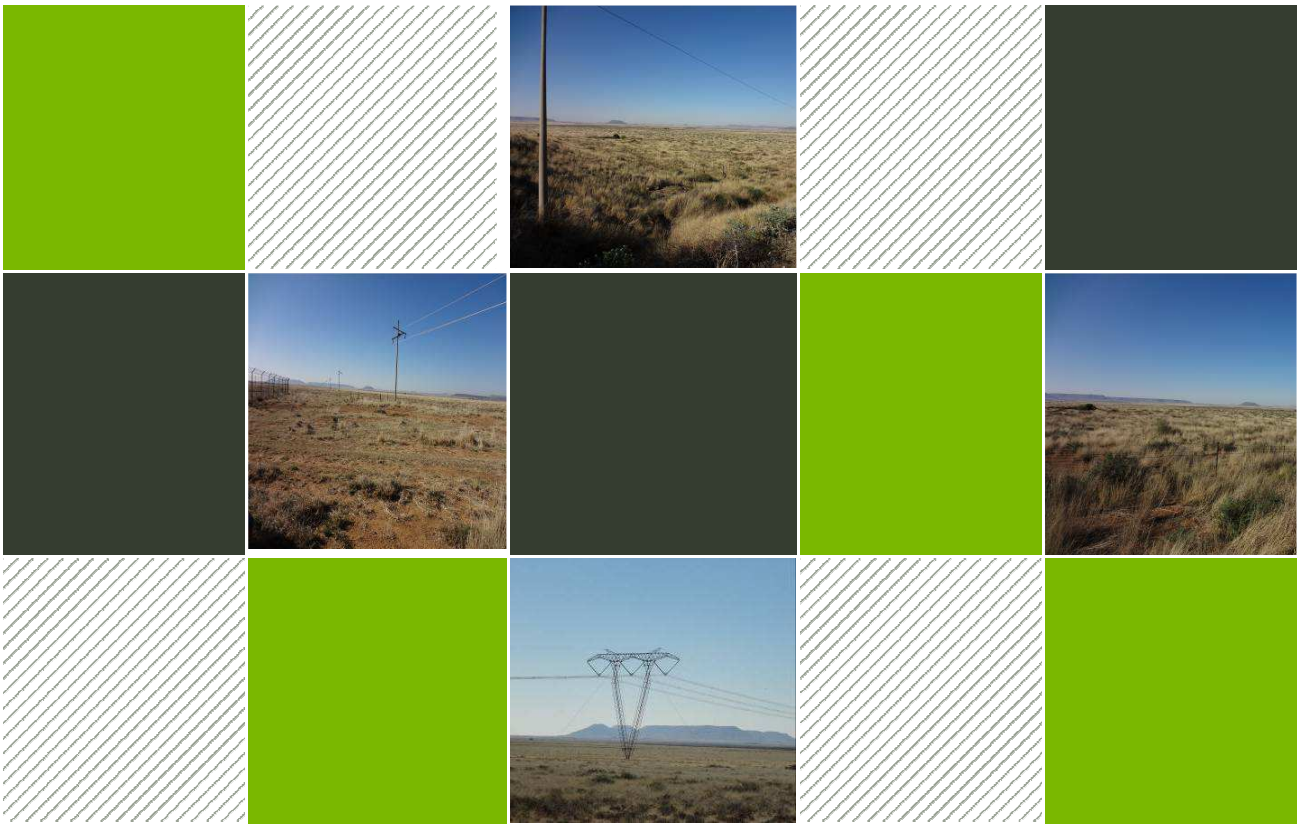

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ENVIRONMENTAL IMPACT ASSESSMENT PROCESS PROPOSED PHOTOVOLTAIC (SOLAR) ENERGY FACILITIES ON BADENHORST DAM FARM NEAR DE AAR, NORTHERN CAPE

DEA REF NO.: & NEAS REF NO.:

PV2: 14/12/16/3/3/2/504; DEA/EIA/0001751/2013
PV3: 14/12/16/3/3/2/483; DEA/EIA/0001750/2013
PV4: 14/12/16/3/3/2/506; DEA/EIA/0001752/2013
PV5: 14/12/16/3/3/2/485; DEA/EIA/0001753/2013

DRAFT SCOPING REPORT- Report No: 7565
Submission date: 30 April 2013

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Report No: [109378/7565]

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS: PROPOSED PHOTOVOLTAIC (SOLAR) ENERGY FACILITIES ON BADENHORST DAM FARM NEAR DE AAR, NORTHERN CAPE

DEA AND NEAS REF. NO'S
PV2: 14/12/16/3/3/2/504; DEA/EIA/0001751/2013
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DRAFT SCOPING REPORT

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PROJECT DETAILS

DEA REFERENCE NO.	PV2: 14/12/16/3/3/2/504; DEA/EIA/0001751/2013 PV3: 14/12/16/3/3/2/483; DEA/EIA/0001750/2013 PV4: 14/12/16/3/3/2/506; DEA/EIA/0001752/2013 PV5: 14/12/16/3/3/2/485; DEA/EIA/0001753/2013
PROJECT NO.	109378
TITLE	Draft Scoping Report for the proposed photovoltaic (solar) energy facilities on Badenhorst Dam Farm near De Aar, Northern Cape
AUTHORS & PREPARED BY	Karen de Bruyn, Grace Shihepo and Karen Versfeld of Aurecon South Africa (Pty) Ltd
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REPORT STATUS	Draft
REPORT NUMBER	109378/7565
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ABBREVIATIONS

CRR	Comments and Responses Report
CSP	Concentrating Solar-thermal Power
DEA	Department of Environmental Affairs (previously Department of Environmental Affairs and Tourism)
DEA&DP	Department of Environmental Affairs and Development Planning
DEANC	Department of Environmental Affairs and Nature Conservations
DEAT	Department of Environmental Affairs and Tourism
DME	Department of Minerals and Energy
DoE	Department of Energy
DSR	Draft Scoping Report
EAP	Environmental Assessment Practitioner
EAPSA	Environmental Assessment Practitioner of South Africa
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMF	Environmental Management Framework
EMP	Environmental Management Programme
EIA	Environmental Impact Assessment
FSR	Final Scoping Report
GN	Government Notice
GWh	Gigawatt hours
ha	Hectares
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IEP	Integrated Energy Plan
IPP	Independent Power Producer
IRP	Integrated Resource Plan
kV	Kilovolt
LOWMA	Lower Orange Water Management Area
MW	Megawatts
NEMA	National Environmental Management Act (No. 107 of 1998) (as amended)
NHRA	National Heritage Resources Act (No. 25 of 1999)
NWA	National Water Act (No 36 of 1998)
PV	Photovoltaic
SAHRA	South African Heritage Resources Agency
SACNASP	South African Council for Natural Scientific Professions
SDF	Spatial Development Framework
ToR	Terms of Reference
VIA	Visual Impact Assessment

1 INTRODUCTION

The purpose of this section is to provide relevant background to the proposed photovoltaic (PV) solar facilities on Badenhorst Dam farm and to introduce the Environmental Impact Assessment (EIA) process.

1.1 INTRODUCTION

Mulilo Renewable Energy (Pty) Ltd (Mulilo) proposes to construct four separate solar energy facilities, on Badenhorst Dam Farm (Portion 1 of Farm 180), near De Aar in the Northern Cape. Each of the four proposed facilities would have a maximum generation capacity of 75MW Alternating Current (AC) through photovoltaic (PV) technology.

The nature of the activity is described in detail in Section 5.1, but in brief the proposed project would consist of the following:

- **Technology:** A photovoltaic component comprising of numerous arrays of PV panels to generate up to 75MW per facility, through the photovoltaic effect.
- **Transmission lines and substations**.
- **Boundary fencing:** Each 75MW facility will be fenced for health, safety and security reasons.
- **Roads:** one access road and internal access roads for servicing and maintenance.
- **Water supply infrastructure.**
- **Stormwater infrastructure:** Including drainage channels, berms, detention areas and kinetic energy dissipaters.
- **Buildings:** Buildings would likely include onsite substations, a connection building, control building, guard cabin, an electrical substation and solar resource measuring substation.

The proposed projects are listed in terms of the EIA Regulations (Government Notice (GN) No. 543, 544 and 545 of 2 August 2010) in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA) (as amended). Mulilo appointed Aurecon South Africa (Pty) Ltd (Aurecon) to undertake the required EIA process in terms of NEMA.

