site via public roads on low-bed trucks. Once the turbine components have arrived on site, it would take approximately 6-9 months to complete the turbine assembly and electrical connections. Delays can easily result due to adverse weather conditions.

Figure 4.3 shows a wind turbine during assembly. After the completion of the internal electrical connections between the turbines, turbine function testing would take place to verify the correct operation of the facility.

As mentioned above, each turbine would require underground excavations and given the rocky terrain in parts of the site, blasting may be required to excavate the foundations for the turbines, and possibly for road construction. However, the extent of it being required would be determined after final geotechnical studies have been completed prior to construction, and would be minimised as far as practicably possible.

Several large borrow pits may be required for road construction and would require a separate mining permit or right in terms of the Mineral and Petroleum Resources Development Act (No. 28 of 2002) once the precise locations are determined.

Due to the size of the development it is possible that the construction and commissioning of the wind farm may be undertaken in one or more phases with duration dependent on the size of the phase which could result in an overall extension of the overall construction phase duration. After installation of the turbines the crane pads and access roads would remain, while the rest of the construction-affected areas could be rehabilitated.

Construction Employment

During the construction period local people would be directly employed by the project, namely for site security, manual labour, transportation of goods and other similar services. The exact number of jobs that would be directly created by the project during construction is estimated to be approximately 59 positions during construction. The turbine assembly and testing would be undertaken by a highly-skilled team of turbine construction specialists (the majority of which would likely be from overseas as a workforce of this type is not currently available in the South African market). As part of the project, opportunities to employ and train up to 20 South African's to become skilled wind farm construction staff would be identified and implemented.

Figure 4.3 Turbine Installation

4.5.4 *Operation*

Once construction of the facility is complete and it becomes operational, it is expected that the wind farm will have a minimum life span of up to 25 years. Regular maintenance would be required to ensure that the turbines are kept in optimal working order. Most day to day facility operations would be done remotely through the use of computer networks but some of the maintenance and repair activities would be undertaken on site. During operation wind farms can function in parallel with daily farming activities due to the relatively small footprint of the turbines, hard-standing areas and access roads. A small team of up to 20 technical wind farm maintenance specialists (including trainees) would be employed by the project during the operations phase. Some additional ancillary 15 employment positions would be created by the project, including administrative staff, security and general maintenance of the wind farm site.

4.5.5 *Decommissioning*

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. If decommissioned, all the components of the wind farm would be removed and the site would be rehabilitated. The concrete foundations of the turbine would be removed to below ground level and would be covered with topsoil and replanted to restore natural habitat cover. Some access roads may also be removed and rehabilitated at the request of the landowner.

4.6 *CONSIDERATION OF ALTERNATIVES*

4.6.1 *Overall Site Alternatives (Pre-feasibility Study)*

The study by CES (2009) considered the anticipated risks associated with securing the obligatory environmental authorisations and other associated permitting and licensing requirements potentially applicable for each of the 14 site alternatives throughout South Africa (1).. A preliminary desktop assessment of the anticipated environmental impacts associated with each site alternative was also conducted in order to determine the possible significance of these impacts on their respective receiving environments. This was intended to inform whether these potential impacts could be deemed environmental fatal flaws that could prevent a given site alternative from receiving environmental authorisation. Another key factor considered in the overall risks associated with the individual site alternatives is any ancillary permitting and/or licensing processes that may be required to be completed prior to the commencement of construction activities, even after the required environmental authorisations have been obtained.

The CES (2009) pre-feasibility/ screening study was also intended to assist in refining G7's decisions as to which site alternatives should be prioritised for the development of wind energy facilities. It addressed the biophysical and social-economic environmental constraints and opportunities, as well as the potential cumulative impacts of the preferred sites. The document provided G7 with important information to inform their decision on whether or not to proceed with the full EIA process. This section gives a summary of the purpose, methodology and main findings of the screening process.

(1) Coastal & Environmental Services, December 2009: Pre-Feasibility Assessment for 14 proposed wind energy facility sites in South Africa, CES, Grahamstown. Available online at http://data.g7energies.com/eia/20091218_CES_Prefeasibility_Assessment_for_G7_FINAL.pdf

Key Informants

International and National Guideline Documents
The pre-feasibility/ screening report was informed by various international and national guideline documents, statutes and regulatory frameworks of relevance to the project, including:

- The ***1992 United Nations Framework Convention on Climate Change (FCCC),*** which is relevant *as* the proposed project will contribute to a reduction in the production of greenhouse gases by providing an alternative to fossil fuel-derived electricity, and will assist South Africa to begin demonstrating its commitment to meeting international obligations.
- ***The Kyoto Protocol (2002)*** which is relevant for the same reason as above.
- ***The Constitution Act (108 of 1996),*** placing an obligation on G7 to ensure that the proposed development will not result in pollution and ecological degradation; and that the proposed development is ecologically sustainable, while demonstrating economic and social development.
- ***The National Environmental Management Act (NEMA) (107 of 1998***), as amended, which requires the developer to be mindful of the principles, broad liability and implications associated with NEMA and to eliminate or mitigate any potential impacts. Also for the developer to be mindful of the principles, broad liability and implications of causing damage to the environment.
- ***National Environment Management: Biodiversity Act (10 of 2004)*** which suggests that the proposed development must conserve endangered ecosystems and protect and promote biodiversity; must assess the impacts of the proposed development on endangered ecosystems; that no protected species may be removed or damaged without a permit; and to ensure that the proposed site must be cleared of alien vegetation using appropriate means.
- ***The National Forests Act (84 of 1998)*** requiring that if any protected trees in terms of this Act occur on site, the developer will require a licence from the responsible authority to perform any of the above-listed activities.
- ***National Heritage Resources Act (25 of 1999)*** requiring amongst others that an archaeological impact assessment be undertaken during the detailed EIR phase of the proposed project.
- ***Atmospheric Pollution Prevention Act 45 of 1965*** requiring that the "best practicable means" for the abatement of dust during construction if approved have to be taken.
- ***The White Paper on Energy Policy for South Africa (Energy White Paper).*** The proposed Wind Farm project is a direct consequence of the Government's White Paper on Energy Policy and the requirements therein to improve energy security of supply through diversification, as well as the demonstration and introduction of cleaner energy technologies and the promotion of competition and empowerment in the electricity market.
- ***The White Paper on Renewable Energy Policy (Renewable Energy White Paper)***. The proposed Wind Farm project is in line with the above policy with regards to diversification of energy supply and the promotion of universal access to clean energy.

