Boesmanland Solar Farm

October 8

2012

Engineering overview and summary pertaining to environmental aspects of the Boesmanland Solar Farm. Compiled by Emma van der Merwe of Solek (Renewable Energy Engineers)

EIA Engineering Report

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Abbreviations and Acronyms

- AC Alternating Current
- DAFF Department of Agriculture, Forestry & Fisheries
- DC Direct Current
- DEA National Department of Environmental Affairs
- DWA Department of Water Affairs
- EAP Environmental Assessment Practitioner
- ECO Environmental Control Officer
- EIA Environmental Impact Assessment
- EIR Environmental Impact Report
- EMP Environmental Management Plan / Programme
- IPP Independent Power Producer
- IPPPP Independent Power Producer Procurement Program
- PPA Power Purchase Agreement
- MW Megawatt
- NEMA National Environmental Management Act
- NERSA National Energy Regulator of South Africa
- PV Photo Voltaic
- SID Strategically Important Development
- SANRAL South African National Roads Agency Limited
- UNFCCC United Nations Framework Convention on Climate Change

1. Introduction

Boesmanland Solar Farm (Pty) Ltd as an Independent Power Producer (IPP) is proposing the establishment of a commercial solar energy facility on a site within the Northern Cape to be known as Boesmanland Solar Farm, of size 75MW. The Northern Cape is generally known to be one of the preferred areas for the generation of solar energy in South Africa, and even in the world, due to its abundant solar radiation. The purpose of this facility is to generate electricity from a renewable energy source (i.e. solar radiation) to provide power to the national electricity grid. The proposed development site is located within the Khai-Ma local Municipality district approximately 8km South West of Aggeneys, in the Northern Cape Province.

The purpose of this engineering report is to describe the various sections of the facility and provide a transparent view on facility operation and the possible effects on the environment. Solek, a renewable energy engineering company is primarily responsible for the compilation of this section of the report, and a complete company profile is attached in the appendix for the reader's convenience.

The report gives background on the energy market in South Africa and the opportunity for solar energy in the Northern Cape. The overall project and proposed facility is also described in more detail by investigating:

- The basic understanding of solar PV plants
- The description of the proposed solar facility
- The different steps in the construction phase of the proposed facility
- The project operation and maintenance phase
- Financial implications and financial overview (Cost Implications)
- Planned project timelines
- Overall conclusion

1.1. Background of the energy market in South Africa

The development of renewable energy in South Africa is gaining momentum at a significant pace, due to the incentives allocated towards approved projects by the South African government. Eskom's shortfall in energy resulted in development and construction of the Medupi and Kusile coal power stations. Development of these power stations relied heavily on World Bank financial assistance. The loan requirements forced South Africa into development of a renewable energy program, hence bringing to life the IPP procurement program.

According to the Integrated Resource Plan 2010 (IRP 2010), South Africa will require 42 500 MW of additional energy over the following 20 years in order to meet the requirements created by the growing economy. Approximately 20% of this energy is projected to be supplied by solar power.

In order to stimulate the demand in solar power, the South African government has made 1450 MW of solar photovoltaic capacity available, which can be applied for by means of the Independent Power Producer Procurement Programme (IPPPP). The Department of Energy (DoE) has set five dates for the submission of bid documents for private companies to apply for permission to generate electricity. In Briefing Notice 14, dated 7 September 2012, the DoE confirmed the postponement of the 3rd, 4th and 5th bidding dates as follows:

- 1st Bid Submission: 4 November 2011
- 2nd Bid Submission: 5 March 2012
- 3rd Bid Submission: 7 May 2013 (was 1 October 2012)

- 4th Bid Submission: to be confirmed (was 15 April 2013)
- 5th Bid Submission: to be confirmed (was 24 September 2013)

Another market arising is that of green builders and corporate organisations which are to invest in green electricity and carbon emission reduction. This means that green electricity suppliers such as biogas or solar, will be bought at a premium price from private power producers and obtain a green status according to the United Nations Framework Convention on Climate Change (UNFCCC).

Large international companies seek opportunities in the local market. However, they lack experience with local authorities, procedures and political environment. This local 'know how' is favourable for South African companies and presents many more partnering opportunities with international companies.

1.2. Opportunity for solar energy in the Northern Cape

When considering South Africa's irradiation distribution, the Northern Cape Province is known to be one of the most preferred areas for the generation of solar energy in South Africa and even in the world. This can be ascribed to the advantageous sun radiation specifications and the vast flat planes that the province has to offer, which are not intensively used, except for farming. The global irradiation in the specific area is between 2400 and 2600 kWh/m^2. Furthermore, specific parts of the Northern Cape can be used for the generation of power without compromising food security due to the area's low food production capacity per hectare of usable land. Below is a map which gives an overview of this potential.

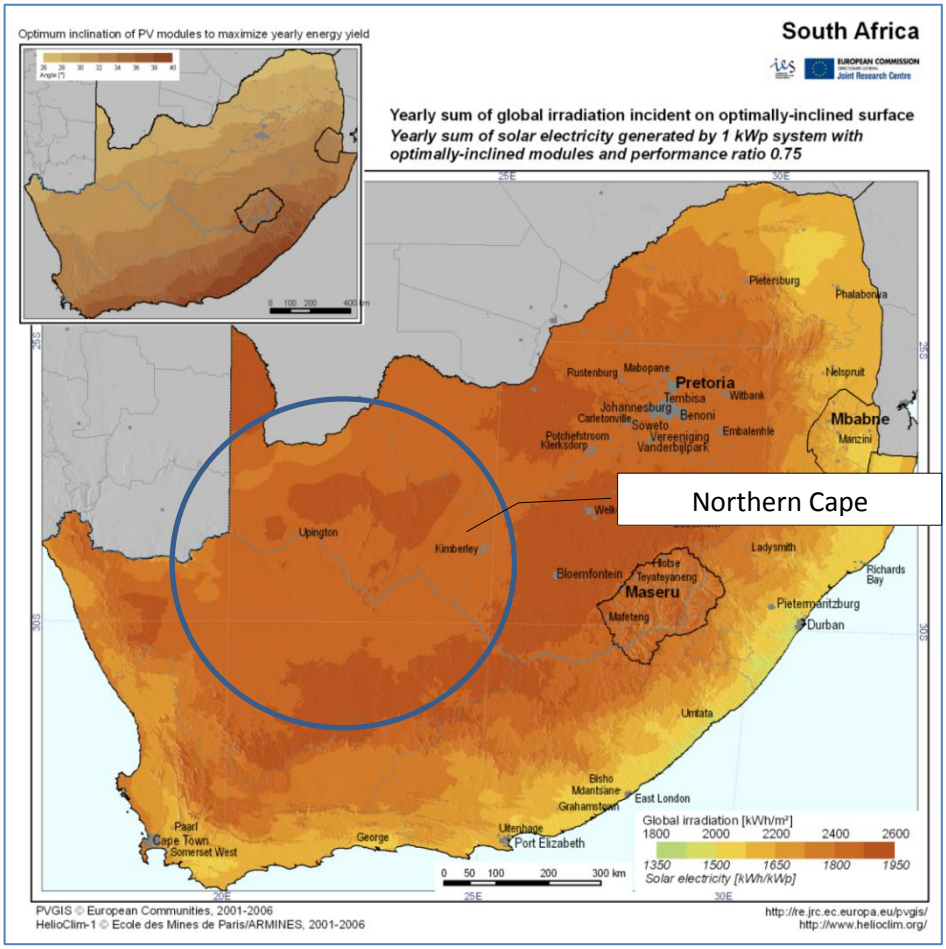

Figure 1: South African solar irradiation distribution

The benefits that the production of energy from the sun holds within the broader South African context outweighs most potential negative impacts the development may have on the bio-physical environment of the property. The contribution and agricultural value of the specific farm should be compared to the impact the national energy crisis could have. This crisis effects job creation, skills development and economic growth potential of the renewable industry.

On the economic front, the proposed project has the potential of making a significantly positive contribution to the local economy. The Northern Cape was well-known for the large number of copper and zinc mines in the area, but since the early 1990's, many of these mines have closed down, leaving a devastating trail of unemployment behind. The local economy, mainly supported by farming, simply isn't enough to accommodate the high level of unemployment. In addition, poverty imposed social problems are a problem in the surrounding area. The proposed development has the opportunity to create a significant amount of career opportunities over its entire lifespan of 20-30 years.

1.3. Overview of the proposed project

The applicant is proposing the establishment of a commercial solar energy facility, known as the Boesmanland Solar Farm and will be operated under the license of a company bearing the same name, Boesmanland Solar Farm (Pty) Ltd. The proposed development site is located on a portion of Portion 6, a portion of Portion 2, of Farm 62 Zuurwater, which is situated within the jurisdiction of the Khai-Ma Local Municipality, in the Northern Cape Province. The purpose of the facility is to assist the government in providing much needed electricity by generating energy from a renewable energy source – the sun.

The proposed facility is to be designed for the generation of approximately 75MW AC (Alternating Current) of electricity, which will be fed into the national electricity grid. The proposed development site covers an area of approximately 265 hectares. The identified 265ha development site is located on a section of the total farm (1927ha). The area is located approximately 6km from the Aggeneis Substation and borders the Vedanta Black Mountain Mine.

2. Solar energy as a power generation technology

2.1. Basic understanding of solar PV plants

Photovoltaic (PV) panels convert the energy delivered by the sun to direct current (DC) electric energy. The array of panels is connected to an inverter by means of a network of cables. The grid-tied inverters invert the DC power to alternating current (AC) power which can be added to the national electricity network (grid). This generated power is stepped up to the required voltage and frequency of the national grid, by using a transformer. The electricity is distributed from the onsite transformers / substation via a distribution / transmission line to the nearest Eskom Substation. The electricity is fed into the Eskom grid at this local Eskom Substation. A percentage of the total power generated by the solar arrays is lost over time as the panels loose efficiency through their 30-year lifespan, as well as through the transformation and distribution process i.e. the facility may generate a minimum of 90MW (DC electricity) to ensure that 75MW (AC electricity) is fed into the Eskom grid.

The proposed Solar PV tracking technology is known as horizontal trackers. Horizontal trackers are ground-mounted and follow the sun's path with the use of typically single-axis technology in order to maximise the amount of direct sunlight on the Solar PV panels.