This report is structured as follows:

Section One:	Provides the introduction, the motivation for the project, introduces the EIA process, the assumptions and limitations and the EIA team
Section Two:	Describes the legal framework
Section Three:	Describes the scoping methodology including the public participation process
Section Four:	Describes the current environment including the existing social and biophysical environment
Section Five:	Describes the proposed project, identified alternatives and potential social and environment aspects and impacts

Section Six: Describes the Plan of Study for the EIA and the assessment methodology, including the criteria used to determine the significance rating of potential socio-economic and environmental impacts

Section Seven: Concludes the report and describes the way forward

1.2 PROJECT BACKGROUND

Aurecon, on behalf of Mulilo, undertook the EIA process for a proposed PV facility at Badenhorst Dam Farm. After completion of the EIA (DEA Reference Number: 12/12/20/2499), the Department of Environmental Affairs (DEA) authorised a PV facility with 100MW capacity (Environmental Authorisation (EA) dated 9 July 2012). The approved PV facility will herein after be referred to as Badenhorst PV1. Please see

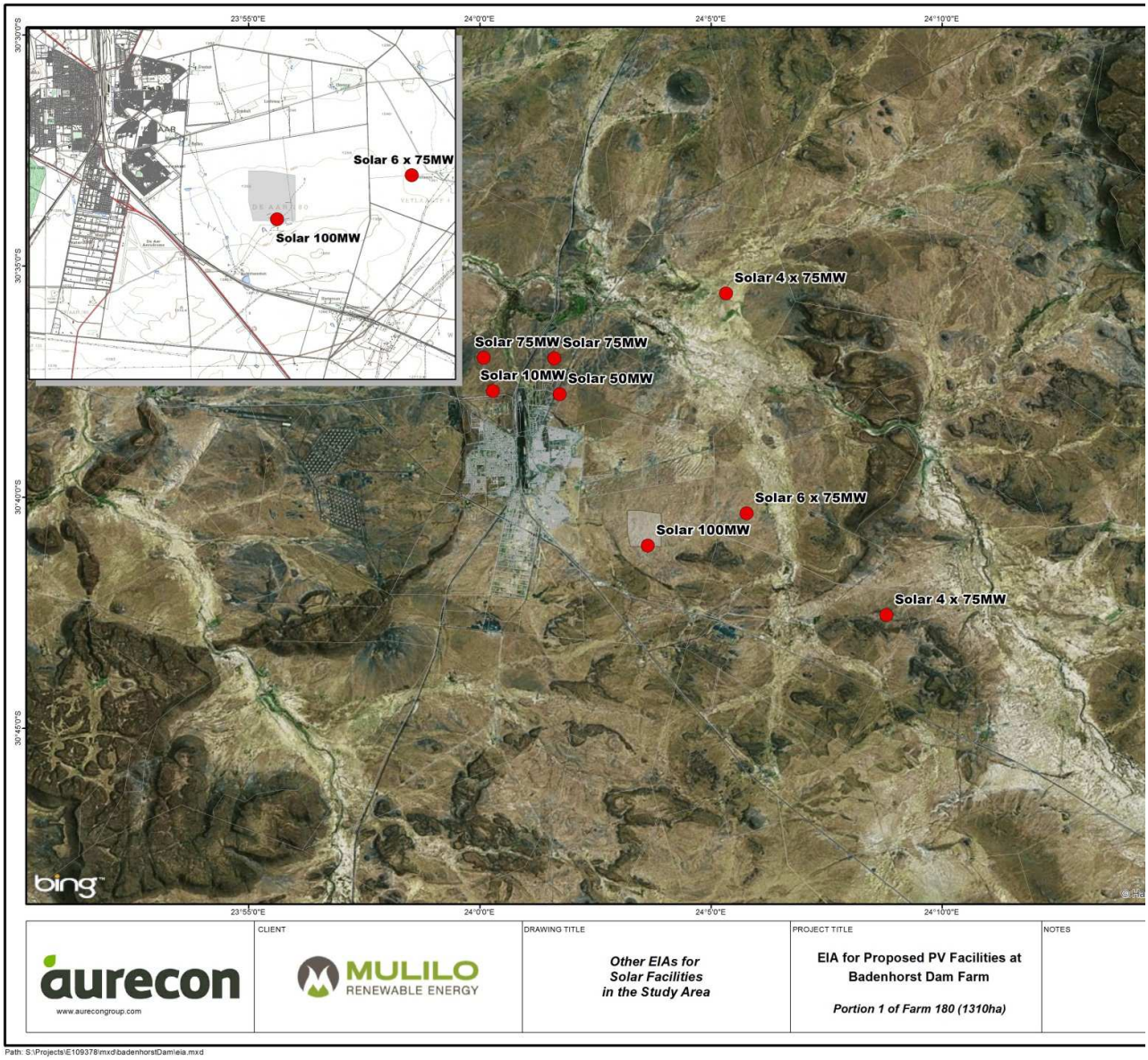


Figure 1 below for the approved layout of PV1 indicated in grey. Mulilo is now investigating an additional four PV facilities on Badenhorst Dam farm as described in Section 5.1.

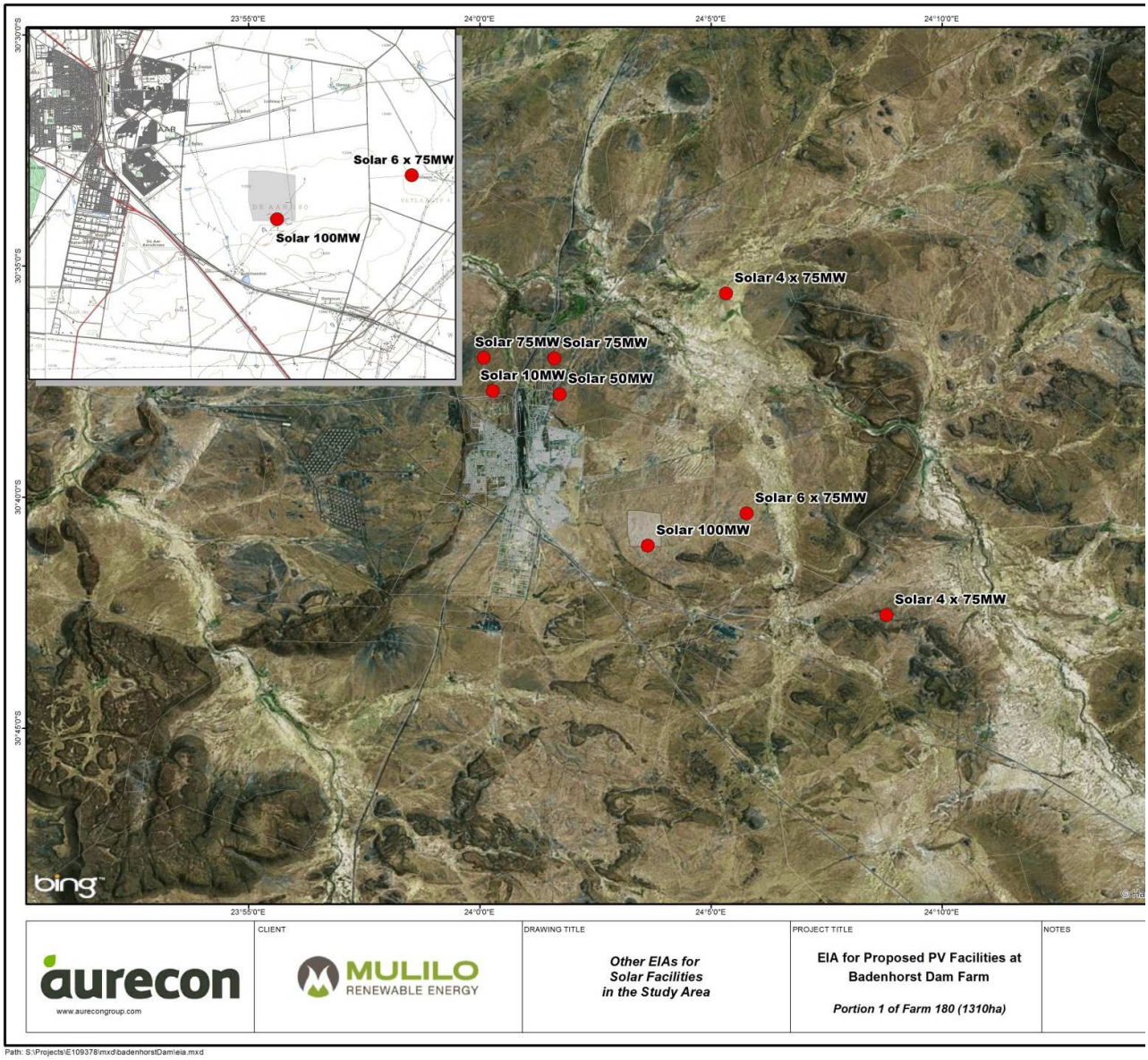


Figure 1 also indicates other EIAs undertaken in the De Aar region.