- ***Electricity Regulation Act (Act No. 4 of 2006)***. The proposed Wind Farm project is in line with the call of the Electricity Regulation Act No. 4 of 2006 as it has the potential to improve energy security of supply through diversification.
- ***Electricity Regulation on New Generation Capacity (Government Gazette No 32378 of 5 August 2009)***. The proposed Wind Farm project is required to comply with any guidelines relating to the IPP bid programme and the REFIT programme.
- ***Aviation Act (Act No. 74 of 1962): 13th Amendment of the Civil Aviation Regulations 1997***. A wind turbine generator is a special type of aviation obstruction due to the fact that at least the top third of the generator is continuously variable and offers a peculiar problem in as much as marking by night is concerned.
- ***National Water Act (Act No. 36 of 1998)*** controlling a number of activities related to: the abstraction of any raw water from any nearby surface water resources during the construction phase of the respective projects; Road access infrastructure that will require, for example, the construction of culverts over water courses. Should any of the 14 sites under consideration require a Water Use Licence Applications (WULA) process it would in all likelihood result in project delays due to the length of time that these application processes take to secure authorisation – at this time anything from 12 to 24 months.
- ***Other national legislation*** that may be relevant to the proposed G7 wind energy project including: The **Telecommunication Act (1966)** which has certain requirements with regard to potential impacts on signal reception. The **Environment Conservation Act No 73 of 1989 (ECA) Noise Control Regulations**, which specifically provide for regulations to be made with regard to the control of noise, vibration and shock, including prevention, acceptable levels, powers of local authorities and related matters.

In addition to the above, and aside from the environmental authorisation, the pre-feasibility report identified other permits, contracts and licenses that will need to be obtained by the project proponent for the proposed project some of which fall outside the scope of the EIA, these include:

- National Energy Regulator of South Africa (NERSA): Generation License
- Eskom: Connection agreement and Power Purchase Agreement (PPA)

Criteria for Impact Identification during the Pre-feasibility Phase

The following criteria were used for identifying potential impact ratings:

<u>Visual Impact Considerations</u>

- *Proximity to scenic areas/ Scenic character:* The closer a proposed facility is to areas of high scenic quality it can be anticipated that the development of a wind farm in the area would be more contentious than in areas of low scenic quality.
- *Sense of place/prevailing land use:* Rural or agricultural areas are for the same reasons stated above most likely to result in public dissatisfaction for wind

farm developments in comparison with their placement in an urban setting.

- *Areas of conservation or recreational use:* Areas designated as parks, nature reserves or public open space in close proximity to wind farm locations could result in negative public perceptions with regard to the project. It can be expected that regulatory authorities will also be resistant to application processes that potentially impinge on the use or quality of recreation experience associated with these areas.
- *Topography/Visual exposure/Viewer incidence:* The surrounding topography of a site alternative can potentially screen some of the visual impacts by reducing the visual exposure of the facility to surrounding landowners or residents. Similarly, the viewer incidence of these facilities by passing motorists for example can also be reduced should the topography facilitate this. If the landscape is relatively flat, or the facility is placed on a ridge/skyline as is the case for most wind farms it can be assumed that this would increase the viewer incidence and exposure to the facility.
- *Proximity to dense settlements:* The higher the population density in a given area the proposed project can realistically lead to a larger degree of public dissent.
- *Shadow flicker:* This will be determined by the proximity of a facility to either settlements or dwellings in close proximity to the facility. In addition, it is anticipated that this will be of greater concern in agricultural areas where the landowner will continue to conduct agricultural activity on the affected land parcels.

Acoustic Impact Considerations

- *Proximity to settlements/Sensitive receptors*: Facilities located within a 1km radius of dwellings or settlements could potentially impact on these areas. Sensitive receptors such as individual residential dwellings in rural areas within 500m of a facility are likely to be subject to potentially significant noise impacts.
- *Surrounding land use/Presence and proximity to existing ambient noise sources*: Surrounding land use practices can to a large degree negate the noise impacts of the facilities should these practices result in elevated ambient noise levels.

Avifauna (Birds and Bats) Impact Considerations

- More than 100 Important Bird Areas (IBAs) occur in South Africa, as well as five Endemic Bird Areas (EBAs). The Succulent Karoo Ecosystem Programme (SKEP) Bird Areas data has been utilised for this assessment, along with Bird Life South Africa's IBA data sets. IBAs are key sites for conservation – small enough to be conserved in their entirety and often already part of a protected-area network.
- Presence of Species of Special Concern (SSC/Listed species): The presence of bird or bat SSC can potentially be considered as a potential fatal flaw for a site alternative. Should a site be a confirmed roosting/breeding/foraging habitat for SSC it will be accorded the maximum rating and designated as a potential fatal flaw.
- Migration and/or preferential flight corridors for avifauna in general.

- Migration corridors of SSC.
- *Potential for bird/bat strikes:* In areas of high incidence of SSC or avifauna in general it can be expected that higher rates of bird strikes and mortalities will occur.
- *The effects of wind farms on Bats.* A confounding number of bat fatalities have been found at the bases of wind turbines throughout the world. Echo locating bats should be able to detect moving objects better than stationary ones, which begs the question, why are bats killed by wind turbines (Baerwald et al. 2008) Bat fatalities at wind power facilities are highly variable throughout the year, but there are many more bat fatalities than bird fatalities at wind farms (Brinkman et al. 2006).

Fauna Impact Considerations
- Presence of Species of Special Concern (SSC/Listed species) in the general area.
- The presence of Endangered or SSC on a given site.

Flora Impact Considerations
- Presence of Species of Special Concern (SSC/Listed species) in the general area.
- Sensitive/endangered biomes or land types that are under pressure on a given site.

Hydrology Impact Considerations
- Water Use Licence Applications (WULA) requirements for access roads/powerline servitudes.
- Cement batching plants water abstraction requirements requiring a WULA.
- Watercourse alteration/siltation/pollution potential.
- Presence of wetlands/surface water or sensitive aquatic features.