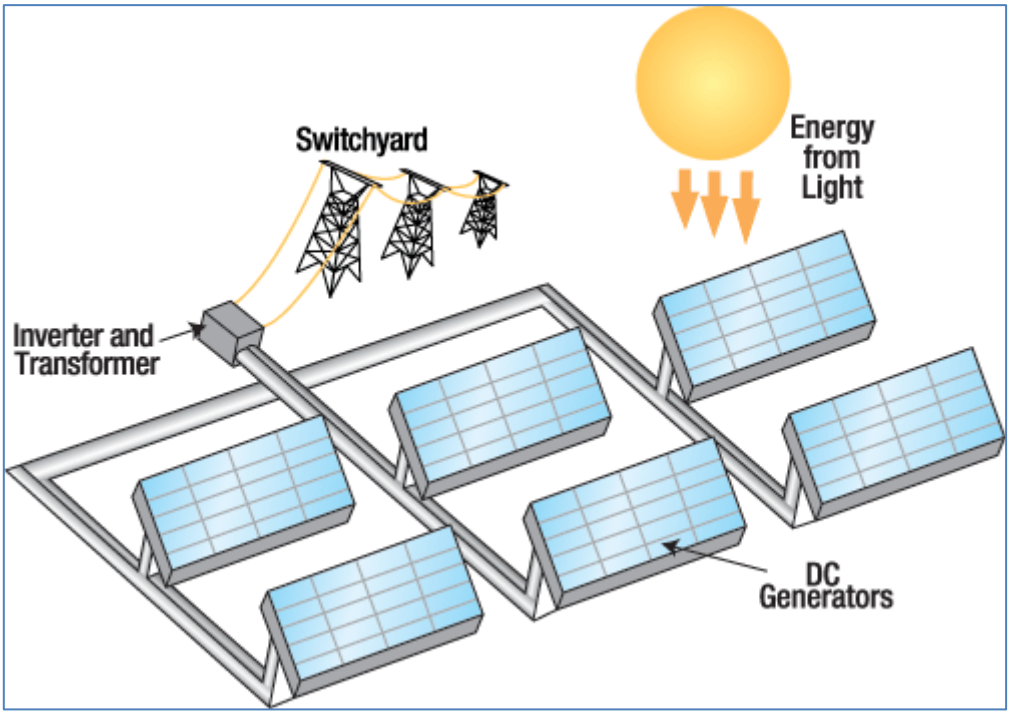

Figure 2: Typical Solar PV Plant diagram

The infrastructure of the facility includes the ground-mounted panels, cables, access roads, auxiliary roads, an onsite substation and a distribution line.

The primary input of the system is sunlight, which is converted to electricity. The facility also utilises auxiliary electricity from the Eskom grid to power tracker motors in order to optimise the amount of direct sunlight on the solar PV infrastructure.

2.2 Project related benefits

The single largest benefit of the generation of solar energy is the fact that the electricity is generated by means of a renewable source, the sun. This means that the project is sustainable and environmentally friendly and in essence the energy source cannot become depleted, as in the case with fossil fuels (i.e. coal or oil). This type of energy production does not pollute the environment, it is renewable, reliable and it does not consume anything close to the amount of natural resources as compared to conventional power generation (e.g. coal power plants). Its long term environmental benefits are perhaps the most notable of any electricity source and hold much promise for reducing environmental impacts from electricity production from coal power plants – which is the most common technology used in South Africa.

The production of 75MW alternative energy is a welcomed supplement to South Africa's electricity supply and aligns with the government's targets of reducing reliance on fossil fuel based electricity. The renewable energy projects are treated as "Strategically Important Developments" (SID's) under the IPP Procurement Programmes, since these projects have the potential to make a significant contribution to the national and local economy.

Not only will the project contribute to the existing electricity Eskom grid in the area, but also in achieving the 40% share of new power generation being derived from IPP's nationally.

Long term benefits, particularly related to the local community and society, can be realised through the project, mainly in terms of much needed employment and skills development. Such a project is a very good stimulus for the local and national economy, positively contributing especially to the surrounding community. In addition, the general requirements provided for by government stipulate strong local procurements and local investments into the surrounding communities.

3. Description of the proposed solar facility

The proposed infrastructure that is planned to be constructed includes a series of Solar PV arrays and inverters, internal electrical reticulation and an internal road network. It will also be necessary to construct an onsite substation, which will typically include a transformer to allow the generated power to be connected to Eskom's electricity grid. Auxiliary buildings, including ablution, workshops and storage areas, are to be erected and a distribution line will also be required to distribute the generated electricity from the site to the existing Aggeneis Eskom substation.

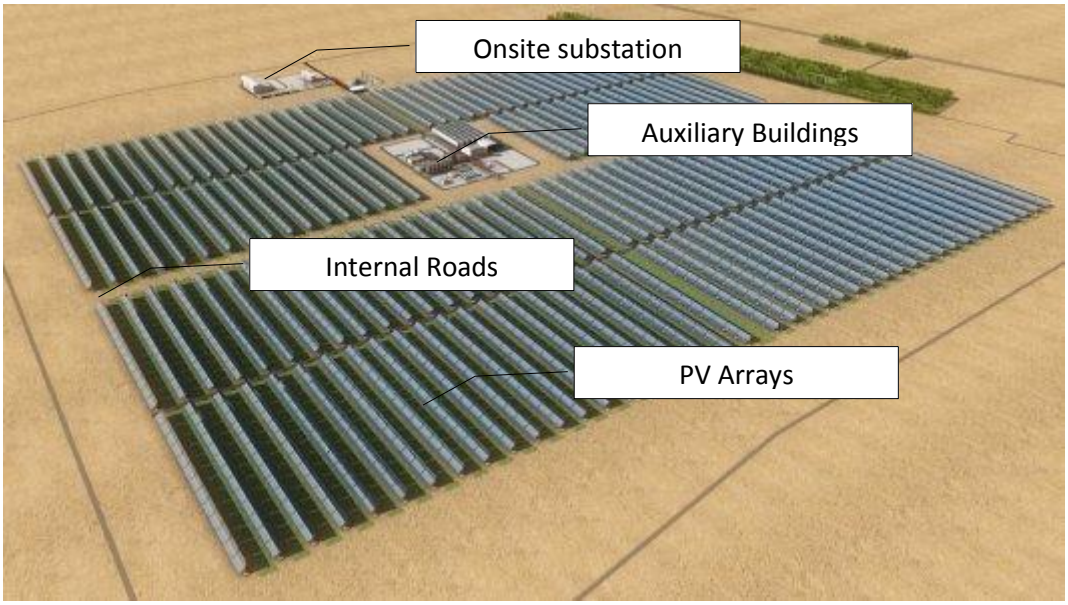

Figure 3: A typical layout of a Solar PV plant

The estimated portion of land each component of the facility will typically occupy is summarised in the table below:

Component	Estimate extent of the 75MW plant	Percentage of selected area (± 265ha)	Percentage of whole farm (±1930ha)
PV Arrays	240 ha (1.8 km^2)	90%	less than 12.5%
Internal Roads	12 ha (0.12 km^2)	4.5%	less than 0.65%
Auxiliary Buildings	1 ha (0.01 km^2)	0.3%	less than 0.05%
Laydown/Assembly Area	3 ha (0.03 km^2)	1.1%	less than 0.15%
Access Road	3 ha (0.03 km^2)	1.1%	Less than 0.15%

3.1. Site development components

The final design will consist of different components. A typical description of the components and their assumed impact are listed below:

1. Position of solar facilities

The exact position of the solar PV array layout will be determined by the recommendations from the environmental specialist reports and conditions of approval to avoid all sensitive areas in the positioning of the facility. In addition, the final layout will be influenced by the final detailed design of the project once a tender has been awarded. The layout will be located on approximately 265ha of the proposed site (on a portion of Portion 6, a portion of Portion 2, of Farm 62 Zuurwater).

Figure 4: Typical layout of solar arrays

2. Foundation footprint

The physical footprint of the PV panels on the ground is formed by a network of vertical poles (typically 100mm in diameter), on which the PV panels are to be mounted (see examples below).

Figure 5: Foundation footprint

Basic drilling or hammering with special tools is used. Removal of such foundations is possible upon de-commissioning of the project. The use of concrete for stabilisation is to be avoided as far as possible.

3. Construction period laydown area

A laydown area of approximately 3ha will typically be used for assembly of the PV panels and as a general placement/storage section for construction equipment. The exact location of this laydown area for the construction period will be determined by the recommendations from the environmental specialists to avoid all sensitive areas in the positioning of the facility.

4. Internal roads indication width

Gravelled internal roads and un-surfaced access tracks will be provided for. Such access tracks (<4m width and limited to the construction site) will form part of the development

footprint. Pathways (<4m width) between the PV panel layout will typically be provided for cleaning and maintenance of the panels. Existing roads will be used as far as possible.

Figure 6: Typical internal road example

5. Onsite substations and transformers

The step-up substation and its associated infrastructure should have a footprint of approximately 0.09 ha (30mx30m). Note that the 0.09 ha is included in the entire auxiliary building footprint of <1ha.

Figure 7: Typical onsite substation footprint

6. Cable routes and trench dimensions

Shallow trenches for electric cables will be required to connect the PV Panels to the onsite transformer substation (such electric cables are planned along internal roads and/or along pathways between the PV panels as far as possible).

Figure 8: Cable trenches

7. Connection routes to the distribution/ transmission network

Electricity will be transmitted from the onsite step-up substation via new overhead power lines to the existing Eskom substation which is located adjacent and West of the proposed site.

8. Cut and fill areas

The property is extremely flat and thus it is unlikely that cut and fill activities will be required. Any cut and fill activity required along the access roads will be kept to a minimum. The existing roads will be used by construction vehicles and should not need any deviation.

9. Borrow pits

An agreement in currently being drawn up with the Black Mountain Mine for use of material from their existing borrow pit, which is fully licenced. The Mine borrow pit is located about 4.1km from the proposed access road, is in good condition and capable of handling the loads expected (for graveling the access and internal roads etc.). In the event of this gravel (from the Mine borrow pit) is not available for use, gravel will be transported from a licensed borrow pit in the vicinity via trucks. Thus the creation of new borrow pits will be avoided, as far as possible - no borrow pits are planned for this construction site.