1.3 EIA APPROACH

The EIA process will be a combined process, in other words one EIA process for Badenhorst Dam Farm, which will include the assessment for all four proposed PV facilities. This combined EIA process will not only streamline the EIA reporting and the specialist investigations, but it will also facilitate the assessment of PV projects, both individually and cumulatively. A similar process is being proposed to assess the proposed PV facilities for Du Plessis Dam farm, also located close to De Aar (a separate EIA[1] will be submitted to the Department). As both projects are located within the same area, we would like to combine the respective public participation

[1] Pv2: 14/12/16/3/3/2/454; DEA/EIA/0001774/2013; PV3: 14/12/16/3/3/2/455; DEA/EIA/0001772/2013 and PV4: 14/12/16/3/3/2/456; DEA/EIA/0001773/2013

processes in order to communicate with the public more efficiently. The processes are set out in Figure 2.

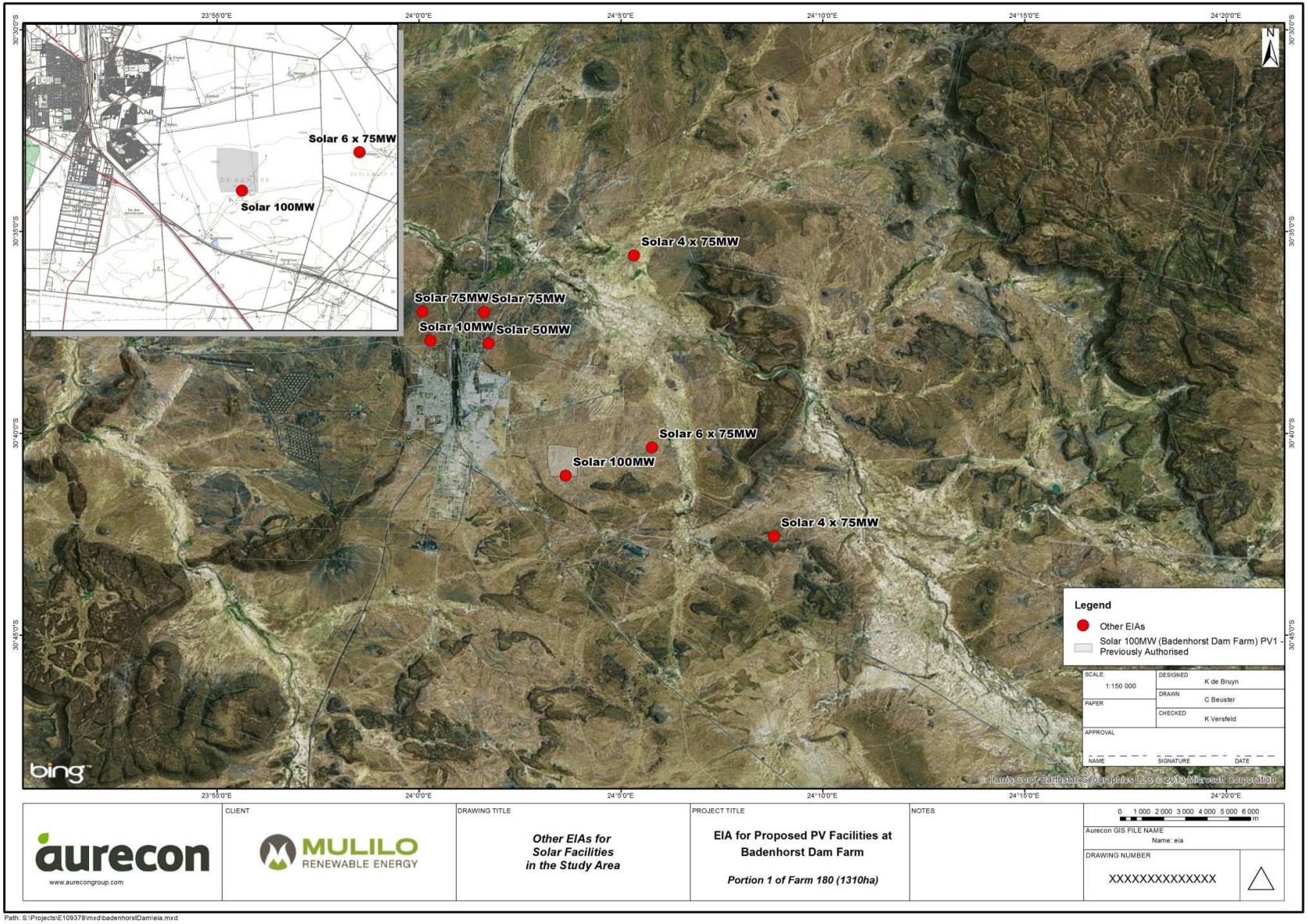


Figure 1: Previously approved PV facility (PV1) on Badenhorst Dam farm

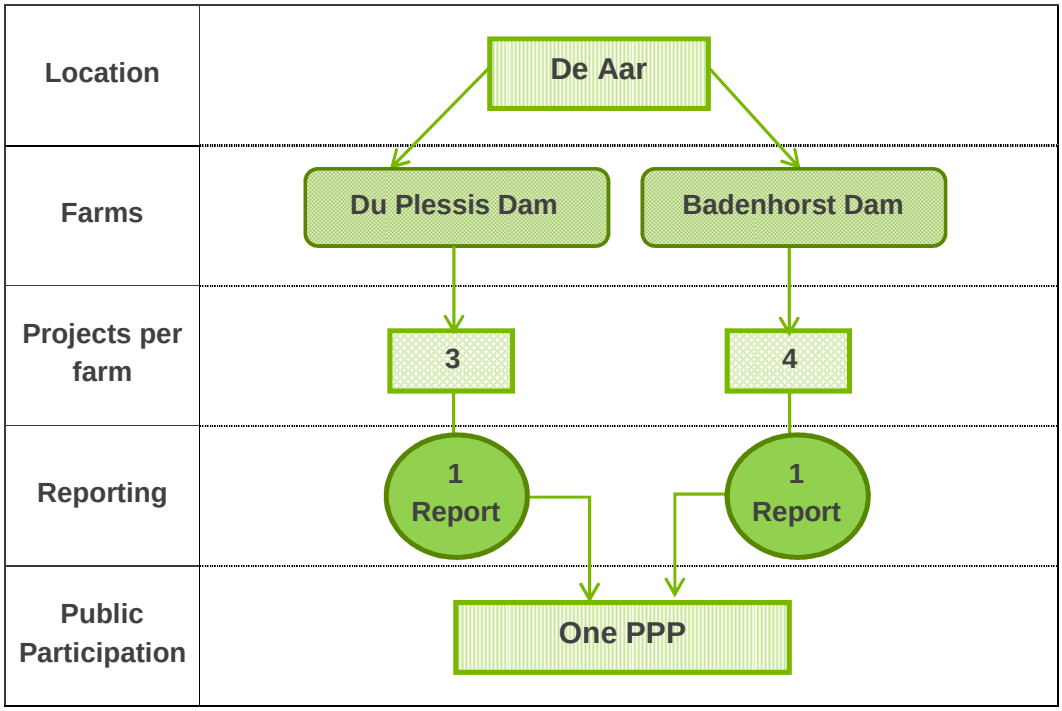


Figure 2: Approach to undertake the EIA Processes

The EIA process will consists of three phases namely the application phase, Scoping phase and the concluding EIA phase. Each of these phases is described below.

1.3.1 Initial Application Phase

The Initial Application phase entailed the submission of a four signed EIA Application Forms to notify the DEA of the proposed facilities. The EIA Application Forms was submitted on 7 March 2013. Acknowledgement of receipt of the EIA Application Forms was received on 26 March 2013.

Table 1: DEA Reference Numbers of the proposed PV facilities

Proposed PV Facility	DEA Ref Nr	NEAS Ref Nr
PV2	14/12/16/3/3/2/504	DEA/EIA/0001751/2013
PV3	14/12/16/3/3/2/483	DEA/EIA/0001750/2013
PV4	14/12/16/3/3/2/506	DEA/EIA/0001752/2013
PV5	14/12/16/3/3/2/485	DEA/EIA/0001753/2013

The Application Forms and the DEA's letters of acknowledgement are included in Annexure A.