Heritage Impact Considerations
- Proximity to known heritage resources.
- Confirmed heritage resources requiring South African Heritage Resources Agency (SAHRA) permitting.
- Heritage resources that define the areas sense of place.
- Heritage resources that significantly add to the local economy.

Road Access and Powerline Servitudes
- Presence of existing roads.
- Presence of existing powerline infrastructure.
- Need for new access roads for facility construction/access to powerline infrastructure.
- Possible impacts on sensitive habitats resulting from the construction of the above.

Potential Safety Impact Considerations
- Proximity to airfields that may be in conflict with CAA regulations.

- Construction phase heavy motor vehicle (HMV) traffic leading to safety impacts.

Approach taken during the Pre-feasibility Phase

The approach to the pre-feasibility/screening assessment is based on recent sustainability appraisals and risk assessments that have been conducted by CES for numerous infrastructure developments. This methodology has been used in a number of pre-feasibility level assessments, and was argued by CES to provide the necessary information to facilitate decisions relating to the respective proposed project sites.

CES developed a matrix containing a list of all 14 proposed wind farms and identified key impact categories. All impact categories for each site were then scored based on the expected significance of the impact. High scores would indicate potentially high impact with a maximum score indicating a potential fatal flaw.

The overall environmental risk profile per project and individual impacts were then tabulated in terms of low, moderate or high and very high for each of the above criteria. This served to highlight the higher risk profiles associated with sites subject to these higher significance ratings. It is the combination of weighted aggregate scores for environmental significance criteria and mitigation potential that inform the overall risk rating for each site.

Once CES identified and assessed the ecological and social significance of the impacts associated with each of the site alternatives under consideration, the mitigation potential of each was then identified and the degree of difficulty interpreted in terms of effectiveness, practicality, and cost effectiveness. For this reason, CES used both an Impact Assessment and a Risk Assessment scale to identify significant environmental impacts and project related risks.

For each of the 14 sites, CES also identified at a desktop level; Vegetation Types; Mammal Species; Bird species and Bat species and prepared maps for vegetation types and sensitive sites for birds and possible impact spheres.

A summary of environmental impact significance ratings for each of the proposed wind farm sites was then prepared as well as a summary of the overall environmental risk ratings for proposed wind farm sites.

Findings/ Conclusions of Pre-feasibility / Screening Study

A number of the 14 sites were red flagged for potential environmental issues of significant concern, with only two sites being potentially fatally flawed. Two further sites were identified to hold the most potential for resulting in cumulative impacts. These sites were thus excluded from G7's list of priority sites while the remaining sites were prioritised in terms of those that held the best potential for success subject to an EIA being completed. The Richtersveld site was selected by G7 as one of five priority sites, and the EIA and other permitting processes were commenced for these five sites. Once landowner agreements had been granted the wind measurement campaign was started with the installation of a temporary 15 m wind monitoring mast (November 2009) and two permanent 80 m wind monitoring masts (installed during December 2010) [(1)].

The pre-feasibility study concluded that the West Coast project sites such as Richtersveld are likely to result in impacts of limited significance on their receiving environments due their relative isolation from densely populated areas. It was anticipated that all impacts can be mitigated to an acceptable level – pending final confirmation through specialist study.

4.6.2 *Site Location*

The sites that were selected for proposed wind energy facilities are considered by G7 as highly desirable from a technical perspective, which considers the following factors:

- Wind resource: Analysis of publicly available information, proprietary information and specialist on site analysis of weather data indicated that the site has sufficient wind resource to make a wind energy facility financially viable.

- Site extent: Sufficient land was secured under long-term lease agreements to allow for a minimum number of wind turbines to make the project feasible.

- Grid access: Grid access and the distance to a viable connection point were key considerations in terms of prioritising appropriate sites. Grid access is deemed favourable for this site due to the existence of an Eskom line traversing the site.

- Land suitability: The current land use of the site is an important consideration in site selection in terms of limiting disruption to existing land use practices. Agricultural land was preferred as the majority of farming practices can continue in parallel to the operation of the wind farm once the construction and commissioning of the project is complete. Sites that facilitate easy construction conditions (relatively flat, limited watercourse crossings, lack of major rock outcrops) are also favoured during site selection.

- Proximity to aerodromes: The proximity to aerodromes and possible interactions with these facilities was considered as part of site selection.

(1) The 60 m masts do not require approval as part of the EIA process according to the 2010 regulations under which it was built. Should this be required, a land use status that gives the masts the same lifetime as the project will be applied for through the land-use planning authorisation of the wind farm.

- Landowner support: The selection of sites where the land owners are supportive of the development of renewable energy is essential for ensuring the success of the project.

- Environmental and social high-level screening: As discussed in *Section **Error! Reference source not found.*** above, CES was contracted by G7 to conduct a pre-feasibility assessment for a number of potential wind energy facility locations throughout South Africa. A preliminary desktop assessment was conducted to provide a preliminary assessment of the environmental risks and potential fatal flaws associated with proposed wind farm site alternatives countrywide.

The consideration of the above criteria resulted in the selection of the preferred site. No further site location alternatives will be considered in the EIA process, which will consider preferred infrastructure locations on the site and layout alternatives, with possible revised locations and site layouts informed by the EIA process (see below), as well as the No-Go alternative.

G7 is in the process of initiating the rezoning application process for the site and the outcome of the EIA process would feed into the LUPO process. The proposed project would be operational for approximately 25 years, and to ERM's knowledge contracts have been signed with the relevant landowners and agreements in place allowing farmers to continue with farming activities.

4.6.3 Site Layout Alternatives

The turbine layout and project component design was subjected to a number of iterations based on technical aspects of the project such as detailed site specific wind data and construction conditions, and the environmental and socio- economic considerations as well as specialist input and sensitivity ratings for the site that were explored during the EIA process.