10. Soil heaps

As far as possible, the creation of permanent soil heaps will be avoided. All topsoil removed for the purpose of digging foundations etc. will be temporarily stockpiled within the boundaries of the 265ha development footprint, for later rehabilitation use. It is unlikely that major soil heaps will be required for this construction site.

11. Auxiliary buildings

The Auxiliary buildings area will typically include:

- A gate house (5mx5m)
- Transformer / Substation (30mx30m)
- A Workshop / Control building (12mx25m)
- A Storeroom / Warehouse (24mx36m)
- A Visitor Centre & Ablution facility (20mx12m)
- An administrative / office building (20mx12m)
- 10x 10kL water tanks

Figure 9: Foundation of a typical onsite building

The infrastructure for the auxiliary buildings should occupy approximately 1ha. The workshop will be used for operations and general maintenance of parts etc. The storeroom will be used for storage of small equipment and parts.

The final detailed design and exact co-ordinated layout of the facility will be finalised should the facility be approved and awarded a tender as an IPP. The component list above is typical to such projects and may deviate due to engineering requirements, new technologies and regulatory changes from the government's tender process. This will be done should the project be approved and the environmental specialists recommendations have been made.

3.2.Project alternatives

In order to propose the best possible design in terms of economic and environmental aspects, several alternatives have been considered. The various alternatives considered in terms of site,

layout, technology and distribution lines and access road routes are discussed in the following sections.

3.2.1. Layout Alternatives

The actual location of the different facility components on the 265ha development site may vary. Determining the optimal layout is a costly process which would normally take place once an IPP tender has been awarded to the bidder. Several Solar PV array layout alternatives have however been considered (see Layout Report) and a preferred layout have been identified taking into account the site constraints identified and recommendations made by the various EIA specialists. With the actual construction, the preferred plant layout will stay the same in terms of footprint and size, but the exact location may change within the 265ha boundary.

3.2.2. Technology Alternatives

Photovoltaic (PV) solar power technology has been identified as the preferred technology to generate electricity in this project. There are, however, several alternate options in terms of the specific Solar PV technology to be used. These alternatives can be grouped in terms of mounting and film alternatives but should not trigger any major difference in the impact of the project as explained in this report.

Mounting Alternatives

There are two major alternatives in terms of Solar PV mounting, namely fixed-tilt and tracker mounting technology.

When fixed-tilt solar mounting technology is considered, the Solar PV modules are fixed to the ground and do not contain any moving parts. These modules are fixed at a specific north facing angle. This type of technology is less expensive than tracker technology, but has a lower energy yield due to the limited exposure to sun radiation.

The preferred technology type is known as horizontal tracker technology. This single-axis technology is designed to follow the path of the sun across the sky. By using to this technology, the modules are exposed to typically 25% more radiation than fixed systems. The design is extremely robust and contains only a few moving parts, while still having more or less the same footprint and infrastructure requirements as fixed-tilt designs.

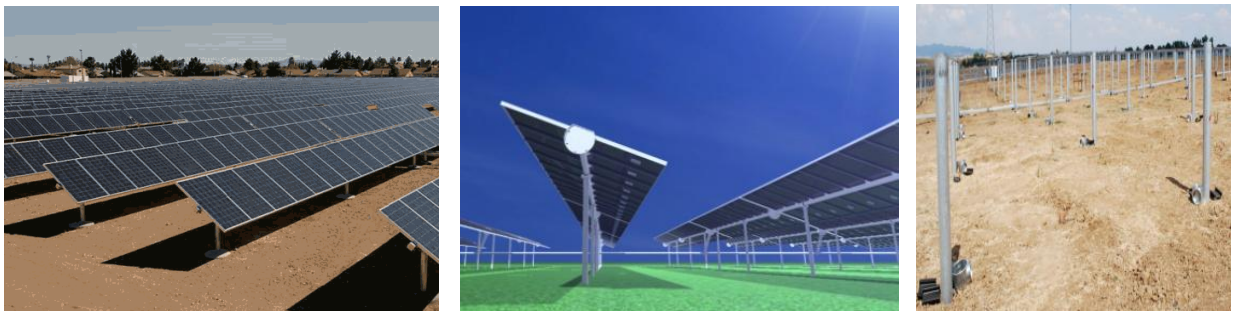

Figure 10: PV tracker mountings

The foundation of mountings can either be laid in concrete, driven piers or screws. Driven piers and screws are recommended in order to minimise the environmental impact of the facility. This technology imposes a lower cost over the lifetime of the project and offers higher equity returns for investors. The operational risks are limited due to the proven performance and track record.

The tracker technology requires approximately 1.8 to 2.3 hectares per megawatt. The tracking design is based on a simple design and makes use of a well proven off-the-shelve technology which is readily available. The maximum height of the trackers is typically less than 2m.

Film Alternatives

There are a multitude of different film technologies available today. The best solution, according to research conducted are currently either thin film (amorphous silicon or cadmium telluride) or multi-crystalline cells depending on the space and irradiance conditions, with the electricity yield and application being the deciding factor.

Multi-crystalline cells are the preferred technology type in South Africa, since the output of this technology is higher and it performs better under higher temperatures than the thin film technology. Furthermore, thin film technology is not yet feasible for South African large scale projects due to its higher price.

As mentioned earlier, the film type would not affect the layout and impact from an environmental perspective.

3.2.3. The "do-nothing" Alternative

Portion 6, a portion of Portion 2, of Farm 62 Zuurwater is currently used for limited stock grazing, which is limited by water availability and arid weather conditions. The exclusion of 265 ha from the 1927 ha property for the purposes of the solar facility will not have a significant effect on these farming activities, and minimal impact on the agricultural resources (soil and water). Should the do-nothing alternative be considered, the positive impacts associated with the solar facility (increased revenue for the farmer, local employment and generation of electricity from a renewable resource) will not be realised.

Cape EAPrac, the project's environmental assessment practitioners will report on a full investigation on what environmental impact the option of not developing the proposed facility will have.

4. Construction of the proposed facility

The construction phase of the solar facility should be between 16-18 months. The construction phase of the facility will create roughly 40-50 employment opportunities (during construction) of which most will ideally be local employments. The construction material and sourcing of required goods can be from the local community and surrounding towns.

Should the project be approved, and all required approvals and licenses are obtained from the DEA, NERSA and a Power Purchase agreement (PPA) is secured with Eskom (Single Buyer's Office, in collaboration with Department of Energy, under IPPPP), the construction is envisioned to begin in the second half of 2014. A series of activities would need to be undertaken, to construct the proposed facility and associated infrastructure.

The facility will be established in different phases namely: the pre-construction, construction, operation and decommissioning phases.

The **preconstruction phase** includes:

1. Conducting of surveys;
2. Transporting of the required construction components and equipment to site.

3. Pre-site preparation (establishment of temporary services for construction such as lavatories, water, health & safety requirements, site office etc.)

The **construction phase** includes:

1. Transportation of solar components and equipment to site,
2. Establishment of internal access roads,
3. Undertaking site preparation (i.e. including clearance of vegetation; and stripping of topsoil where necessary),
4. Erecting of solar PV frames and panels,
5. Constructing the onsite substation,
6. Establishment of additional infrastructure (workshop and maintenance buildings),
7. Establishing the underground connections between PV panels and onsite substation
8. Connection of onsite substation to power grid
9. Undertaking site remediation

The activities that will be undertaken on site, fall under different specialist fields, and include:

- **Civil works:** Site Preparation, Site grading, Drainage, Roads, Foundations, Storm water & Anti-erosion Management
- **Mechanical works :** Piers Installations, Mechanical Assembly including trackers, Mounting of Panels
- **Electrical works :** Installation from low to high voltage including substation

For the purpose of the engineering report, the stages of the construction phase that have engineering implications will be discussed.

4.1.Transportation of solar components and equipment to site

All solar plant components and equipment are to be transported to the planned site by road. Construction should stretch over a period of approximately 18 months. During this period the majority of the solar PV panels and construction components will be transported by utilising standard 2x40ft container trucks.

Less than 30 containers will be required per installed MW. This will typically include all solar PV components and additional construction equipment. Over the period of 18 months, 2250 containers will therefore be transported to the proposed site. Roughly estimated this amounts to two 2x40ft container trucks per day. Normal construction traffic will also need to be taken into account. The usual civil engineering construction equipment will need to be transported to the site (e.g. excavators, trucks, graders, compaction equipment, cement trucks, etc.) as well as components required for the establishment of the onsite substation power line. Some of this power station equipment may be defined as abnormal loads in terms of the Road Traffic Act (Act No.29 of 1989). Input and approval are to be sought from the relevant road authorities for this purpose.

Transport to the site will be along appropriate national, provincial and local roads. The access roads to the site will be from Upington or Springbok, along the N14. This is a tarred national road and no alterations should be necessary to handle construction traffic and traffic involved in the operation phase.

In some instances, the smaller farm roads may require some alterations (e.g. widening of corners etc.), due to the dimensional requirements of the loads to be transported during the construction phase (i.e. transformers of the onsite substation). Permission from the local authorities can be obtained in this regard if required.

The exact access routes that are considered will be discussed in more detail later in the document.

4.2.Establishment of internal access roads on the farm

Internal maintenance roads on the farm and proposed construction site are to be constructed. Where necessary, gravel may be used to service / upgrade sections of the existing roads.

The construction of the access road would normally consist of compacted rock-fill with a layer of higher quality surfacing stone on top. The proposed access road will either be comprised of gravel tracks or of compacted rock-fill with layer of higher quality surface stone on top. The preferred alternative is still to be confirmed. If compacted rock-fill is used, a geotechnical survey is planned to be completed to assess the strength and durability properties of the rock strata at the site. It may be necessary to strip off some of the existing vegetation and level the exposed ground surface, in order to form an access track surface. Such access tracks (less than 4m width) will form part of the less than 265ha development footprint. The layout and alignment of these internal roads will be informed by recommendations made by the botanical specialist, as well as the topographical survey. Pathways / tracks (less than 4m width) between the Solar PV panels are to be provided for ease of maintenance and cleaning of the panels.

4.3.Site preparation

Cleaning of the surface areas is necessary in order to construct the solar PV plant. Due to the sparse nature of the vegetation on the site, the clearance of vegetation at the footprint of the solar PV panels will be kept to a minimum, while vegetation clearing will be necessary for the digging of the onsite substation and workshop area foundations and the establishment of the internal access roads and laydown areas. Where stripping of the topsoil is required, the soil is planned to either be

stockpiled, backfilled and or spread on site.