1.3.2 The Scoping Phase

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

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

To date the Scoping Phase has involved a desktop review of relevant previous environmental studies in the area. A field trip was undertaken on 6 October 2011 with the Aurecon EIA team and the landowner, as part of the previous EIA process. Since the *status quo* assessed in the previous EIA process has not changed, no additional field visit will be undertaken by the EIA team during the Scoping Phase.

The information gathered during the desktop study, and previous site visit, was used in refining the Plan of Study for the EIA process and Terms of Reference (ToR) for the specialist studies which will be undertaken during the EIA Phase (see Section 6).

1.3.3 The EIA Phase

The Scoping Phase will be followed by the EIA Phase, during which the specialist investigations will take place. This phase will culminate in a comprehensive EIA report documenting the outcome of the impact assessments.

1.3.4 The Public Participation Process

Consultation with the public forms an integral component of this investigation and enables I&APs (e.g. directly affected landowners, national-, provincial- and local authorities, environmental groups, civic associations, and communities), to identify their issues and concerns, relating to the proposed activities, which they feel should be addressed in the EIA process. As much available information has been included upfront to create a transparent process and to ensure that I&APs are well informed about the project. A summary of the public participation process is provided in Section 3.2.

1.4 ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

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

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

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

- Lack of confirmation of service's capacity from the municipality.
- Lack of clarity on the accommodation of construction workers.
- Comprehensive list of surrounding renewable facilities.
- Commencement date of construction phase.

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

1.5 SCOPING ASSESSMENT REPORT

As outlined in Section 1.3, there are three distinct phases or stages in the EIA process, namely the Initiation Stage, the Scoping report stage and the EIA report stage. This document addresses the Scoping report stage.

Table 2 presents the structure of the Scoping report as well as the applicable sections that address the required information in terms of NEMA. Specifically, Section 28 (1) of the EIA Regulations requires that the following information is provided:

Table 2: NEMA requirements for Scoping Reports

Regulation	Content as required by NEMA	Section / Annexure
28(1)(a)	(i) Details of the EAP who prepared the report; and	Annexure C
	(ii) Details of the expertise of the EAP to carry out scoping procedures.	
28(1)(b)	A description of the proposed activity.	Section 1.2 and Section 5.1
28(1)(c)	A description of any feasible and reasonable alternatives that have been identified.	Section 5.2
28(1)(d)	A description of the property on which the activity is to be undertaken and the location of the activity on the property.	Section 4.1
28(1)(e)	A description of the environment that may be affected by the activity and the manner in which the activity may be affected by the environment.	4.2
28(1)(f)	An identification of all legislation and guidelines that have been considered in the preparation of the scoping report.	Section 2
28(1)(g)	A description of environmental issues and potential impacts, including cumulative impacts that have been identified.	Section 5.4
28(1)(h)	Details of the public participation process conducted in terms of regulation 27(a), including –	Section 3.2
	(i) The steps that were taken to notify potentially interested and affected parties of the application;	Section 3.2
	(ii) Proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed or given;	Final Scoping Report
	(iii) A list of all persons, organisations and organs of state that were registered in terms of regulation 55 as interested and affected parties in relation to the application; and	Annexure B
	(iv) A summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues.	Final Scoping Report

Regulation	Content as required by NEMA	Section / Annexure
28(1)(i)	A description of the need and desirability of the proposed activity.	Section 5.3
28(1)(j)	A description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and on the community that may be affected by the activity.	Section 5.2
28(1)(k)	Copies of any representations, comments received in connection with the application or the scoping report from interested and affected parties.	Final Scoping Report
28(1)(l)	Copies of the minutes of any meetings held by the EAP with interested and affected parties and other role players which record the views of the participants.	
28(1)(m)	Any response by the EAP to those representations and comments and views.	
28(1)(n)	A plan of study for environmental impact assessment which sets out the proposed approach to the environmental impact assessment of the application, which must include:	Section 6
	(i) A description of the tasks that will be undertaken as part of the environmental impact assessment process, including any specialist reports or specialised processes, and the manner in which such tasks will be undertaken;	Section 3.1
	(ii) An indication of the stages at which the competent authority will be consulted;	Section 6.8.1
	(iii) A description of the proposed method of assessing the environmental issues and alternatives, including the option of not proceeding with the activity; and	Section 6.3 and Section 6.4
	(iv) Particulars of the public participation process that will be conducted during the environmental impact assessment process.	Section 6.8
28(1)(o)	Any specific information required by the competent authority.	To be included as requested.
28(1)(p)	Any other matters required in terms of sections 24(4)(a) and (b) of the Act.	Included as required.
28(2)	In addition, a scoping report must take into account any guidelines applicable to the kind of activity which is the subject of the application.	Section 2.6.8
28(3)	The EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) if the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation (1)(c), exist.	Section 5.3

2 LEGAL FRAMEWORK

This section describes the policy and legal framework within which the EIA is undertaken.

2.1 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT NO. 107 OF 1998)

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

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

In terms of the EIA regulations, certain activities are identified, which require authorisation from the competent environmental authority, in this case DEA, before commencing. Listed activities in Government Notice (GN) No. 545 require Scoping and EIA, whilst those listed in GN No. 544 and GN No. 546 require a Basic Assessment (unless they are being assessed under an EIA process). The activities being applied for in this EIA process are listed in Table 3, Table 4 and Table 5. The EIA approach is described in Section 1.3.

Table 3: Relevant activities listed in Listing Notice 1, GN544

Activity	Activity triggers
Activity No. 10 "The construction of facilities or infrastructure for the transmission and distribution of electricity - (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts;"	The capacity of the transmission lines would be 132kV. This activity will therefore be triggered.
Activity No. 11 "The construction of (x) buildings exceeding 50 square metres (m^2) in size; or (xi) infrastructure or structures covering 50m^2 or more where such construction occurs within a watercourse or within 32m of a watercourse, measured from the edge of a watercourse, excluding where such	Some infrastructure and or buildings may be constructed within 32m of a watercourse.

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

Activity	Activity triggers
construction will occur behind the development setback line."	
Activity No. 22 "The construction of a road, outside urban areas, (i) with a reserve wider than 13,5 meters or, (ii) where no reserve exists where the road is wider than 8m."	This activity will not be triggered since the proposed road would be less than 8m wide and the reserve will be less than 13,5m.

Table 4: Relevant activities listed in Listing Notice 2, GN545

Activity	Activity triggers
Activity No. 1 "The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more."	The proposed solar (PV) facilities would each have a generation capacity of 75MW AC, as such this activity is triggered.
Activity No. 15 "Physical alteration of undeveloped vacant or derelict land for residential retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more."	Based on our knowledge of Badenhorst Dam farm, the predominant farming activity is grazing. It is therefore assumed that this activity would be triggered as the DEA considers grazing land to be undeveloped.

Table 5: Relevant activities listed in Listing Notice 3, GN546

Activity	Assumptions
Activity No. 4 "The construction of a road wider than 4m with a reserve less than 13,5 metres. (a) In Northern Cape: ii. Outside urban areas, in: (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority.	An access road wider than 4m, but less than 8m, will be constructed. As De Aar is located within the Platberg-Karoo Conservancy, this activity will be triggered.
Activity No. 14" The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, except where such removal of vegetation is required for. a) In Northern Cape: (i). All areas outside urban areas."	This activity may or may not be triggered depending on the extent of the indigenous vegetation. This will be confirmed by the ecological

Activity	Assumptions
	assessment.
Activity No. 16 The construction of: (iii) buildings with a footprint exceeding 10m^2 in size; or (iv) infrastructure covering 10m^2 or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line. (a) In Eastern Cape, Free State, KwaZulu-Natal, Limpopo, Mpumalanga and Northern Cape: ii. Outside urban areas, in: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.	It is assumed that buildings and infrastructure, exceeding 10m^2, would be constructed. Depending on the location of the respective buildings, this activity may be triggered.

Considering that activities from Listing Notice 1 (GN 544), Listing Notice 2 (GN 545) and Listing Notice 3 (GN 546) are trigged by this proposed development, an EA is required from the National Department of Environmental Affairs (DEA), via the EIA process outlined in Sections 26 to 35 of Regulation 545.

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

2.2 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT (ACT NO. 10 OF 2004)

The National Environmental Management Biodiversity Act (Act No.10 of 2004) (NEM: BA) aims to conserve and manage the country's biodiversity via protecting species and ecosystems, specifically those which are threatened and/or are considered to be critically endangered.