An original layout (Layout Alternative 1 shown in *Figure 4.4*) provided by G7 and based on limited data was used as the basis for the initial specialist assessment. After field surveys and workshops by the EIA team particular areas posing additional environmental and social constraints or specific unsuitable turbine locations were identified and fed back to the G7 technical team. Areas considered unsuitable by the environmental specialists were excluded where possible based on potential impacts to vegetation, birds, bats, ecology, noise sensitive receptors and visual considerations. *Figures 4.5* and *4.6* indicate Layout Alternative 1 on the Ecological, Bird and Bat Sensitivity maps. The technical team then generated a revised 'buildable areas map' based on these environmental and social constraints as well as additional technical constraints and from there developed a revised turbine layout design, Site Layout Alternative 2 (*Figure 4.7*) taking these constraints into consideration. The two alternative layouts are summarised below in *Table 4.2.*

Table 4.2 *Alternative Layouts Considered in this Assessment*

Description	No. of turbines	Turbine Type	Turbine Max. Hub Height	Total Output capacity (MW)	Reason
Site Layout Alternative 1 ***Error! Reference source not found.***	75	2MW-3MW	100m	225	Initial buffers and technical constraints.
Site Layout Alternative 2 ***Error! Reference source not found.7***	69	2MW-3MW	100m	207	Additional buffers and sensitive areas considering inputs from the public and environmental and social constraints.

Technical criteria and buffer zones considered in deriving at the final site layout (Layout Alternative 2) included:

- Slopes of less than 8 degrees in the immediate vicinity of the turbines;
- Where possible, avoiding areas which are very rocky or uneven in order to minimise earthworks and thus real and potential environmental impact;
- Inland water body buffer of 100 m;
- House or buildings buffer of 500 m;
- Railway buffer of 200 m;
- River buffer of 200 m;
- Buffer along public roads of 200 m; and
- Buffer along existing Eskom grid infrastructure of 125 m for turbines.

The coordinates of the turbines in the preferred and final layout are given in *Table 4.3*. In future, the precise coordinates of the individual wind turbines given here may undergo further minor refinement of no more than 50 m for geotechnical reasons, described in *Section 4.5.2.*

4.3 *Turbine coordinates of Site Layout Alternative 2 (preferred/final)*

Turbine	Latitude	Longitude
Northern String		
WTG1	16.65128	-28.7528
WTG2	16.65372	-28.7533
WTG3	16.65614	-28.7539
WTG4	16.65855	-28.7545
WTG5	16.66095	-28.755
WTG6	16.66349	-28.7548
WTG7	16.66582	-28.7538
WTG8	16.66776	-28.7524
WTG9	16.66968	-28.7509
WTG10	16.67189	-28.7499
WTG11	16.67418	-28.7487
WTG12	16.67612	-28.7473
WTG13	16.67821	-28.746
WTG14	16.68037	-28.7448
WTG15	16.68243	-28.7435
WTG16	16.68452	-28.7422
WTG17	16.6869	-28.7413

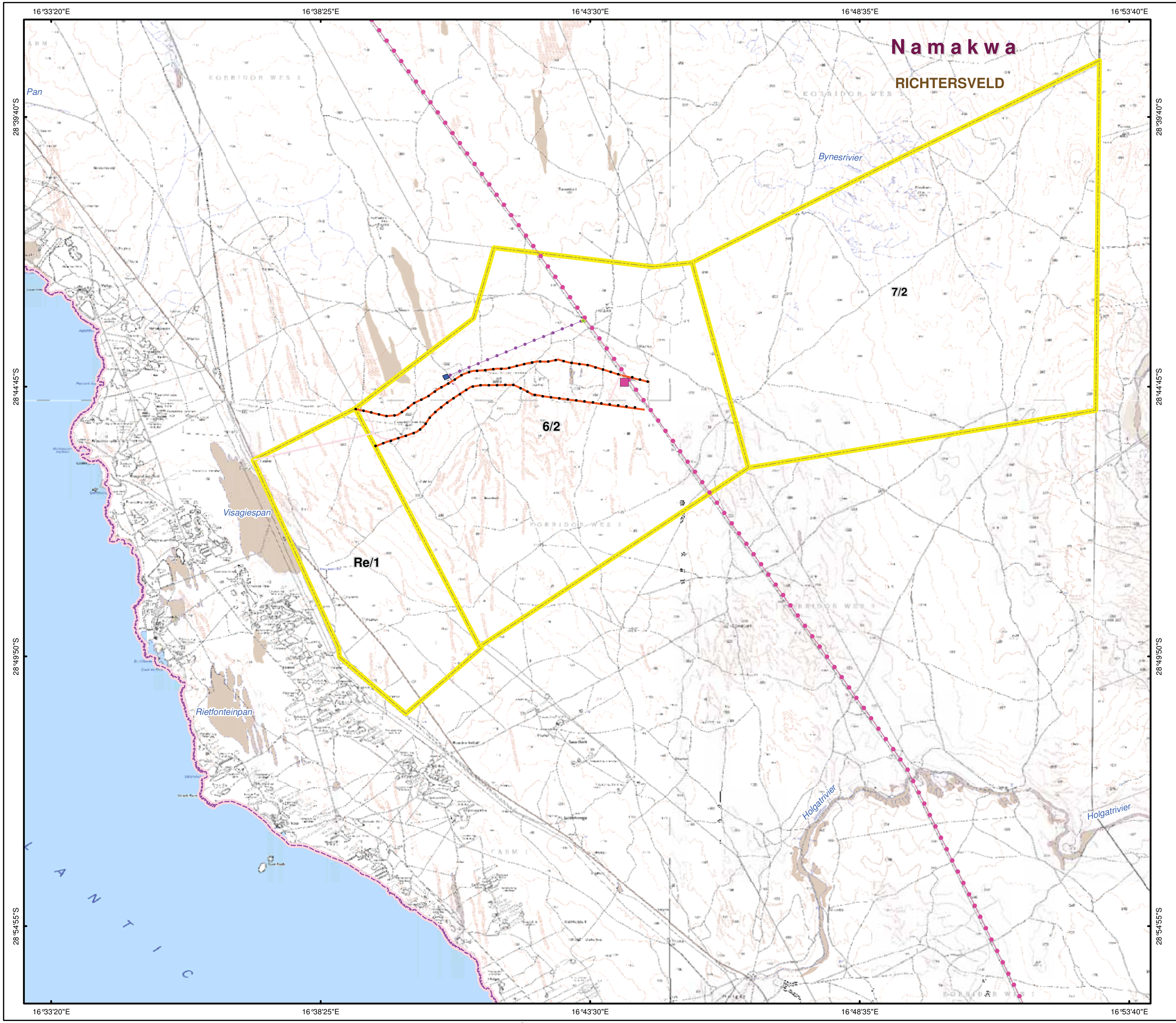
Turbine	Latitude	Longitude
WTG18	16.68941	-28.7408
WTG19	16.692	-28.7406
WTG20	16.69452	-28.7403
WTG21	16.69703	-28.7401
WTG22	16.69951	-28.7399
WTG23	16.70187	-28.7393
WTG24	16.70424	-28.7387
WTG25	16.7067	-28.7382
WTG26	16.70923	-28.7379
WTG27	16.7118	-28.7379
WTG28	16.7142	-28.7375
WTG29	16.71666	-28.7378
WTG30	16.71911	-28.7383
WTG31	16.72166	-28.7387
WTG32	16.72422	-28.739
WTG33	16.72669	-28.7397
WTG34	16.72902	-28.7404
WTG35	16.73146	-28.7412
WTG36	16.73382	-28.7419
WTG37	16.7382	-28.7428
WTG38	16.74064	-28.7435
WTG39	16.74309	-28.7442
Southern String		
WTG6	16.66946708	-28.76039164
WTG7	16.67154253	-28.75919088
WTG8	16.67326946	-28.75743949
WTG9	16.6745434	-28.75552758
WTG10	16.67626959	-28.75383913
WTG11	16.67811863	-28.75228216
WTG12	16.68004628	-28.75080715
WTG13	16.68199637	-28.74947838
WTG14	16.68397564	-28.74816196
WTG15	16.68598597	-28.74685376
WTG16	16.6881008	-28.74574205
WTG17	16.69054071	-28.74539424
WTG18	16.69315055	-28.74534195
WTG19	16.695687	-28.74532532
WTG20	16.69826977	-28.74530719
WTG21	16.70081721	-28.74530379
WTG22	16.7030761	-28.74627674
WTG23	16.70523888	-28.74740185
WTG24	16.7075747	-28.74837599
WTG25	16.71005382	-28.74885798
WTG26	16.71269082	-28.74917308
WTG27	16.71532782	-28.74948817
WTG28	16.71796482	-28.74980327
WTG29	16.72060182	-28.75011837
WTG30	16.72323882	-28.75043346
WTG31	16.72587583	-28.75074856
WTG32	16.72851283	-28.75106366
WTG33	16.73114983	-28.75137875
WTG34	16.73378683	-28.75169385
WTG35	16.73642383	-28.75200895
WTG36	16.73906083	-28.75232404