Figure 11: Illustration of a typical site after preparation

To reduce the risk of open ground erosion, the site preparation will typically be undertaken in a systematic manner. Where any floral species of concern or sites of cultural / heritage value are involved, measures are to be put in place to attend to the preservation or restoration of these elements.

4.4.Erecting of solar PV panels

Figure 12: Onsite construction of the PV arrays

Once the site preparation has been completed, and all necessary equipment has been transported to the site, the Solar PV panels and structures are assembled on site. Each Solar PV module consists of 60 monocrystalline silicon cells , forming a single panel. Each module is capable of generating typically 230W of DC electrical power. The solar PV modules are assembled in long rows across the Solar PV array, with the rows approximately 5m apart. The exact number of modules in each Solar PV array is subject to the final facility design and is still to be confirmed. Foundation holes for the Solar PV panels are to be mechanically quarried to a depth of approximately 300-500 mm. Driven piers and screws are recommended in order to minimise the environmental impact of the facility, hence reduced reliance on concrete foundations.

4.5.Construct onsite substation

An onsite substation will be necessary to enable the connection between the solar energy plant and the National Eskom electricity grid. The generated voltage is planned to be stepped up to 66kV by means of such an onsite substation in order to be fed into the Eskom grid via the Aggeneis Eskom substation, shown below.

Figure 13: Aggeneis Eskom substation

The onsite substation is constructed in a few sequential steps. First a site is determined by the recommendations from the environmental specialist's reports and Environmental Control Officer (ECO) to avoid the most sensitive areas in the positioning of the substation. Once the site is approved, the site clearing and levelling is to be done, after which the access roads to the substation are constructed. Next the substation foundation is laid. Once the foundation is constructed, the assembly, erection and installation of all equipment including the transformers are to be completed. The final step is the connection of the conductors to the equipment. The post-construction phase includes the rehabilitation of disturbed areas and protection of erosion sensitive areas. Below is typical onsite substation that connects to the existing Eskom substation.

Figure 14 : Typical onsite substation

4.6.Establishment of additional infrastructure

To minimise the potential ecological impact a project of this scope, a decision was made to limit all activities and storage of equipment to one nominated area. A dedicated construction equipment camp and laydown is to be established, which will then form part of the auxiliary building area. This area will typically be used for the assembly of the solar PV panels and the generation placement / storage of construction equipment. A temporary facility is to be used to secure the storage of fuel for the on-site construction vehicles. Necessary control measures will be put in place for correct transfer and use of fuel (as described in the EMP).

The auxiliary building area will typically consisit of the following:

- A Control Building / Workshop
- A Warehouse / Storeroom
- A Visitor Centre
- A Change / Ablution room
- Administrative / office and security buildings (gate house)
- 10x 10kL water tanks

4.7.Connect onsite substation to power grid

In order to evacuate the power generated by the proposed facility and feed it into the Eskom grid, a distribution line would have to be constructed between the proposed onsite substation and the existing Eskom Aggeneis substation. The proposed onsite substation is approximately 6km from the existing Eskom substation.

The Aggeneis substation is a key substation in the supply base of the Northern Cape and is fitted with two 40 MVA 220/66kV step-down transformers. The substation is fed with a 400kV line from Aries. From here, three 220kV lines are fed towards the Nama, Harib and Paulputs substations. The 220kV line towards Harib is a double circuit line. There is also a double circuit 66kV line that feeds the Black Mountain substation.

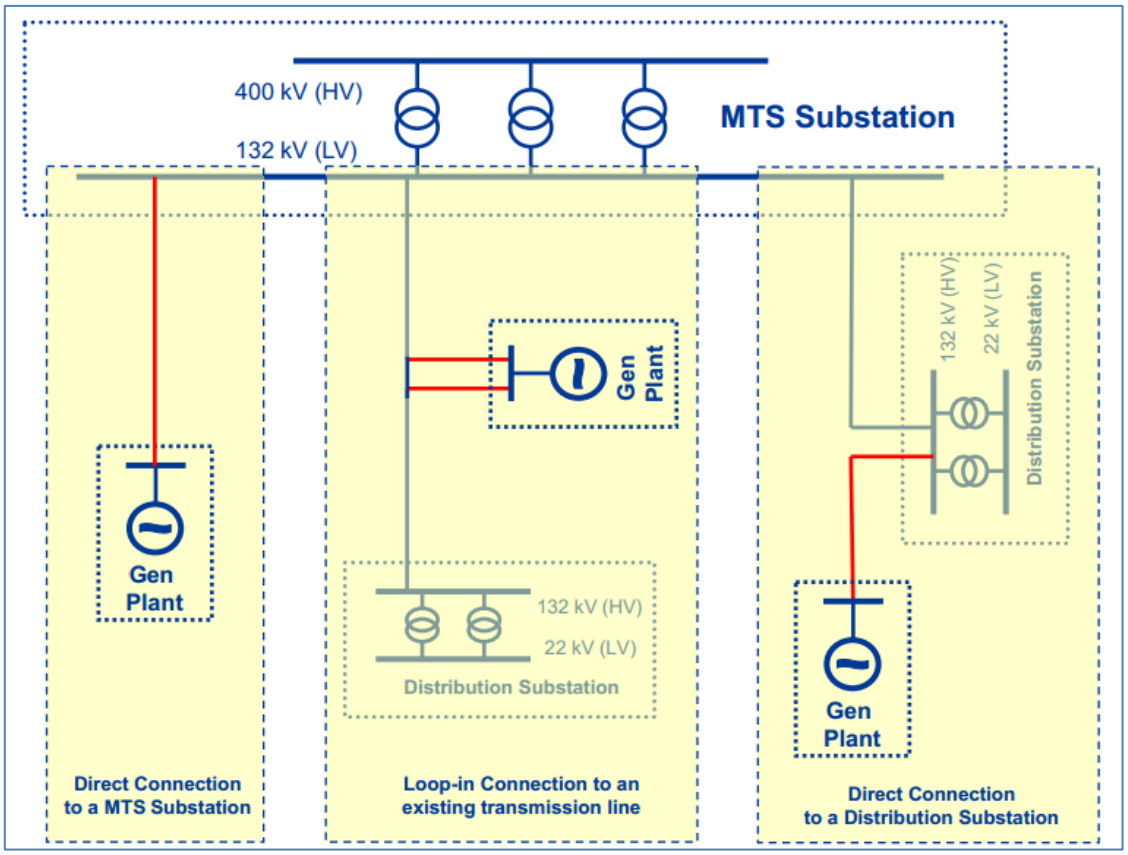

Figure 15: The different connection alternatives

There is currently an excess capacity of 40MW available at the Aggeneis substation when connecting to the 66kV busbar without any alterations of the substation's existing infrastructure. By installing an additional 40MW transformer and extending the 66kV busbar, 75MW can be made available. Even more than 75MW can be made available by establishing a 400/132kV step-down transformer. It is proposed to construct a 66kV distribution line between the two substations. This line will be constructed by the developers, but would be handed over to Eskom for operation and maintenance.

In principle, there are two viable alternatives. The line can run either parallel with the 220kV line between the Aggeneis substation and Harib, or parallel with the 66kV line running between the Aggeneis and Black Mountain substations.

The first and preferred option for the route of the proposed distribution line runs parallel with the existing 220kV transmission line running between the Aggeneis substation and Harib. The existing line has a registered servitude of 47m (23,5m on either side). The minimum separation distance between this line and any other proposed line is 32m. Thus, the proposed line would run parallel to the existing line, with a separation distance of approximately 50m between them.

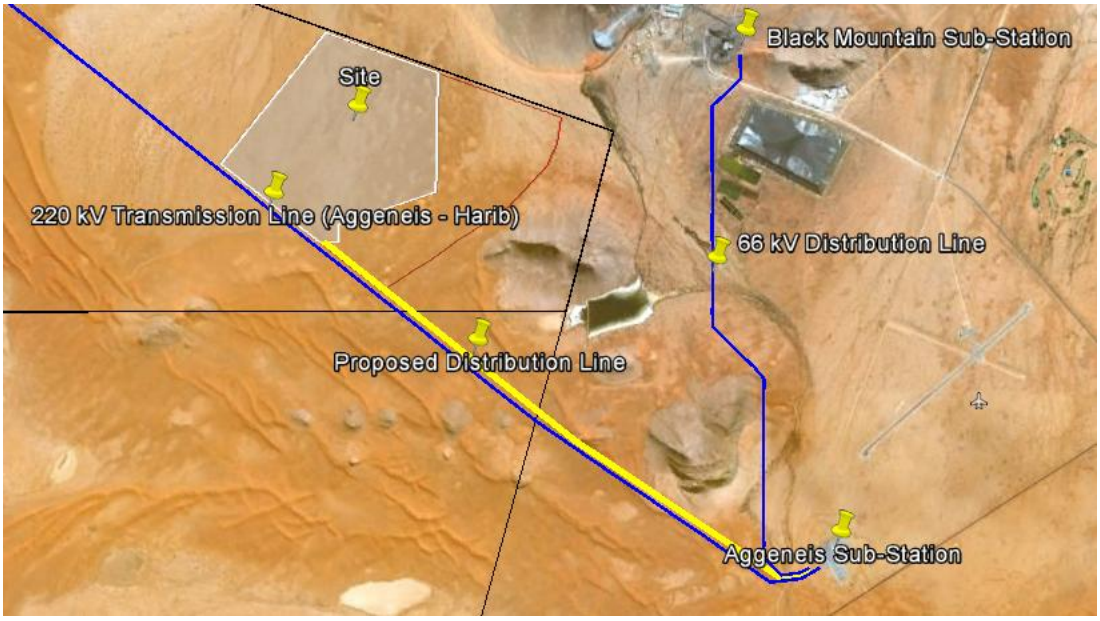

Figure 16: Proposed Distribution Line Alternative 1 (Proposed line is indicated as yellow line)

The alternative option for the route of the proposed distribution line runs parallel with the existing 66kV distribution line running between the Aggeneis substation and Black Mountain Mine substation. The existing line has a registered servitude of 22m (11m on either side). The minimum separation distance between this line and any other proposed line is 14m. Thus, the proposed line would run parallel to the existing line, with a separation distance of approximately 20m between them.