The Act also allows for the publication of provincial and national lists of ecosystems that are considered to be threatened and are therefore in need of protection and include:

- Critically endangered ecosystems: ecosystems that have undergone severe ecological degradation as a result of human activity and are at extremely high risk of irreversible transformation;
- Endangered ecosystems: ecosystems that, although they are not critically endangered, have nevertheless undergone ecological degradation as a result of human activity;
- Vulnerable ecosystems: ecosystems that have a high risk of undergoing significant ecological degradation; and
- Protected ecosystems: ecosystems that are of a high conservation value or contain indigenous species at high risk of extinction in the wild in the near future.

In terms of NEMBA a list of endangered, critically endangered, vulnerable, and protected species has been promulgated on the 6 November 2009 (Section 6, Table 3 of the Act), which calls for an EIA process should any of the listed species be identified on the site and need to be removed. The vegetation type will be determined through an ecological impact assessment.

2.3 NATIONAL WATER ACT (ACT NO. 36 OF 1998)

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

Should the proposed development trigger any of the water uses as defined in Section 21 of the NWA, the proponent will be advised to apply for the appropriate authorisation from the DWA.

2.4 NATIONAL HERITAGE RESOURCES ACT (ACT NO. 25 OF 1999)

In terms of the National Heritage Resources Act (No. 25 of 1999) (NHRA), any person who intends to undertake "*any development … which will change the character of a site exceeding 5,000m^2 in extent*", *"the construction of a road powerline, pipeline exceeding 300m in length"* or *"the rezoning of site larger than 10,000m^2 in extent…"* must at the very earliest stages of initiating the development notify the responsible heritage resources authority, namely the South African Heritage Resources Agency (SAHRA) or the relevant provincial heritage agency. These agencies would in turn indicate whether or not a full Heritage Impact Assessment (HIA) would need to be undertaken.

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

2.5 CONSERVATION OF AGRICULTURAL RESOURCES ACT (ACT NO. 43 OF 1983)

The Conservation of Agricultural Resources Act (Act No. 43 of 1983) (CARA) makes provision for the conservation of the natural agricultural resources of South Africa through maintaining the production potential of land, combating and preventing erosion, preventing the weakening or destruction of the water sources, protecting vegetation, and combating weeds and invader plants. Regulation 15 of CARA lists problem plants (undesired aliens, declared weeds, and plant invaders). Plants listed in this regulation must be controlled by the landowner.

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

2.6 OTHER APPLICABLE LEGISLATION AND POLICIES

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

- Policies regarding greenhouse gas and carbon emissions;
- White Paper on the Energy Policy of the Republic of South Africa (1998);
- White Paper on Renewable Energy (2003);
- National Energy Act (No. 34 of 2008) and Electricity Regulation Act (ERA) (No. 4 of 2006);
- IPP Procurement Process;
- Integrated Energy Plan for the Republic of South Africa (2003); and
- Integrated Resources Plan.

2.6.1 Policies regarding greenhouse gas and carbon emissions

Gases that contribute to the greenhouse effect are known to include carbon dioxide (CO_2), methane (CH_4), water vapour, nitrous oxide, chlorofluorocarbons (CFCs), halons and peroxyacylnitrate (PAN). All of these gasses are transparent to shortwave radiation reaching the earth's surface, but trap long-wave radiation leaving the earth's surface. This action leads to a warming of the earth's lower atmosphere, resulting in changes in the global and regional climates, rising sea levels and extended desertification. This in turn is expected to have severe ecological consequences and a suite of implications for mankind.

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

The United Nations Framework Convention on Climate Change (UNFCCC) has initiated a process to develop a more specific and binding agreement on the reduction of greenhouse gas (GHG) emissions. This led to negotiations with a particular focus on the commitments of developed countries, and culminated in the adoption of the Kyoto Protocol in 1997, which came into effect in February 2005. Using the above framework to inform their approach, the Kyoto Protocol has placed specific legal obligations in the form of GHG reduction targets on developed countries and countries with 'Economies in Transition'. The developed countries are required to reduce their overall emissions of six GHGs by at least 5% below the 1990 levels between 2008 and 2012. While South Africa, as a developing country, is not obliged to make such reductions, the increase in greenhouse gas emissions must be viewed in light of global trends to reduce these emissions significantly. More recently under the Copenhagen Accord 2010, countries representing over 80% of global emissions have submitted pledges on emission reductions. South Africa commitment is to reduce GHG emissions totalling 34% by 2020 and 42% by 2025.

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

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

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

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

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

2.6.3 White Paper on Renewable Energy (2003)

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

The White Paper presents South Africa's options in terms of renewable energy as extensive and a viable and sustainable alternative to fossil fuel options. A strategic programme of action to develop South Africa's renewable energy resources is proposed, particularly for power generation and reducing the need for coal-based power generation. The starting point will be a number of initial investments spread across both relatively low cost technologies, such as biomass-based cogeneration, as well as technologies with larger-scale application, such as solar water heating, wind and small-scale hydro.

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

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

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

(i) The National Energy Act (No. 34 of 2008); and
(ii) The Electricity Regulation Act (No. 4 of 2006) (ERA).

In May 2011, the DoE gazetted the Electricity Regulations on New Generation Capacity under the ERA. The New Generation Regulations establish rules and guidelines that are applicable to the undertaking of an IPP Bid Programme and the procurement of an IPP for new generation capacity. They also facilitate the fair treatment and non-discrimination between IPPs and the buyer of the energy[3].

In terms of the New Generation Regulations, the Integrated Resource Plan (IRP) has been developed by the DoE and sets out the new generation capacity requirement per technology, taking energy efficiency and the demand-side management projects into account. This required, new generation capacity must be met through the technologies and projects listed in the IRP and all IPP procurement programmes will be undertaken in accordance with the specified capacities and technologies listed in the IRP[4].

2.6.5 IPP Procurement Process

South Africa initially aimed to procure 3,725MW capacity of renewable energy by 2016 (the first round of procurement). This 3,725MW is broadly in accordance with the capacity allocated to renewable energy generation in IRP2010. It was announced on 19 December 2012 that South Africa will move to procure an additional 3,200MW of renewable energy capacity by 2020[5], over and above the 3,725MW being procured currently under the Renewable Energy Independent Power Producer Programme (REIPPP).[6] A brief overview of the IPP Procurement process to date is provided below and in Table 6.

On 3 August 2011, DoE formally invited interested parties with relevant experience to submit proposals for the finance, operation and maintenance of renewable energy generation facilities adopting any of onshore wind, solar thermal, solar photovoltaic, biomass, biogas, landfill gas or small hydro technologies for the purpose of entering, *inter alia*, an Implementation Agreement with DoE and a Power Purchase Agreement with a buyer (Eskom)[7] in terms of the ERA. This Request for Qualification and Proposals for new generation capacity was issued under the IPP Procurement Programme. The IPP Procurement Programme has been designed to contribute

[3] http://www.eskom.co.za/c/73/ipp-processes/ (accessed 29/10/11)
[4] http://www.eskom.co.za/c/73/ipp-processes/ (accessed 29/10/11)
[5] GN 1074, 19 December 2012
[6] http://www.engineeringnews.co.za/article/sas-renewables-procurement-programme-to-be-enlarged-by-a-further-3-200-mw-2012-10-09
[7] http://www.ipp-renewables.co.za/wp-content/uploads/2011/08/Tender_Notice.png (accessed 30/10/11)

towards the target of 3,725MW and additional 3,200MW, and towards socio-economic and environmentally sustainable growth, and to start and stimulate the renewable industry in South Africa[8].

In terms of this IPP Procurement Programme, Bidders will be required to bid on tariff and the identified socio-economic development objectives of DoE. The tariff will be payable by the Buyer should the project be selected. Although earlier information was that the 2009 Renewable Energy Feed In Tariff would act as an upper limit on price, the actual caps are set out in Table 6.

The Department of Energy has implemented a limit with regards to the capacity of renewable energy facilities to 75MW. The notification of this capacity limit was not published in a Government Notice as it was included in the criteria to qualify as a REIPP.

Table 6: Milestones of the IPP process

First Bid Submission	
• First Bid Submission Date	4 November 2011
• Announcement of Preferred Bidders in respect of First Bid Submission Date	7 December 2011
• Solar PV capacity awarded	631.53MW
Second Bid Submissions	
• Second Bid Submission Date	5 March 2012
• Announcement of Preferred Bidders in respect of Second Bid Submission Date	21 May 2012
• Solar PV capacity awarded	417.1MW
Third Bid Submission	
• Third Bid Submission Date	19 August 2013
• Announcement of Preferred Bidders in respect of Third Bid Submission Date	To be advised

After the second bid submission the prices for solar PV were capped at below 285c/kWh.