Technical inputs that may influence the final design of the facility, including the final layout, size, type and number of turbines, would be determined using:

- The intensity of wind turbulence determined from further on-site wind measurements and wind modelling;
- The characteristics of the turbine model, including hub height, rotor diameter and generator size;
- Results of detailed geotechnical surveys, construction design and civil engineering; and
- Detailed wind turbine procurement with short-listed reputable wind turbine manufacturers.

The aim of considering layout alternatives was to balance the technical and financial objectives of maximising the output of the proposed facility with the other critical environmental and social constraints including visual, noise, botanical, fauna, heritage, archaeology, palaeontology and avifauna.

It is reiterated that Layout Alternative 2 is the preferred and **final turbine layout** design applied for in this EIR. The precise coordinates may be subject to minor adjustments of approximately 50 m once detailed engineering has been completed as mentioned in *Section 4.5.2*. Any unforeseen revision of the design which would impose changes larger than 50 m would be within the allowable zones prescribed by the sensitivity zoning undertaken in this EIR.



Legend

- Richtersveld Land Parcel
- District Municipalities
- Local Municipalities
- Contours (20m)
- Rivers
- Secondary Roads
- Other Roads
- Track and Hiking Trail
- Cadastral Farms
- Power Line
- Dry Pan
- Sand
- Linking Station
- Substation Alternative 2
- 220kV Substation
- Existing Transmission Lines (Gromis\Oranjemund 1)
- Substation alternative
- Access Roads
- Wind Turbine Generator
- Internal Road

SCALE:

0 5 10 15 20 25

Kilometres

N

TITLE:

Figure 4.4: Topographical Map showing Layout Alternative 1

CLIENT:

G7 renewable ENERGIES

DATE: SEPT 2011	CHECKED: TS	PROJECT: 0134745
DRAWN: AB	APPROVED: SHC	SCALE: 1 : 125 000

DRAWING:	REV:
Topo Map of Richtersveld WF.mxd	0

ERM
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Woodlands Drive,
Woodmead, 2148
Johannesburg, South Africa
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Fax: +27 (0)11 804 2289

	SIZE:
Projection: Geographic, Datum: WGS84 Source: Chief Directorate National Geo-Spatial Information - 2816DA_2003_ED2_GEO.tif, DB, DC & DD Inset Map, Esri Data & Maps	A3