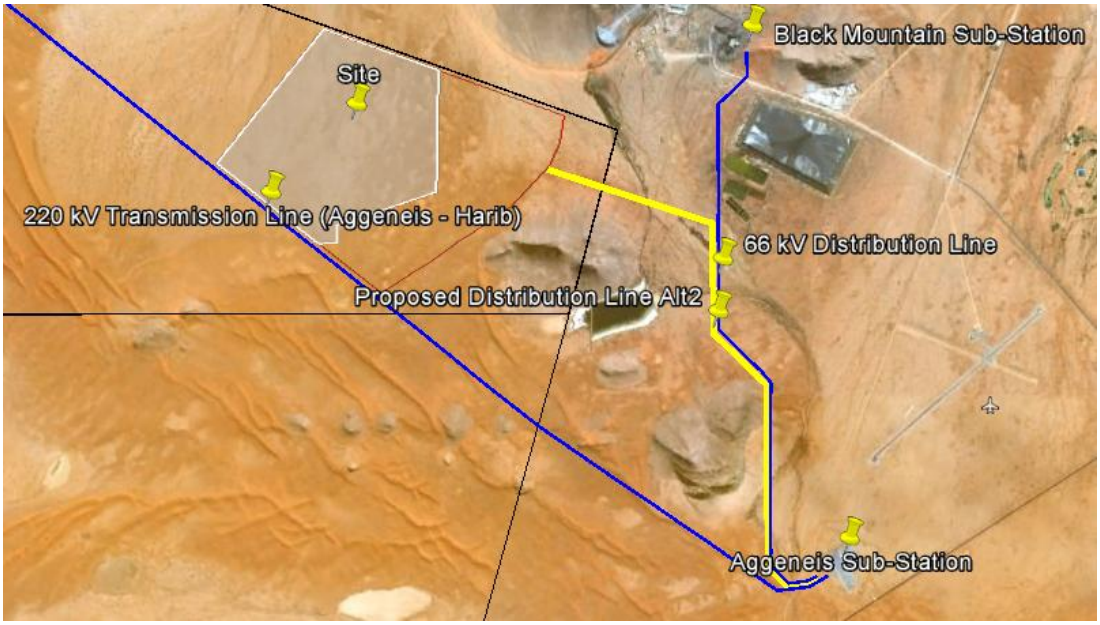

Figure 17: Proposed Distribution Line Alternative 2 (Proposed line is indicated as yellow line)

There is also an option to connect to the 66kV line between the Aggeneis and the Black Mountain Mine substations by means of a “loop-in/loop-out” connection, since this is a double circuit line and the Mine is the only entity utilising the line.

There are some possibilities of expansion in the near future, which may affect the proposed project. Eskom is planning a new 400kV transmission line between Aggeneys and Oranjemund. Vedanta (Black Mountain Mine) is also planning to develop the Gamsberg Zinc Project, which could lead to the construction of a 132kV distribution line.

The single largest risk involved in terms of grid connection is the timelines involved in the upgrading of the Eskom substation if necessary. If the capacity of the substation is allocated to other preferred bidders after IPPPP phase 3, the substation should be upgraded, which could influence the timelines of the project significantly. The upgrade of the substation will also impose significant financial implications.

Feedback from Eskom on the Draft Engineering Report and Draft Scoping Report provides guidance with regard to the planned expansions, which has been considered during the layout planning of the proposed development. Eskom also provided generic requirements for works at or near Eskom infrastructure. Eskom's recommendations will be taken into account and a declaration letter explaining the process followed has been attached.

4.8. Undertake site remediation

Once construction is completed and once all construction equipment is removed, the site is to be rehabilitated where practical and reasonable (guided by the EMP). In the instance where access routes to the site were used which will not be used during operation, the access points are to be closed and rehabilitated.

5. Access to facility

As mentioned, transport to the site will be along appropriate national, provincial and local roads. The access roads to the site will be from Upington or Springbok, along the N14. From the N14, the Aggeneys turn-off is taken. According to the Khai-Ma municipality, the Aggeneys road falls under provincial jurisdiction.

Figure 18: Turn-off from N14 to access site

The Black Mountain property is adjacent to and accessed from the Aggeneys Road. The facility is accessed through the Mine's property and Maasdorp farm, on their existing roads.

Figure 19: Proposed access from the N14 to the proposed site indicated in red

Black Mountain Mine has confirmed in a meeting with the project engineers that in principle they do not have a problem with allowing Boesmanland Solar Farm to use their existing road (please find email correspondence attached). The formal consent for land use will be included in the final report. Two access alternatives are being considered: One accessing directly from the N14, and the other from the Aggeneys Road. The two alternatives meet at the Aggeneis Eskom substation, from where an existing road runs North West, to the proposed site. The existing road runs parallel to the Eskom Powerline, and confirmation has been provided by Eskom that the road belongs to the property owners (the Mine and Maasdorp Farm).

Written consent has also been received from the owner of Maasdorp Farm, indicating that in principle they do not have an objection with granting Boesmanland Solar Farm permission to use their road. The terms on which this agreement will be granted are being finalised by the relevant parties.

From the civil engineers' perspective, the existing road was inspected and the road seems to be in a very satisfactory condition. A report describing the condition of the road and what the necessary upgrading will entail is included with the EIReport.

In the event that the Mine will not be able to grant Boesmanland Solar Farm the full approval for the utilisation of their existing road, further negotiations with Maasdorp will be undertaken, in order to identify an alternative route.

6. Establishment of water sources

It is estimated that approximately 11 200 kl of water in total should be required during the 18 month construction phase (with is an average of 24kl per day when construction is calculated at 6 days a week). In addition, 10 - 18kl of water per day should be required for the cleaning of solar panels and for other operational phase requirements. Note that in terms of cooling of the electricity transformers, dry cooling is to be implemented by means of resin cast transformers.

Weather conditions, traffic and general dustiness of the site play a role in the exact amount of water required to wash the Solar PV panels. At present it is assumed that each panel should be washed twice a month.

To further reduce the use of water at the solar facility, the use of alternative panel cleaning methods is also being investigated. The most feasible technology under consideration uses compressed air to blow off any debris from the panel's surface. At this stage the technology is being tested and needs refinement before it would be commercially viable.

6.1.Water sources

1. Boreholes:

The preferred water sources are the existing nearby boreholes on the proposed farm. Three bore-holes are situated near the proposed site, and are seen as water options for the facility. The small volumes of water required for washing of the Solar PV panels and for general operational purposes (maximum 18kl per day or 500 kl per month) can be sourced from these boreholes. According to the farmer the boreholes are strong enough and the water it supplies is drinking water quality.

2. Witputs (alternative supply)

An additional option is the borehole at the Witputs farmstead, situated on an adjacent farm 20km from the proposed site, and owned by the same farmer. This borehole can pump 2.5 kl per hour, of which only 1.5 kl is currently used. It will therefore be able to supply the daily quantity required. If this option is put into action, the water will either be transported by 20kl water trucks, or a pipeline would be constructed from the farmstead to the proposed site (this pipeline will be below the listed thresholds). The borehole statistics is attached for the reader's convenience.

3. Namakhoi municipality (alternative supply)

Aggeneys falls under the Khai-Ma municipality. Khai-Ma receives their water from the Orange River, via the Pella pipeline. At the moment, this pipeline is running at full capacity. Capacity upgrades are being investigated and are bound to be put in place in the next three years. In the meantime, the Nama Khoi Municipality has agreed to provide the project with the necessary water, until the Khai-Ma Municipal water capacity has been expanded. This water will be transported to the proposed site by standard water trucks. A letter confirming this agreement has been received from the Nama Khoi office.

4. Rainwater

As an additional measure, PVC rainwater tanks could also be placed alongside the onsite buildings to collect the rainwater runoff from the roof. These PVC tanks will then form part of the water storing tanks. If necessary, measures can also be put in place to capture the rainwater runoff from the PV panels.

6.2.Water buffer

Water storing infrastructure is to be provided as part of the auxiliary building footprint area. A week's storing capacity is to be provided for. This will add up to approximately 10 x 10 kl water tanks.

Figure 20: Typical water storage tank

6.3.Water-use permission

The minimal quantity of water required usually qualifies for a General Authorisation (GA) in terms of the National Water Act, however the specific quaternary area in which the development site is situated does not allow for general authorisation. Thus, a formal Water Use License would have to be applied for. However, after various discussions with the DWA, it was confirmed that a full assessment of the Water Use License Application (WULA) will only be undertaken by the DWA once DEA and DAFF have issued the ROD and the proposed project has been appointed as a preferred bidder by the Department of Energy (DOE). The EIA application can therefore be submitted without a water licence, as long as there is enough confirmation that there are sufficient water available. Feedback from the DWA on the Draft Engineering Report and Draft Scoping Report provides guidance on the requirements for the Water Use Licence and associated water use monitoring. The recommendations made by the DWA will be taken into account and have been included in the EMP for implementation. A water declaration letter explaining the process followed is attached.

6.4.Erosion and storm water control

Due to the extremely low annual rainfall in the Aggeneys area the risk of water erosion is low. The ground condition is such that any surface water is very quickly absorbed into the soil which avoids water build up on the surface and quickly reducing any water flow which might cause water erosion.

On large structures or buildings, appropriate guttering would be used to capture roof run-off and avoid water erosion in the surrounding area. Wherever practically possible rainfall run-off captured from the roofs/ gutters will be stored in rainwater tanks. Water that cannot be captured will be channelled into energy dissipating structures to spread and slow it down, reducing the risk of erosion. Such a structure could be moulded from precast concrete, loosely packed rock or perforated bags filled with stone.

Any rainfall on the solar panels would be welcomed due to its cleaning effect, but as mentioned before, the annual rainfall is very low and is not expected to cause erosion. The solar panel surfaces are installed at a relatively large incline with gaps between panels, which would not allow significant water build up on the panels, while reducing the energy of falling droplets. Considering that the panels are on a tracking system, this also means that droplets leaving the solar panel surface would not drop onto the same ground areas all this time.

The construction area would cross over a number of seasonal washes / minor drainage lines. To avoid erosion in these washes, recognised storm water management practices will be followed to promote the natural flow of water within its natural borders. It is in the interest of the solar operator to keep the area clean and free of erosion to avoid any damage to the equipment. The solar panels would be installed on frames, allowing for natural water flow underneath the structure.