The selection process to determine the preferred bidders will be based on both price and other economic development criteria in a 70% and 30% ratio respectively (Creamer, T. 2011). If the maximum MW allowance for any particular technology has been allocated during any particular window, then the subsequent bidding opportunities will not be opened for that technology. The MW capacity per technology is indicated in Table 7.

IPPs that wish to connect to Eskom's network will be required to apply for a connection, pay a connection charge and sign a connection and use-of-system agreement[9]. All IPPs will be provided non-discriminatory access to Eskom's network, subject to the IPP's obtaining its required approvals such as EIA's and a generating and trading licence from the National Energy Regulator South Africa.

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

Table 7: Megawatts capacity per technology

Technology	Initial MW	Additional MW	Total MW per Technology
Onshore wind	1,850MW	1,470MW	3,320MW
Concentrated solar thermal	200MW	400MW	600MW
Solar photovoltaic	1,450MW	1,075MW	2525MW
Biomass solid	12.5MW	47.5MW	60MW
Biogas	12.5MW	47.5MW	60MW
Landfill gas	25MW	-	25MW
Small hydro	75MW	60MW	135MW
Small projects[10]	100MW	100MW	200MW
TOTAL	**3,725MW**	**3,200MW**	**6,925MW**

2.6.6 Integrated Energy Plan for the Republic of South Africa

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

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

2.6.7 Integrated Resource Plan

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

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

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

[10] Small projects are less than or equal to 40MW.

resources such as water and the need to meet nationally appropriate emission targets in line with global commitments".

As can be seen by Table 8 below the current final IRP provides for an additional 20,409MW (shaded in grey) of renewable energy in the electricity mix in South Africa by 2030.

Table 8: Policy adjusted scenario of the IRP2010 as gazetted on 6 May 2011

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

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

2.6.8 Guidelines

This EIA *process is informed by the series of national Environmental Guidelines*[11] *where applicable and relevant:*

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

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

- IEIM, Information Series 12: Environmental Management Plans (DEAT, 2004).
- Integrated Environmental Management Guideline Series, Guideline 4: Public Participation, in support of the EIA Regulations. Unpublished (DEAT, 2005).
- Integrated Environmental Management Guideline Series, Guideline 7: Detailed Guide to Implementation of the Environmental Impact Assessment Regulations. Unpublished (DEAT, 2007).
- Guideline for involving biodiversity specialists in EIA process (June 2005).
- Guideline for involving heritage specialists in the EIR process (June 2005).
- Guideline for involving visual and aesthetic specialists in the EIR process (June 2005).
- Guideline for Environmental Management Plans (June 2005).
- Guideline for determining the scope of specialist involvement in EIA Processes (June 2005).
- Guideline for the review of specialist input into the EIA Process (June 2005).

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

- DEA&DP. 2011. Guideline on Alternatives, EIA Guideline and Information Document Series (DEA&DP, October 2011).
- DEA&DP. 2011. Guideline on Need and Desirability, EIA Guideline and Information Document Series (DEA&DP, October 2011).
- DEA&DP. 2012. Guideline on Public Participation, EIA Guideline and Information Document Series (DEA&DP, October 2012).
- DEA&DP. 2013. Guideline on Transitional Arrangements (DEA&DP, March 2013).
- DEA&DP. 2013. Generic Terms of Reference for EAPs and Project Schedules (DEA&DP, March 2013).
- DEA&DP. 2013. Guideline on Public Participation (DEA&DP, March 2013).
- DEA&DP. 2013. Guideline on Alternatives (DEA&DP, March 2013).
- DEA&DP. 2013. Guideline on Need and Desirability (DEA&DP, March 2013).
- DEA&DP. 2013. Guideline on Exemption Applications (DEA&DP, March 2013).
- DEA&DP. 2013. Guideline on Appeals (DEA&DP, March 2013).

3 EIA METHODOLOGY

This section describes the sources of information used in the EIA reporting and the proposed public participation process as engagement with the public and stakeholders forms an integral component of the EIA process.

3.1 INFORMATION COLLECTION

Various methods and sources were utilised to identify the social and environmental aspects associated with the proposed project and to develop the Terms of Reference (ToR) for the required specialist studies. The sources of information for the preparation of this EIA report include, amongst others, the following:

- Collection of information regarding the project, as provided by Mulilo:
  - Project description;
  - Methodology for construction of the various components of the project;
  - Methodology during operations;
  - Preliminary closure objectives;
  - Expected time table for project development;
  - Maps and figures, outlining the proposed facilities;
  - Technical information relating to design;
- Other relevant EIAs;
- Consultation with the project team;
- Consultation with I&APs; and
- Consultation with relevant authorities.

During the initiation/screening phase of the EIA, reference was made to various EIAs and specialist studies, conducted in the area to date, to inform social and environmental aspects relating to the proposed project. These include, amongst others:

- Proposed photovoltaic facility on Badenhorst Dam Farm, near De Aar in the Northern Cape. Final Environmental Impact Assessment Report (Aurecon, 2012).
- Two Proposed 132kV transmission lines from the South and North Wind Energy facilities on the Eastern Plateau near De Aar, Northern Cape. Final Basic Assessment Report (Aurecon, 2013); DEA reference: 14/12/16/3/3/1/785; NEAS Reference: DEA/EIA/0001601/2012.
- Proposed Photovoltaic Facility on a site South-East of De Aar, Northern Cape Province. Draft Scoping Report (DSR) (Savannah Environmental, 2011).
- Groundwater Resources in the Northern Cape Province (Department of Water Affairs, 2008).
- Construction of a CSP and CPV/ PV Plant in De Aar, Northern Cape Province of South Africa. Draft Environmental Impact Report (SiVest, 2011).
- ACO Associates, 2012. Impact Assessment for three solar energy facilities near De Aar, Northern Cape. Heritage Impact Assessment.

- Almond, J. 2012. Proposed Mulilo Renewable Energy PV2, PV3 and PV4 photovoltaic energy facilities on Farms Paarde Valley, Badenhorst Dam and Annex Du Plessis Dam near De Aar, Northern Cape Province. Palaeontological Impact Assessment.
- Belcher, A. 2012. Freshwater Assessment for the Proposed Photovoltaic Energy Facilities near De Aar: Aquatic Impact Assessment. Revision 1.
- Harebottle, D. 2012. Construction of three photovoltaic energy facilities near De Aar, Northern Cape. Avifaunal impact assessment.
- Hansen, K. 2012. Proposed Photo-voltaic facilities near De Aar, Northern Cape: Level 3 Visual Impact Assessment.
- Hoare, D. 2012. Specialist ecological study on the potential impacts of the proposed De Aar PV2, PV3 and PV4 Solar Energy Facilities, near De Aar, Northern Cape.
- SiVest, 2012. Proposed Solar Energy facilities near De Aar, Northern Cape. Final Soil and Agricultural Assessment Report. Revision No. 2.2.
- Walker, N. 2012. Proposed Photovoltaic (Solar) Energy Facility De Aar, Northern Cape Report 1:100 Year Recurrence Interval Floodline Determination.

A bibliography is included at the end of this report, which provides reference to other studies and that are of relevance to this EIA process.

3.1.1 Authority involvement

Authority consultation represents the first stage of the public consultation process. The EIA Application Forms were submitted to DEA to notify them of the proposed projects. The DEA acknowledged receipt of the EIA Application Form and issued a reference number for the proposed project.

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

The following authorities were requested to comment on the DSR:

- DEA;
- National Department of Agriculture, Forestry and Fisheries: Directorate: Land Use and Soil Management;
- Emthanjeni Local Municipality;
- Department of Environmental Affairs and Nature Conservation (DEANC);
- Eskom Holdings Limited;
- South African Heritage Resources Agency (SAHRA);
- Northern Cape Provincial Heritage: Boswa ya Kapa Bokone;
- Pixley ka Seme District Municipality;
- Department of Agriculture (Northern Cape); and
- Department of Water Affairs: Deputy Director Lower Orange WMA.

3.1.2 Review of Plan of Study for EIA

The DSR will be made available to the public for a prerequisite 40-day comment period. All comments received during the comment period will be included in a Comments and Response Report (CRR) and annexed to the Final Scoping Report (FSR). The CRR will include responses from the Applicant and the consultants. Once the FSR has been completed, including the CRR, it will be submitted to the DEA for review.

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

(a) Accept the report and advise the Environmental Assessment Practitioner (EAP) to proceed with the tasks contemplated in the Plan of Study for EIA;
(b) Request the EAP to make such amendments to the report as the competent authority may require; or
(c) Reject the Scoping Report if it
    (i) Does not contain material information required in terms of these regulations, or
    (ii) Has not taken into account guidelines applicable in respect of Scoping Reports and Plans of Study for EIA.