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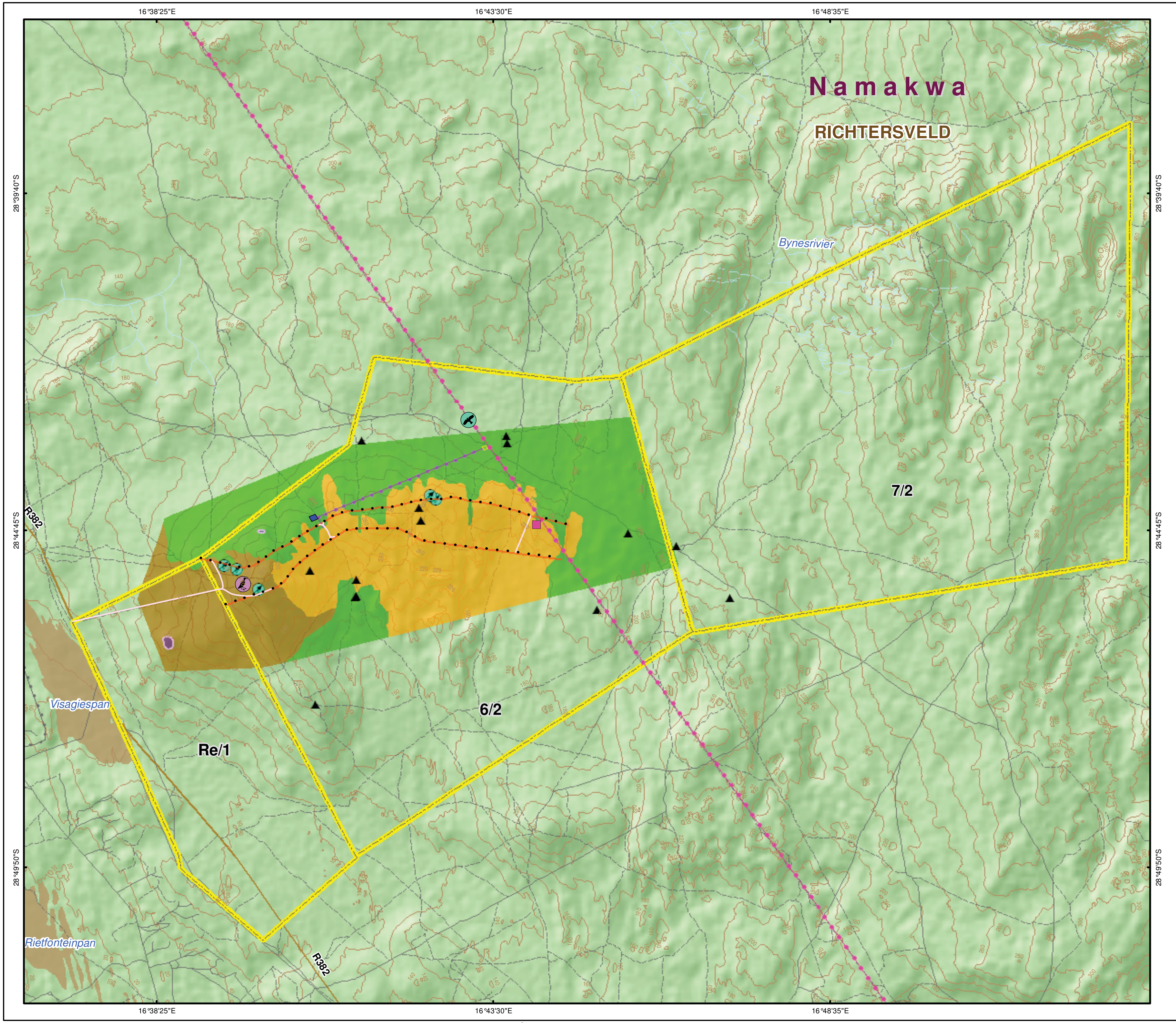

Legend

- Richtersveld Land Parcel
- Transmission Line
- Secondary Road
- Other Access
- Track/Footpath
- Contours (20m)
- Non-Perennial River
- Dry Pan
- Linking Station
- Substation Alternative 2
- 220kV Substation
- Existing Transmission Lines (Gromis\Oranjemund 1)
- Substation alternative
- Access Roads
- Wind Turbine Generator
- Internal Roads

Bird Locations

- Barlow's Lark
- Lanner Falcon

Bat Sensitivity

- Sensitive Areas
- 50m Buffer

Heritage/Cultural Sites

- Archaeological Site
- Stock-Posts

Ecological Sensitivity

- Very High
- High
- Medium

SCALE: 0 1 2 3 4 5 Kilometres

N

TITLE:

Figure 4.5: Alternative 1 on the Constraints Map

CLIENT: G7 renewable ENERGIES

DATE: SEPT 2011	CHECKED: TS	PROJECT: 0134745
DRAWN: AB	APPROVED: SHC	SCALE: 1 : 100 000

DRAWING: Constraints Map Alt1.mxd

REV: 0

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Projection: Geographic, Datum: WGS84
Source: NGI, EnPAT, PPF, Natural Scientific Services
Ecology Impact Assesment - Simon Todd
Inset Map, Esri Data & Maps

SIZE: A3

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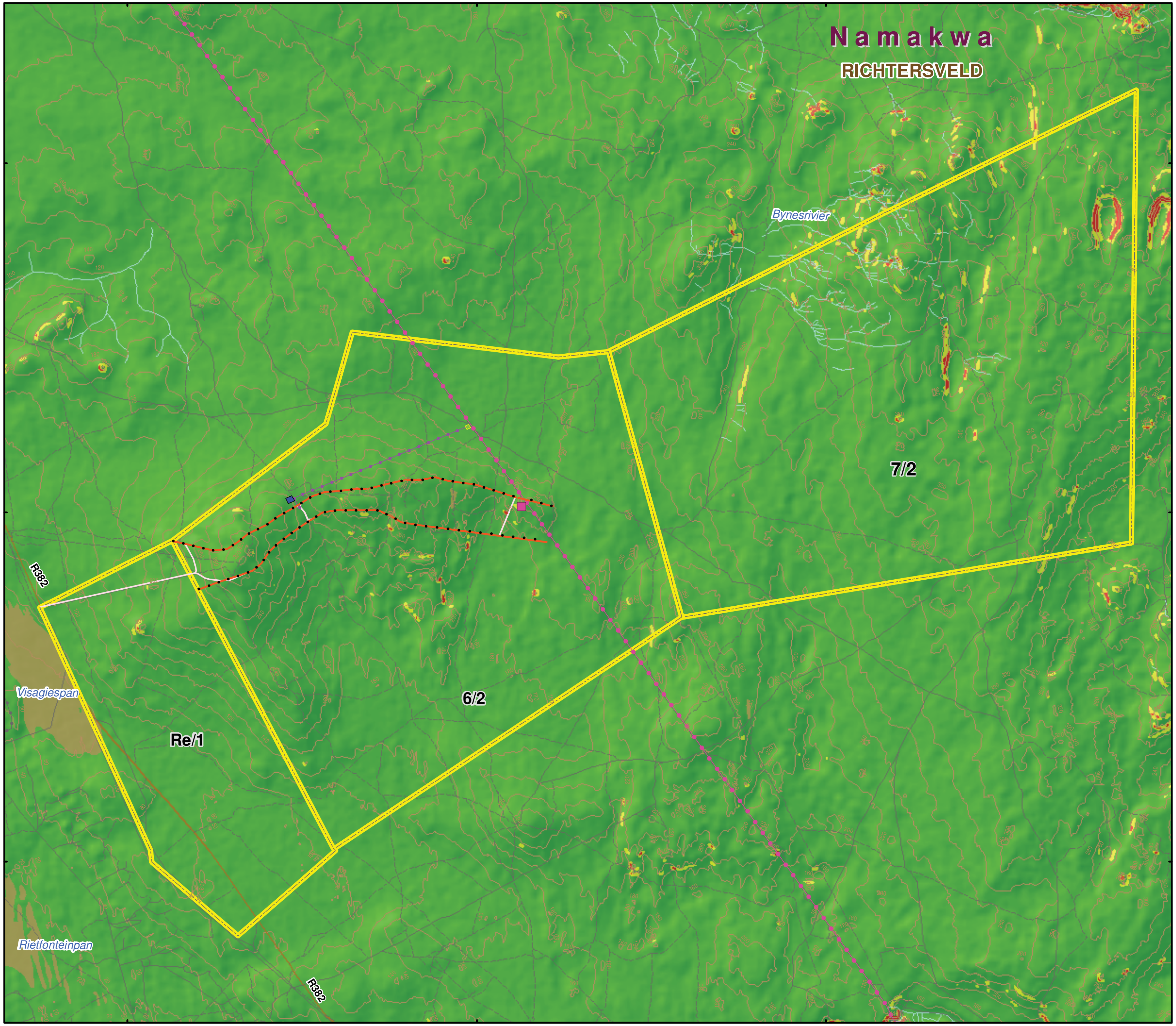
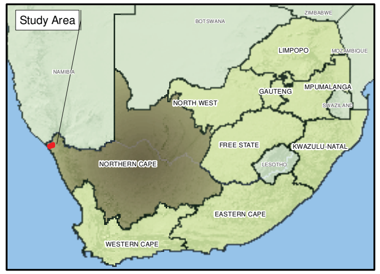