During the construction phase of the project there might be a risk of wind erosion where natural vegetation is removed. This might increase the risk of damaging sensitive equipment with a sandblasting effect and all parties involved will be vigilant to avoiding this from happening. Once the construction phase is complete the cleared areas will be covered with brush (from locally removed vegetation) and/or re-vegetated with locally-collected seed of indigenous species, to allow vegetation to return to the area naturally. Bare areas will also be packed with brush removed from other parts of the site to encourage natural vegetation regeneration and limit erosion. Any water being used in the cleaning process would speed up this natural vegetation rehabilitation process. Further it will also have a bonding effect on the sandy soil, avoiding loose sand blowing away.

Figure 21: Illustration of current vegetation on the farm

Access roads and internal roads would also be designed and built using recognised erosion and storm water management systems. During the construction phase of the solar PV facility temporary solutions would be implemented to ensure that the environment is preserved in a sustainable way by avoiding erosion. The following figures show a typical temporary solution that would be implemented during the construction phase, basically consisting of an inlet, channel and outlet. At the channel outlet the energy / speed of outflowing water is dissipated by packed rock beds to allow any particles in suspension to sink to the ground and avoid erosion from fast flowing water sweeping soil particles away.

Figure 22 Installed concrete pipes and culverts

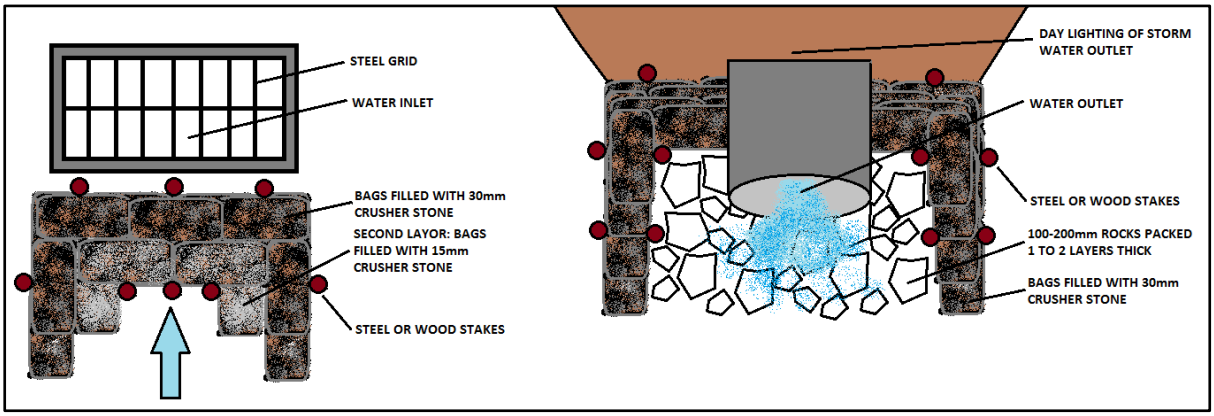

Figure 23 Temporary culvert inlet and outlet

More permanent solutions would be designed manage storm water under in a sustainable way. These structures would be built to be aesthetically pleasing by using stabilisation fixtures such as stones packed in wire mesh or locking retaining walls at the inflow and outflow of the culverts (to protect against scouring). Depending on the situation, influenced by the type of storm water flow and control needed, the most probable structures to be used would be Low-Level-River-Crossings (LLRC) (in this particular case it would be a dry water wash for most of the year) or culverts (either portal culverts with bases or reinforced precast concrete pipes, used as the channelling).

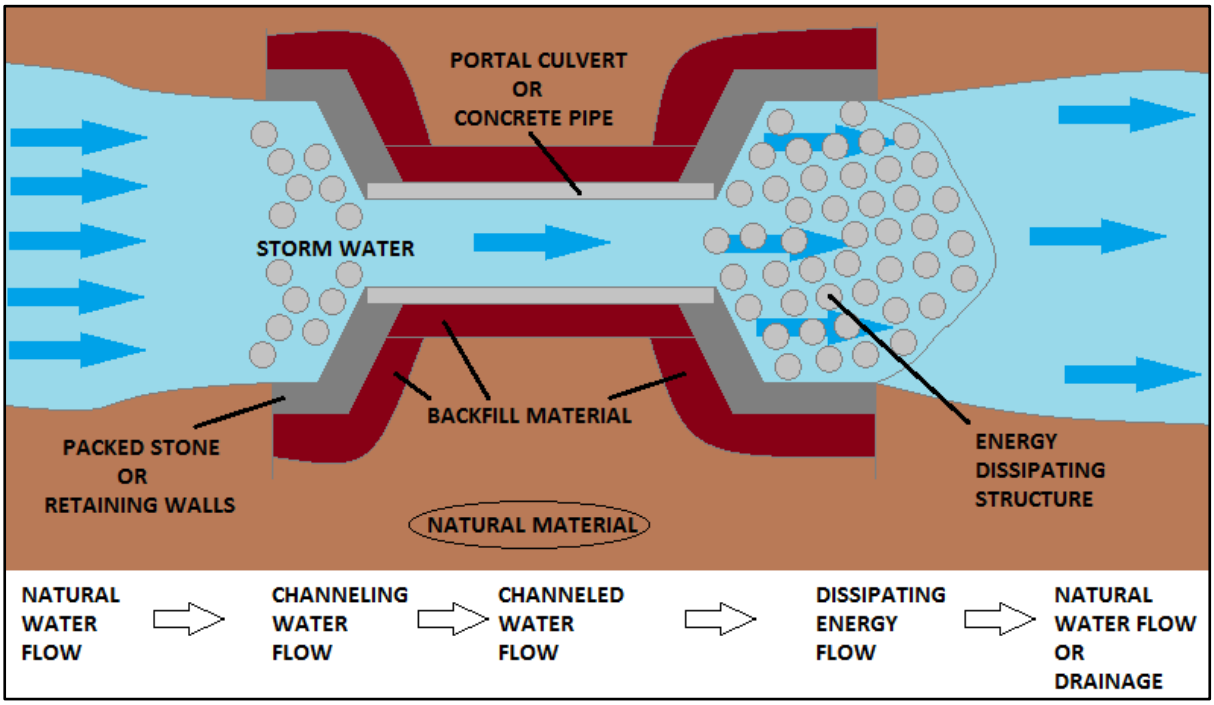

Figure 24 Storm water flow

The preferred structure for the internal road crossings of the drainage lines would be Low-level River Crossings (LLRC). LLRC structures are designed to provide a bridge when water flow is low, while under high flow conditions, water flows over the roadway, without causing damage.

Two types of LLRC can be used depending of the particular situation. A “Causeway” contains openings underneath the surface, which allows passing water through, where a “Drift” does not.

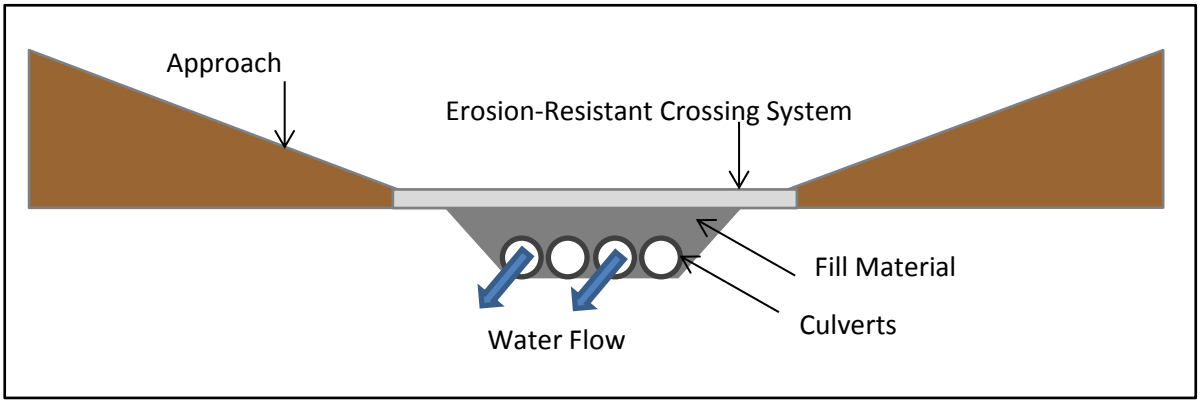

Figure 25: Causeway (Low Level River Crossing)

The same type of erosion control methods discussed with the culverts is taken into account when designing a LLRC. Because a LLRC is designed for water to flow over it, erosion protection is very important. Rock filled baskets, loosely packed rock or perforated bags filled with stone are some of the methods usually considered with LLRC.

Project operation and maintenance phase

The aim is to generate at full capacity by 2016. The facility should be operational during daylight hours, except during maintenance, poor weather conditions or breakdowns. Regular maintenance will typically include periodic cleaning, greasing of bearings and inspection. The panels are planes to be cleaned with water or compressed air. Any waste products are to be disposed of in accordance with relevant waste management legislation.

An estimated total of six (6) full time staff members will typically be required during the operation phase of the project, which includes technicians, maintenance and security personnel. Approximately three (3) unskilled labourers will be needed for maintenance purposes and two security personnel will be deployed on a shift basis. One (1) skilled staff member will be needed to manage and oversee the operations. Staff can be transported around the site using utility vehicles and a typical mini bus to transport staff from nearby town of Aggeneys and surrounding community. From time to time additional contract staff may be required for ad hoc vegetation trimming or special panel cleaning.

7. Project decommission phase

The proposed solar energy facility is expected to have a lifespan of approximately 30 years if the specified periodic maintenance is performed. Once the facility has reached the end of its economic life, the infrastructure is to be decommissioned. The decommissioning of the facility would entail the disassembly and replacement of components with other appropriate technologies. However, if not deemed so, then the facility would be completely decommissioned which would include the following decommissioning activities.

Site decommissioning preparation activities should include confirming the integrity of access to the site. Site access should be able to accommodate the required equipment (e.g. lay down areas, construction platform) and the mobilisation of decommissioning equipment.

The components would be disassembled, reused and recycled where possible, or disposed of in accordance with regulatory requirements. Functional components are planned to be donated to and installed at local schools and clinics to benefit the community.