3.2 PUBLIC PARTICIPATION PROCESS

As mentioned in Section 1.3.4, engagement with the public and other stakeholders that are interested in, or affected by the development proposals forms an integral component of any EIA process. The public participation process has thus been structured to provide I&APs with an opportunity to gain more knowledge about the proposed project, to provide input through the review of documents/reports, and to voice any issues of concern at various stages throughout the EIA process.

The objectives of public participation are to provide information to the public, identify key issues and concerns at an early stage, respond to the issues and concerns raised, provide a review opportunity, and to document the process properly. The public participation process will be managed to meet these objectives throughout the EIA.

The Scoping Phase public participation process is summarized in Table 9.

Table 9: Summary of the EIA Scoping public participation process

Task	Details	Date
Stakeholders notification (relevant authorities and I&APs)		
Submission of Applications for Authorisation	The four applications for authorisation were submitted to DEA on 11 March 2013. Refer to Annexure A for proof of submission as well as the Acknowledgment of Receipt from DEA.	**11 March 2013**
Stakeholder identification	A stakeholder database was developed for the project by referring to the database of the previous projects undertaken on Badenhorst Dam farm. This database will be updated during the EIA as required. A copy of the I&AP database is attached in Annexure B.	**March 2013**
Site notices	Site notices were put up to inform the general public of the	**16 April 2013**

	proposed project and the public participation process. One was placed at the entrance to the Badenhorst Dam Farm. Photos of the site notices will be included in the FSR.	
Newspaper Advertisements	An advert was placed in *Die Volksblad.* Copies of the advert are attached in Annexure B. Proof of placement will be included in the FSR.	**30 April 2013**
Review of Draft Scoping Report		
I&APs and authorities	All potential I&APs were informed of the availability of the DSR by means of post and or email. Relevant state departments as listed in Section 3.1.1, was notified of the report and requested to submit comments within the 40-day commenting period. Copies of the Scoping Report (and EMP) are available for review at the following places: • De Aar public library located in Station Street, • The Emthanjeni Municipal Offices (Contact person: Mrs Kloppers). The report is also available on the Aurecon website (http://www.aurecongroup.com- indicate “Current Location” as “South Africa” and click on the “Public Participation” link). Electronic copies of the report will be made available on request (on a CD). Authorities and I&APs will be given 40-days to review the scoping report and submit comments in writing to the Aurecon team. The closing date for comments is **10 June 2013**.	**30 April 2013 to 10 June 2013**
Addressing comments received	All comments received on the DSR will be collated into a Comments and Responses Report (CRR). The response to these comments from the Applicant and the Consultant would also be included in the CRR and would be annexed to the FSR. All parties that submitted comments will be provided with a hard copy of the CRR.	
	Review of Draft Scoping Report	
Release of Final Scoping Report (FSR)	All registered I&APs and relevant state departments will receive written notification (email/ sms/ post/ fax) regarding the availability of the reports and the 21-day comment period. I&APs will be provided with 21-days to submit written comments to Aurecon. The FSR would be lodged at the same locations as the DSR.	
Addressing comments received	All comments received on the FSR will not be collated into a CRR, but will be forwarded to DEA for final decision-making.	
DEA decision-making		
Notification of the Departments Decision	If DEA authorise the proposed project, all registered I&APs would be notified of the decision within 12-days from the date of the decision. All registered I&APs will be notified of the Appeal process by means of letters sent by post or e-mail and an advert will be placed in *Die Volksblad*.	

3.2.1 Identification of Stakeholders

The I&AP register compiled during the Environmental Process for the establishment of a 100MW facility on Badenhorst Dam Farm near De Aar served as the baseline I&AP register for this EIA process[12]. The initial database of I&APs include the landowner, the adjacent landowners, relevant district and local municipal officials, relevant national and provincial government officials, and organisations in the area. This database will be augmented via chain referral during the EIA process, and will be continually updated as new I&APs are identified throughout the project lifecycle. The current list of potential I&APs is included in Annexure B1.

3.2.2 Notification of the Public Participation Process

Consultation with all potential I&APs commenced with the Notification of the Public Participation Process, as required in terms of the EIA Regulations, which entailed the following:

- Placing advertisements in local newspaper (*Die Volksblad*);
- Placing a notice board at the site;
- Providing written notice to potential I&APs including surrounding landowners, organs of state and relevant authorities; and
- Requesting potential I&APs to recommend other potential I&APs to include on the database (chain referral process).

Thereafter, the remainder of the communications will be focused on registered I&APs. Consequently, the initial advertising campaign was broad and thorough and invited the members of the public to register as I&APs.

3.2.3 Issues Raised

All issues raised during the comment period of the DSR will be recorded in a CRR, along with responses from the Proponent and Consultant. The CRR will be annexed to the FSR and all parties that raised issues will be provided with a copy of the CRR.

[12]Aurecon, 2012. Proposed Photovoltaic (Solar) Energy Facility on Badenhorst Dam Farm near De Aar, Northern Cape: Final Environmental Impact Assessment Report. Report No. 5735B

4 DESCRIPTION OF THE CURRENT ENVIRONMENT

This section provides an overview of the receiving socio-economic and biophysical environment. It is based on information extracted from previous EIAs and specialist studies.

The description of the affected environment provided below draws on existing knowledge from published data, previous studies, site visits to the area and discussions with various role-players.

4.1 SITE LOCATION, EXTENT AND CONTEXT

De Aar falls within the Northern Cape Province approximately 300km southwest of Kimberley as indicated in Figure 3. De Aar, meaning “artery” in Dutch, was established in 1903 and the name refers to the water-bearing arteries that occur underground. The water supply is thus sourced entirely from underground resources. Due to De Aar’s central location, government chose the location as a junction for the first railway line from Cape Town to Kimberley in 1881[13]. The junction was of very strategic importance for the English during the Second Boer War.

De Aar is at 1,280 meters above sea level (mamls) and the terrain is relatively undulating.

The proposed site for the construction of the photovoltaic facilities is the Badenhorst Dam Farm (Farm No. 180 Portions 1). Badenhorst Dam farm is approximately 1,310ha in extent and is zoned as agricultural land. Badenhorst Dam Farm is located approximately 340m from the Nonzwakazi informal settlement and approximately 3km east of De Aar. Badenhorst Dam Farm (Portion 1 of Farm No. 180) is owned by De Aar Stone Crushers, with which Mulilo has entered into a long term agreement with for the proposed project.