Legend

- Richtersveld Land Parcel
- Transmission Line
- Secondary Road
- Other Access
- Track/Footpath
- Contours (20m)
- Non-Perennial River
- Dry Pan
- Linking Station
- 220kV Substation
- Substation Alternative 2
- Access Roads
- Substation alternative
- Existing Transmission Lines (Gromis\Oranjemund 1)
- Wind Turbine Generator
- Internal Roads

Slope (Degrees)

- < 8
- 8 - 12
- > 12



SCALE:

0 1 2 3 4 5

Kilometres

N

TITLE:

Figure 4.6: Map showing Slopes of the Richhtersveld Site

CLIENT:

G7 renewable ENERGIES

DATE: SEPT 2011	CHECKED: TS	PROJECT: 0134745
DRAWN: AB	APPROVED: SHC	SCALE: 1 : 100 000

DRAWING: Slope Map.mxd

REV: 0

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Projection: Geographic, Datum: WGS84
Source: NGI, EnPAT, PPF
Inset Map, Esri Data & Maps

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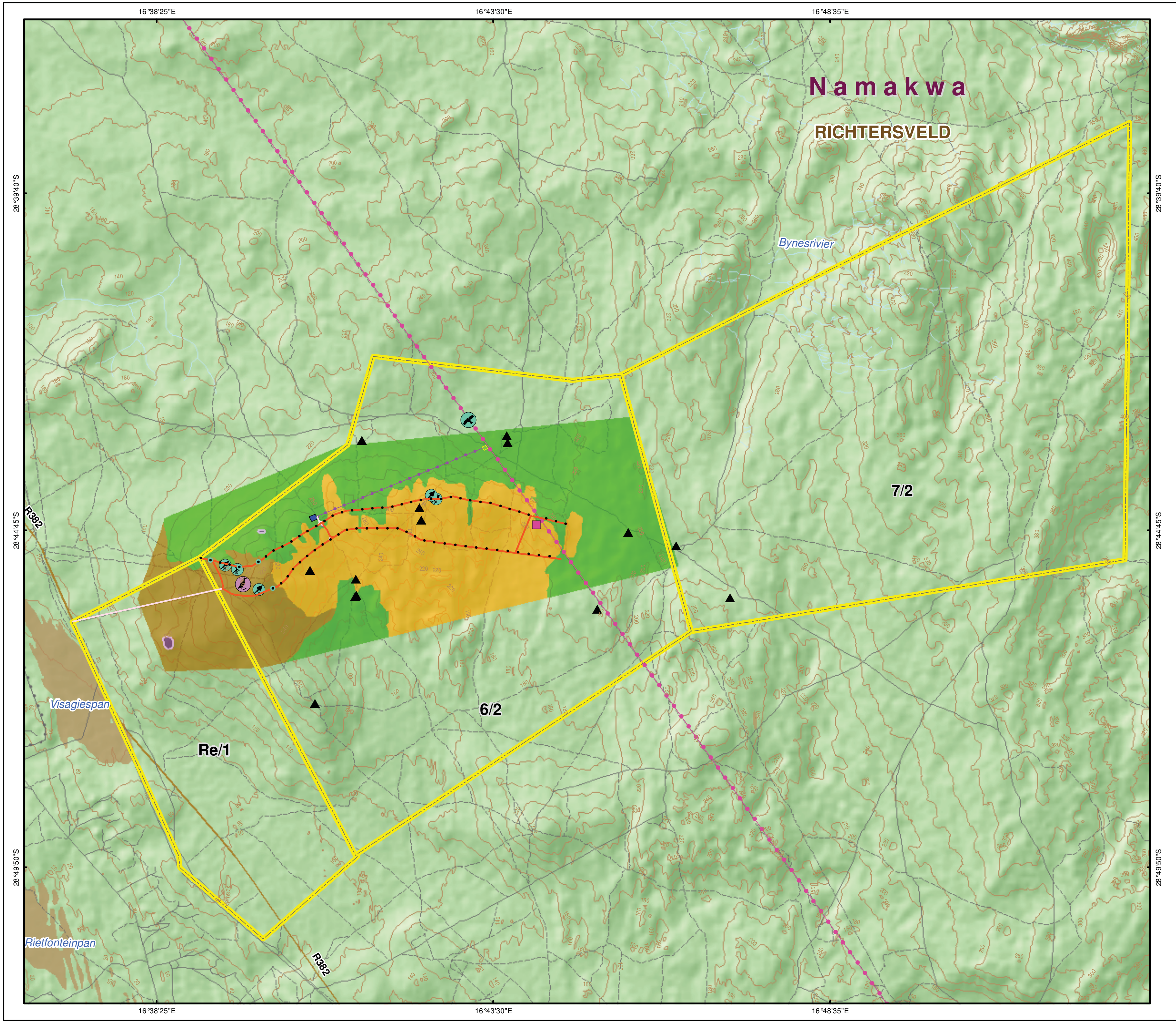