8. Project output

8.1. Waste effluent, emission and noise management

Solid waste management

During the construction phase an estimated amount of less than $5m^3$ non-hazardous solid construction waste is to be produced per month for the expected 18 month construction period. All construction waste should be safely stored and be removed from site on an ad hoc basis by the appointed construction contractor where and when deemed necessary. The construction waste, where applicable, is to be disposed at an appropriately licenced Municipal landfill site.

During operational phase after construction, the facility should not produce any solid wastes.

Liquid effluent (sewage)

Sewage is planned to be treated onsite by means of a septic tank system or conservancy tank system. Due to the locality of the farm, sewage cannot be disposed in a municipal sewage system.

Emissions into the atmosphere and noise generation

Very little emissions should be released into the atmosphere and no significant noise should be generated, except during the construction period with drilling and hammering. Due to the site location this should not pose any issue as no residential area is located nearby.

9. Cost implications & revenue

9.1.Project cost overview

Renewable energy projects, such as the Boesmanland Solar Farm, require significant investment. Funds of equity and debt investors, either from foreign or domestic sources are obtained. The cost requirements and potential revenue is discussed in this section, sketching a business case for the development of renewable energy projects within South Africa (specifically solar farms in the Northern Cape).

The project costs consist of two parts, capital cost and running cost. The capital cost pertains to all costs incurred for the establishment of a producing facility. The running cost relates to those costs incurred to ensure that the facility operates as it should throughout its expected lifetime.

Solar PV installations can operate for many years with little maintenance or intervention. Therefore after the initial capital outlay required for building the solar power plant, financial investment is limited. Operating costs are also extremely low compared to existing power technologies.

9.2.Project specific costs

The Boesmanland Solar Farm's detailed costing has not been completed on the date of submitting this engineering report. The project is however based on the industry standard cost, with capital expenditure that can amount to more or less R30M per megawatt installed capacity. The running

cost of a Solar PV facility is minimal related to the initial capital cost, contributing to the most significant cost of constructing and running a solar PV facility.

9.3. Revenue streams

The payback of the Boesmanland Solar Farm results mainly from electricity sales, intended under the current governmental subsidy, known as the Independent Power Producer Procurement Program (IPP procurement program).

The IPP procurement program portrays fixed ceiling prices for bidders to tender against. The establishment of these ceiling prices is based on industry standard return on investments. The governmental study performed identified the feed-in tariff per technology related to the capital cost required per technology against its revenue potential, identifying the required subsidy per technology to be paid.

In short, the subsidy offered by the governmental procurement program (IPP procurement program) enables the project to be financially viable by selling electricity at a subsidised price, while the costs of such a facility relates to the industry standard.

As part of the IPP procurement program preferred bidders will enter into a power purchase agreement between the IPP generator and the Single Buyers office. National treasury stands-in for surety, while NERSA regulates the IPP licences.

NERSA and the IPP procurement program require an approved EIA Environmental Authorisation / Record of Decision as a gate keeping criteria, where no project would be considered without the EIA Environmental Authorisation being given.

10. Project program and timelines

As mentioned previously the Boesmanland Solar Farm is intended to be lodged under the IPP procurement program. The program has definite and stringent timelines, which the project should meet:

#	Description	Timeline
1	IPP procurement program submission (3rd round)	7 May 2013
2	Preferred bidders selected	21 July 2013
3	Finalisation of agreements	July 2013 – January 2014
4	Procurement of infrastructure	February 2014 – March 2014
5	Construction	April 2014 – September 2015
6	Commissioning	October 2015 – December 2015

The table above clearly depicts the dependence of the project on the IPP procurement program's timelines. Any delay within the IPP procurement program will have a corresponding effect on the timelines of the Boesmanland Solar Farm's timelines.

11. Conclusion

In conclusion, the overall positive significance of the Boesmanland Solar Farm outweighs the negative impacts the project may have. From an environmental perspective the project can be well-managed with sound contingencies being put in place to prevent harm to surrounding areas.

The project makes significant contribution from a social and economic perspective. Such benefits include potential revenue for the landowner, job creation during construction and the 20-30 year operational phase. In addition, much needed electricity is generated and fed into Eskom's national grid, taken from a sustainable carbon-free natural energy resource, solar.

If the recommended mitigation measures contained in the EMP are implemented, there should be no lasting significant negative environmental impacts arising from the development of the project. This pertains to the construction phase, as well as the operational phase. Solar projects use remarkable technology which can ensure a sustainable future for electricity generation. This is especially true since solar technology does not severely impact the environment as with coal power generation or similar technologies.

In the light of the long term benefits the Boesmanland Solar Farm is to create, upon approval of this application the project can be implemented with minimum environmental impacts.

Appendixes

I. Solek Company Profile

II. Water declaration - Aggeneys

III. Eskom declaration - Aggeneys

IV. Consent for use of access road:

a. Maasdorp

b. Black Mountain Mine

Solek
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Who we are

Our company Solek, was founded in 1988 and has a proven track record of experience and professional service in South Africa. The company has crossed borders and now extends into Africa. Two decades of practical experience, collaboration with local importers and exporters, and internal knowledge defines our capacity. Research and innovation is the heartbeat of the company. Our focus revolves around doing what we do best:

Consult	Provide key knowledge to meet our client demands
Supply	Source and supply the needed products & technology
Partner	Collaborate with key partners to extend our reach

Resource network

Partnering and long-term relations are the business approach we value. Ongoing partnerships with well-established solar companies provide added resources which the company can tap into. Broad expertise and man-power are available if needed. The aim is to support and collaborate rather than compete.

Experience

New branch in Stellenbosch	Core capacity moved to Western Cape, where engineering office is based; branch in Loeriesfontein, Northern Cape.
***eta* Awards**	Received a Special Award sponsered by Eskom and the Department of Energy in 2011 for the Kleinmond EPC.
PV grid-tie systems	Two-decade client base: hundreds of clients in Northern Cape and elsewhere give evidence of the company's success.
Kleinmond EPC	Design, consulting and procurement of solar PV and solar water heaters for over 400 low-cost houses in Kleinmond.
Solar farms Northern Cape	Secured sites for development of utility scale solar projects. Solek is in the process of assisting the development thereof under the Department of Energy's IPP scheme.
Engen Namibia	3kWp grid-tie PV system for Engen Namibia to provide base load power for evaporative air-cooling units.
Angola off-grid project	Consultants and sub-contractors to partially supply, install and train solar installations for 120 schools & clinics.
Biogas project development	Waste-to-energy project under development in KwaZulu-Natal - to feed Eskom national grid.
Angola village systems	Consulted and supplied solar cells, battery and inverter systems to small households in Angola.
Consulting & advising	Solar energy advisors for Namakwa District Municipality & consultants for Western Cape Department of Agriculture.

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Expertise

The heart of the company beats with many years' experience. Engineering knowledge including master-degrees and related qualifications extend management arms. Industrial engineering together with our sought-after technical and electrical know-how boost efficient operations help manage extending projects and deal with sourcing and supply issues.

Supplier support

Solek focuses on long-term customer value. Only quality products are supplied backed by major suppliers for support and warranties, locally and abroad. This provides a knowledge base and strong competitive advantage which differentiate Solek from other solar companies. Products supplied by Solek have proven to last 15 years and more, thus enduring harsh African conditions.

Consulting

Owing to our experience, the company engages in risk assessment, quality assurance and project due diligences. Typically, tenders can be evaluated to ensure the right products are supplied, system design is correct and margins acceptable based on industry models. The company has extensive experience in hybrid and off-grid systems design, providing optimal performance at minimal cost.

Innovation & Research

The company has a track record of innovative ideas. An entrepreneurial spirit boosts performance to deliver inventions and solutions beyond expectations. Research and development reinforce our long-term focus and Solek collaborates with Stellenbosch University as well as Cape Peninsula University of Technology. Products have been patented and released to the market.

Value-added service

In addition to consulting and technology supply, value-added services are provided, such as project management, installation and post-installation services. A lifecycle approach ensures longevity in the solutions we implement and a single sub-contractor to outsource various functions to.

Legacy

As part of our business model we believe industry has to touch lives. The vision of the company ensures that resources are committed beyond monetary value to affect society. Projects have been initiated to serve the less privileged through inventive ways and thousands have been influenced already. The company dedicates its knowledge and expertise to effectively reach this goal.

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Water-use application

The water volume required during the construction of the facility would be no more than 24m^3 per day while the water volume required during the operation of the solar facility would be no more than 18m^3 per day. In the past such a small amount of water would have been allocated under Small Industrial Use by means of a General Authorisation. However, since the development area falls within the D81E and D82C quaternary area, a formal water license must be applied for. After various discussions with the Department of Water Affairs (DWA), it was confirmed that the Water Use Licence Application (WULA) would only be undertaken by the DWA once the Department of Environmental Affairs (DEA) have issued the relevant Environmental Authorisation (EA)/ Record of Decision (ROD) and the proposed project has been approved and selected as a preferred bidder by the Department of Energy (DOE). The Environmental Impact Assessment application can therefore be submitted without a water license; as long as there is enough confirmation that sufficient water sources are available.

Considering this process, a preliminary investigation was undertaken in order to ensure the sufficient availability of water for the proposed development. Three alternative water sources were considered during the investigation, namely three existing onsite boreholes, an additional borehole near the proposed development site, as well as the Springbok Municipality. The preliminary investigation proved that these three alternatives would be more than able to supply in the demand of the proposed development.

Firstly, water could be extracted from the existing boreholes on the farm on which the proposed development is planned. There are three boreholes in the vicinity of the proposed site, of which one is currently being utilised for agricultural purposes. According to the farmer, the water from these boreholes is fit for human consumption and would thus be suitable for the proposed development.

Secondly, water could be extracted from an additional borehole situated at the homestead of the neighbouring farm, approximately 20km from the proposed site. A blow test has been performed on this borehole and proved that it can supply 2.5m^3 per hour. The water quality is also fit for human consumption and would be suitable for the proposed development. If this water is used, the water will be transported to the site by standard water trucks.

The third option is to acquire water from the nearest municipality. Aggeneys falls under the Khai-Ma municipality. Khai-Ma receives their water from the Orange River, via the Pella pipeline. At the moment the pipeline is running at full capacity. Capacity upgrades are being investigated and are bound to be put in place in the next three years. In the meantime, the Namakhoi Municipality has agreed to provide the project with the necessary water, until the Khai-Ma capacity has been expanded. This water will also be transported to the proposed site by standard water trucks.