Legend

- Richtersveld Land Parcel
- Transmission Line
- Secondary Road
- Other Access
- Track/Footpath
- Contours (20m)
- Non-Perennial River
- Dry Pan
- Linking Station
- Substation Alternative 2
- 220kV Substation
- Existing Transmission Lines (Gromis\Oranjemund 1)
- Substation alternative
- Access Roads
- Wind Turbine Generator
- WTGs to be Re-Sited
- Internal Roads

Bird Locations

- Barlow's Lark
- Lanner Falcon

Bat Sensitivity

- Sensitive Areas
- 50m Buffer

Heritage/Cultural Sites

- Archaeological Site
- Stock-Posts

Ecological Sensitivity

- Very High
- High
- Medium

SCALE: 0 1 2 3 4 5 Kilometres

N

TITLE:

Figure 4.7: Alternative 2 on the Constraints Map

CLIENT: G7 renewable ENERGIES

DATE: SEPT 2011	CHECKED: TS	PROJECT: 0134745
DRAWN: AB	APPROVED: SHC	SCALE: 1 : 100 000

DRAWING: Constraints Map Alt2.mxd

REV: 0

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ERM

Projection: Geographic, Datum: WGS84
Source: NGI, EnPAT, PPF, Natural Scientific Services
Ecology Impact Assesment - Simon Todd
Inset Map, Esri Data & Maps

SIZE: A3

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4.6.4 *Grid Connection Alternatives*

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 existing 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.

4.6.5 *Technology Alternatives*

Wind energy is considered to be the most suitable renewable energy technology for this site, based on the site location, ambient conditions and energy resource availability. A number of different wind turbine models are available with different dimensions and outputs. The Final Layout has reduced the choice of possible turbines, however the preferred turbine supplier has not yet been selected and different turbine models suitable for installation and operation on site will be considered with an output of 2.0 to 3MW, hub height of 100 m and rotor diameter of up to 117 m. For the final choice of supplier, criteria such as suitability to the site high wind conditions, sufficient generation capacity of the chosen model, guarantees, scope of delivery and services, overall experience, accreditation and acceptance by lenders, long term support structure within South Africa, willingness to maximize local content and financial aspects will be taken into consideration.

4.6.6 *No-Go Alternative*

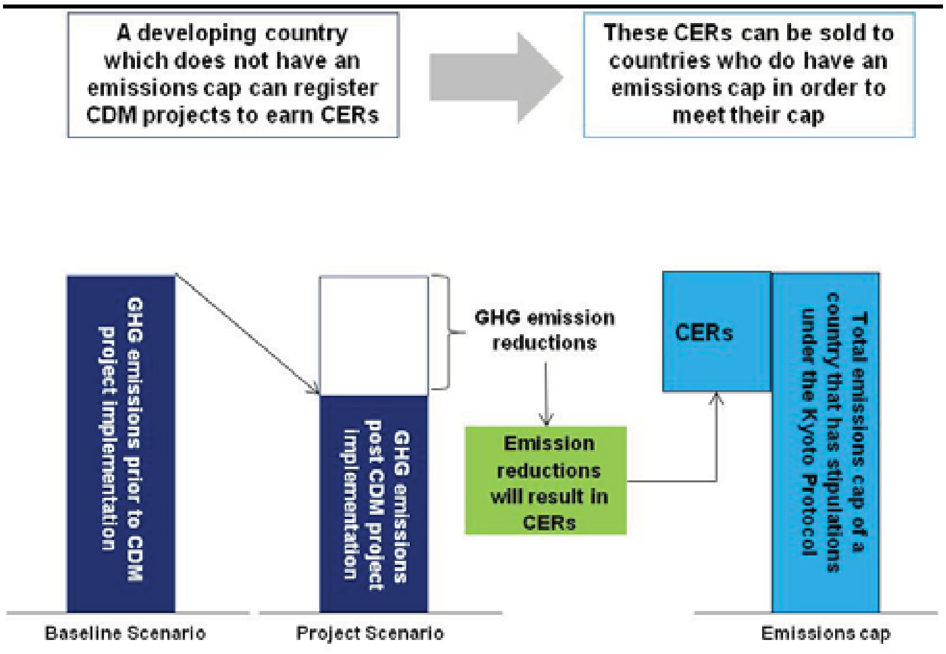
The no-go alternative implies that the proposed project would not be executed. Assuming that the wind energy facility would not be developed at the proposed site, there would be no increase in electricity generation from the facility, no CO_2 (1) offsets associated with the proposed development and no economic benefit to the landowners associated with the potential income generated through the operation of the facility. There would be no job creation, no contribution to meeting South Africa's targets for renewable energy generation and no additional developments and economic benefits to the local community. There would also be no negative or positive environmental and social impacts associated with the development of a wind energy facility, as identified in *Chapters 7-16*.

(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.

4.7 CLEAN DEVELOPMENT MECHANISM REGISTRATION

The proposed Richtersveld Wind Farm would generate electricity which would be supplied into the national grid. The electricity generated by this facility would displace grid electricity which is primarily coal-based and, as such, has a high Greenhouse Gas (GHG) emission factor. Part of the project planning includes an application for the project to be registered under the Clean Development Mechanism (CDM) of the Kyoto Protocol. The CDM allows developing countries such as South Africa to implement GHG emission reduction projects and generate carbon credits. These carbon credits are also known as Certified Emission Reductions (CERs). One MWh of electricity generated by the proposed Richtersveld Wind Farm would be equivalent to one carbon credit (one CER). The carbon credits are sold to developed countries to assist in achieving the GHG emission reduction targets committed to under the Kyoto Protocol. This process is illustrated in *Figure 4.8* below.

Figure 4.8 ***CDM Process Illustration***



The project is in the process of preparing an application for registration under the CDM. This CDM registration process is not part of the EIA process and is not being undertaken by ERM. G7 has commissioned Deloitte & Touche as independent CDM consultants to undertake this process. General information on the CDM can be found at www.unfccc.int and for further information on the CDM registration for the Richtersveld Wind Farm please contact Joslin Andrews at Deloitte & Touche (josandrews@deloitte.co.za or +27 (0) 11 806 5952).

Figure 4.9 CDM Project Development