In their comment on the Draft Scoping Report and Engineering Report, dated 28 June 2012, the DWA recommended the following:

- A full water use license be applied for as well as a separate water use license application for the Witputs farm, if the Witputs borehole is to be used.

- That the existing farm boreholes be fitted with flow meters to measure the volumes of water abstracted (and keep record of such);
- That the water level of the boreholes be monitored on a monthly basis (and records kept);
- That a 24-hour pump test be done on each borehole to determine the amount of water each borehole can deliver (these pump test results must be submitted to the DWA with the WULA); and
- In addition, water used for dust suppression on gravel roads must be of a quality compliant with the General Special Effluent Standards (31/03/2009): Temperature: max.25°C, pH: between 5.5 & 7.5 and conductivity: not be increased more than 15% above the intake water & not exceed 250 milli-Siemens per metre (determined at 25°C). The water used for dust suppression is likely to be borehole water / water from Khai-MA, and not treated effluent. However the water quality standards mentioned will be taken note of.

As stated in the DWA comments, these requirements will only be applicable once the project has been appointed as a preferred bidder and the application for a water license can be submitted. Water availability would thus not be a restricting factor on the development. Regarding water-use, DEA can therefore issue the EA/ROD on the conditions that the abovementioned requirements from the DWA will be adhered to.

Consulting advice regarding this water application process was received from the DWA and MBB South, a consulting engineering company specialising in agricultural developments and water-affairs. Advice was also received from Cape EAPrac, environmental practitioners. Persons spoken to:

DWA:	Danita Hohne,	054 338 5881
	Alexia Hlangane,	054 338 5881
	Annetjie Steenkamp	054 338 5881
MBB South:	Matthys J. Saayman	021 887 1026
	Francios du Plessis	021 887 1026
Cape EAPrac:	Louis-Mari van Zyl	044 874 0365
	Sian Holder	044 874 0365

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BOREHOLE CAPACITY DECLARATION

Solek Renewable Energy Engineers hereby declares the following information regarding the borehole at the Witputs homestead to be accurate and true, as received first-hand from Robert Heys, the contractor who bored the hole.

The coordinates of the Witputs homestead: Longitude: 18°37'1.166" Latitude: 29°17'42.709"

After the borehole was sunk, a 6 hour constant blow test was conducted on the hole. According to these tests, the capacity of the hole was documented to be the following:

Borehole	Kilolitres per hour	Kilolitres per day
Witputs homestead	2,5 kl/h	25 kl per day (if pumped for 10h)

This borehole has been utilised for the past 5 months for agricultural and domestic purposes and have never run dry or produced less than normal. The groundwater available is more than sufficient to supply in the demand of the proposed solar development which requires approximately 18kl per day. This demand can be supplied in full, either by utilising Namakhoi Municipality or only the boreholes on the farm.

..... 10/07/2017

Wiehann van Zyl — Date

Director

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NAMA KHOI

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Web: www.namakhoi.org.za

Navrae / Enquiries:
Ons verwysing / Our Reference:

16 May 2012

Boesmanland Solar Farm, (Pty) Ltd.
PO Box 871
Stellenbosch
7599

To whom this may concern

Sir/ Madam

RE: WATER SUPPLY

Nama Khoi Municipality hereby gives consent that Boesmanland Solar Farm, (Pty) Ltd. can purchase water from Nama Khoi Municipality for their proposed project.

Regards

N.A.BAARTMAN
MUNICIPAL MANAGER

Development near Eskom Servitudes

After various discussions with Eskom's Network Planning as well as Lands and Rights Departments, the development does not seem to impact directly on any existing Eskom Transmission infrastructure. However, it borders some of their servitudes. Thus, it would be necessary to ensure that the Eskom servitudes are taken into consideration, especially during the layout planning of the proposed solar farm. In their comment on the Draft Scoping Report and Engineering Report, dated 13 June 2012, Eskom provided the following generic requirements for works at or near Eskom infrastructure:

- Eskom's rights and services must be acknowledged and respected at all times.
- Eskom shall at all times retain unobstructed access to and egress from its servitudes.
- Eskom's consent does not relieve the developer from obtaining the necessary statutory, land owner or municipal approvals.
- Any cost incurred by Eskom as a result of non-compliance to any relevant environmental legislation will be charged to the developer.
- If Eskom has to incur any expenditure in order to comply with statutory clearances or other regulations as a result of the developer's activities or because of the presence of his equipment or installation within the servitude restriction area, the developer shall pay such costs to Eskom on demand.
- The use of explosives of any type within 500 metres of Eskom's services shall only occur with Eskom's previous written permission. If such permission is granted the developer must give at least fourteen working days prior notice of the commencement of blasting. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued in terms of the blasting process. It is advisable to make application separately in this regard.
- Changes in ground level may not infringe statutory ground to conductor clearances or statutory visibility clearances. After any changes in ground level, the surface shall be rehabilitated and stabilised so as to prevent erosion. The measures taken shall be to Eskom's satisfaction.
- Eskom shall not be liable for the death of or injury to any person or for the loss of or damage to any property whether as a result of the encroachment or of the use of the servitude area by the developer, his/her agent, contractors, employees, successors in title, and assignees. The developer indemnifies Eskom against loss, claims or damages including claims pertaining to consequential damages by third parties and whether as a result of damage to or interruption of or interference with Eskom's services or apparatus or otherwise. Eskom will not be held responsible for damage to the developer's equipment.
- No mechanical equipment, including mechanical excavators or high lifting machinery, shall be used in the vicinity of Eskom's apparatus and/or services, without prior written permission having been granted by Eskom. If such permission is granted the developer must give at least seven working days' notice prior to the commencement of work. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued by the relevant Eskom Manager.

- Where and electrical outage is required, at least fourteen work days are required to arrange it.
- Eskom's rights and duties in the servitude shall be accepted as having prior right at all times and shall not be obstructed or interfered with.
- Under no circumstances shall rubble, earth or other material be dumped within the servitude restriction area. The developer shall maintain the area concerned to Eskom's satisfaction. The developer shall be liable to Eskom for the cost of any remedial action which has to be carried out by Eskom.
- The clearances between Eskom's live electrical equipment and the proposed construction work shall be observed as stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993).
- Equipment shall be regarded electrically live and therefore dangerous at all times.
- In spite of the restrictions stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), as an additional safety precaution, Eskom will not approve the erection of houses, or structures occupied or frequented by human beings, under the power lines or within the servitude restriction area.
- Eskom may stipulate any additional requirements to highlight any possible exposure to Customers or Public to coming into contact or be exposed to any dangers of Eskom plant.
- It is required of the developer to familiarise himself with all safety hazards related to Electrical plant.
- Any third party servitudes encroaching on Eskom servitudes shall be registered against Eskom's title deed at the developer's own cost. If such a servitude is brought into being, its existence should be endorsed on the Eskom servitude deed concerned, while the third party's servitude deed must also include the rights of the affected Eskom servitude.

Although the Eskom servitudes have been taken into consideration during the layout design process, most of the above requirements only become applicable once the project has been appointed as a preferred bidder. Regarding Eskom servitudes, DEA can therefore issue the EA/ROD on the conditions that the abovementioned requirements from Eskom will be adhered to.

..... 10/07/2012

Wiehann van Zyl — Date

Director

CONTACT INFORMATION

Name of land owner	MARTIQ 1281 CC		
Trading name (if any):			
Contact person:	Mrs H Marsberg.		
Physical address:	Farm Zuurwater, Aggeneys.		
Postal address:	P.O Box 348 Aggeneys		
Postal code:	8893	**Cell:**	0783161185
Telephone:		**Fax:**	
E-mail:			

If there is more than one landowner, please attach a list of their contact details to this application and tick the box

☐ Extra page attached

CONSENT

1. I/we the undersigned *(insert the name/s of the owner/s of the land)*
MARTIQ 1281 CC

of identity number/registration number *(insert the owner/s ID number/s or the registration number of the legal entity)* CK 2006/074809/23

am/ are the registered owner/s of the property *(insert description of the property/ies and title deed numbers)* PTN 3 ZUURWATER NR 62

located at *(insert physical address or a brief description of the location of the property)* FARM ZUURWATER AGGENEYS.

2. I/ we hereby give consent to the applicant **Anjubex (Pty) Ltd** of registration number **2011/121908/07**, that the applicant may negotiate terms and conditions to undertake the following activities on the property:

i. To gain access to the proposed PV Solar site, on Portion 6, a portion of Portion 2, of Farm 62 Zuurwater, using the existing access road running under the 220KV on the Eskom Servitude, from the Aggeneis substation to the proposed site.

ii. To construct a new power line running from the proposed site to the Aggeneis substation, next to the current Eskom line;

iii. To upgrade the existing access road running on the Eskom Servitude from the substation to the proposed site.

By signing this letter the landowner agree that in principle they do not have objections against the proposed request, but the terms of use are still to be finalised.

Maasdorp Maasdorp

Signature of land owner or authorised representative

D.V. Maasdorp ; H J Maasdorp.

Name of authorised person if the landowner is a legal entity

15 March 2012

Date

Hendri Beukes

From: Mario Cloete <MarioCloete@blackmountain.co.za>
Sent: 11 May 2012 12:44 PM
To: Hendri Beukes
Subject: Re: Road and Line Proposal

Dag Henri,
Ek het die verslag ontvang en die myn is besig om daarna te kyk. Ons sal so gou moontlik terug kom.

Groetnis,
Mario

From: Hendri Beukes <hendri@solek.co.za>
Date: Thursday 03 May 2012 4:14 PM
To: Mario Cloete <MarioCloete@blackmountain.co.za>
Cc: Emma Vd Merwe <emma@solek.co.za>
Subject: Road and Line Proposal

Good afternoon Mario,

I hope the short week has been good so far.

Could you please confirm that you have received the meeting minutes and proposal concerning the utilisation of the Eskom service road and the construction of the distribution line?

As we have concluded during our meeting, the mine does not have a problem with the proposed development in principle, but the formal approval is subject to a decision of the Board of Directors. Would you be able to give me an estimation of when we could expect an answer from the mine?

Thank you very much, I hope you enjoy the rest of the week.

Kind regards

Hendri Beukes
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