[13] http://www.deaar.co.za/, accessed 29/10/2011

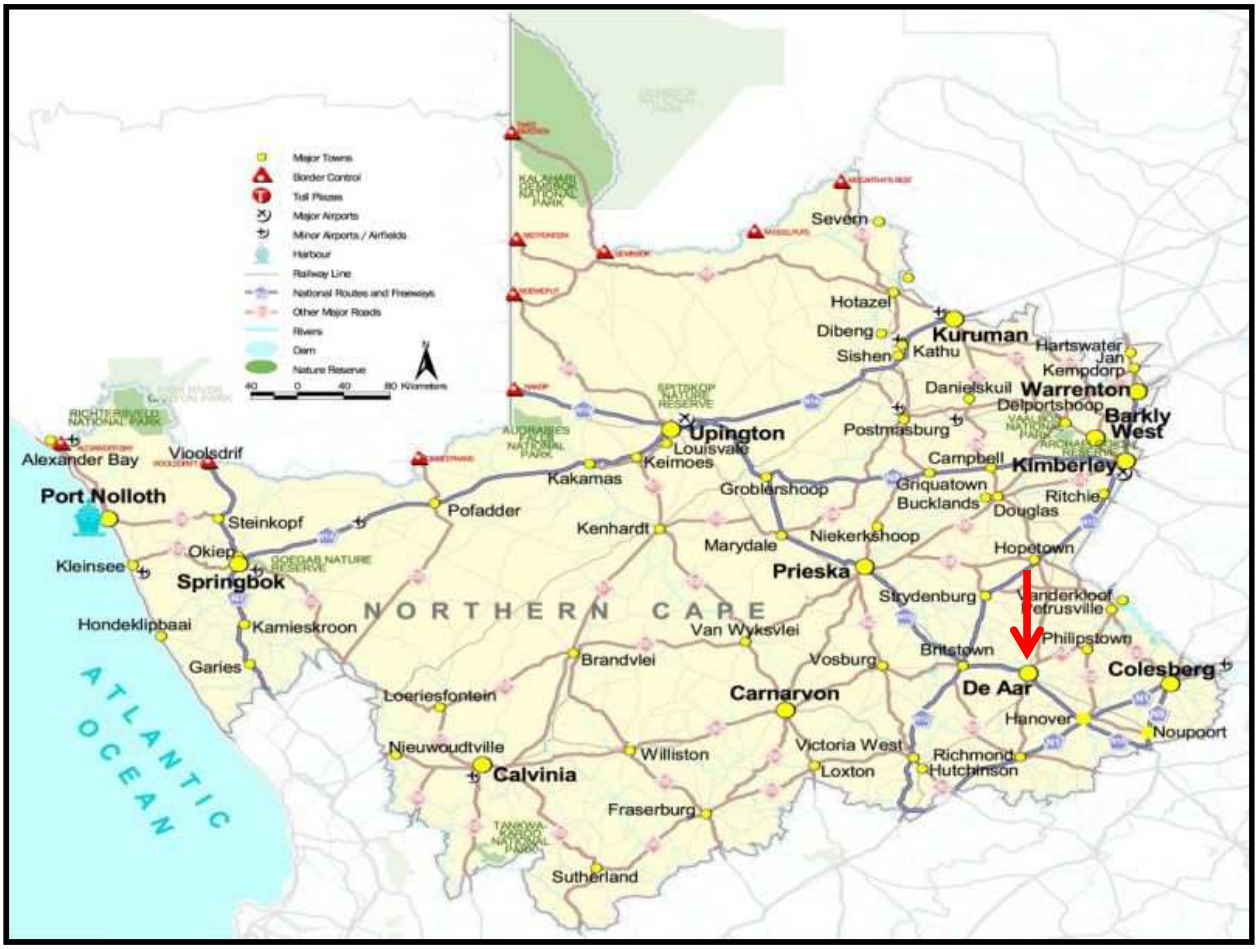


Figure 3: Locality map of De Aar indicating the major roads and railway lines linking De Aar with the rest of the country

4.2 BRIEF DESCRIPTION OF THE AFFECTED BIOPHYSICAL ENVIRONMENT

4.2.1 Climate

De Aar has a semi-arid to arid continental climate with a summer rainfall regime i.e. most of the rainfall is confined to summer and early autumn. Mean Annual Precipitation (MAP) is approximately 300mm per year, which is low considering that 500mm is considered the minimum amount of rain required for sustainable dry land farming. Therefore, without some form of supplementary irrigation, natural rainfall for the De Aar area is insufficient to produce sustainable harvests. This is reflected in the lack of dry land crop production within the study area. De Aar typically experiences hot days and cold nights with the highest maximum temperature of approximately 40˚C and the lowest minimum temperature of approximately -8˚C. The average rainfall and temperature are indicated in Figure 4. Evaporation is estimated to be in the region of 2,000mm per annum and thus the area is subjected to very severe moisture availability restrictions. In summary the climate for the study area is to severely restrictive to arable agriculture which is primarily due to the lack of rainfall and severe moisture availability restrictions (Aurecon, 2012).

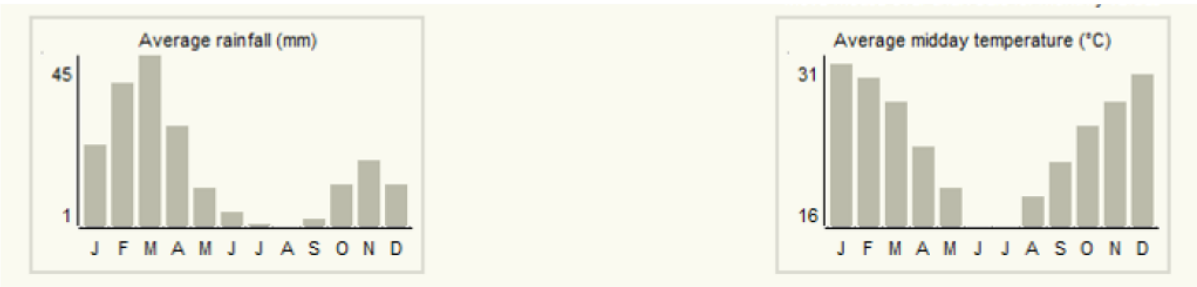


Figure 4: Average monthly rainfall for the area (Belcher, 2012)

4.2.2 Topography

The Northern Cape is characterised by wide open plains, sparse settlements and open spaces. The topography of the area is relatively flat, although a few ridge shaped hills and larger flatter plateaus do emerge as can be seen in Figure 5. The site for the proposed PV facility is located on the open plains.

Figure 5: Typical topography of De Aar

4.2.3 Flora

Many parts of South Africa contain high levels of biodiversity at species and ecosystem level. At any single site there may be large numbers of species or high ecological complexity. Sites also vary in their natural character and uniqueness and the level to which they have been previously disturbed. Assessing the potential impacts of a proposed development often requires evaluating the conservation value of a site relative to other natural areas and relative to the national importance of the site in terms of biodiversity conservation. Dr David Hoare of David Hoare Consulting cc undertook the ecological impact assessment for the previous EIA[14] and his description of the environment are included below.

[14] Hoare, D. 2012. Specialist ecological study on the potential impacts of the proposed De Aar PV2, PV3 and PV4 Solar Energy Facilities, near De Aar, Northern Cape.

The study area falls within the Nama-Karoo Biome and only one vegetation type occurs within the study site, namely Northern Upper Karoo. This vegetation type occurs in the northern parts of the Upper Karoo Plateau, with its southern extent ending near De Aar. It is a shrubland dominated by dwarf karoo shrubs, grasses and some low trees, including *Acacia mellifera* sub species *detinens*. There are five known endemics in this vegetation type. At a national scale only a small amount (approximately 4%) of this vegetation type has been transformed and none is conserved. It is therefore considered to be a *Least Threatened* vegetation type.

The vegetation on the farm is dominated by grasses, with a significant number of karoo shrubs of low stature amongst the grasses. Vegetation in the rocky areas on the ridges was more dominated by dwarf shrubs than on the lowlands. A view of the farm looking towards the west is shown in Figure 6. The lowlands tend to have relatively deep soils and are primarily grass-covered.

The vegetation on the farm is in moderate condition. Portions of the farm had been burnt during the 2010 winter. There were also areas on the lowlands that had been exposed to earth-moving activities, probably in order to manage potential erosion. There are patches in poor condition closer to the town of De Aar, where the vegetation was grazed short and was heavily affected by strewn rubbish and blown plastic bags. There are small numbers of alien species present on the farm, including *Opuntia ficus-indica* (sweet prickly pear), *Agave americana* (sisal) and *Echinopsis spechiana* (torch cactus).

There were no trees found on the farm nor were there any threatened, near threatened, declining or rare plant species that could occur on site.

Figure 6: View of the vegetation on the site (Hoare, 2012)

In addition to the typical Northern Upper Karoo vegetation, the base of the ridge along the western boundary of the site is also important habitats for birds. The riverine vegetation along the Brak River, flowing north of the town of De Aar approximately 20km from the site, also creates important bird habitats.

4.2.4 Fauna (including avifauna)

De Aar falls within the Platberg-Karoo Conservancy Important Bird Area[15] which covers the districts of De Aar, Philipstown, and Hanover in the south-eastern portion of the Northern Cape Province (BirdLife International, 2011).

4.2.4.1 Red listed and protected animal species of the study area

There is one mammal species of low conservation concern that could occur in available habitats in the study area, namely Geoffroy's Horseshoe Bat. This is a species classified nationally as near threatened (NT), but globally as Least Concern. This is a cave-dwelling species that emerges in the evening to catch flying insects. There are small rock crevices on the ridge adjacent to the site, but no caves were found on site or nearby. Based on the proposed distribution of infrastructure (flat areas) and the habitat preferences of this species (ridges), it was assessed as highly unlikely that this species would be affected by construction or operation of the proposed project. The species may forage over the site (low likelihood), but it will not roost there.

There are two small mammal species (Black-footed Cat and the Cape Fox) that could potentially occur on site that are protected under the NEM: BA and any impacts on a specimen of this species or that may negatively affect the survival of the species would require a permit. It was assessed that it was possible that these species may traverse the site while foraging, but that it was unlikely that they would occur there as permanent residents. This is primarily due to the close proximity of the site to the town of De Aar. The proximity of humans and domestic animals, such as dogs, are factors that would lead to these animals moving away.

The Giant Bullfrog is the only amphibian species with a distribution that includes the study area and which could occur on site. This species is classified nationally as Near Threatened, but globally as Least Concern. It is, however, protected under the NEM: BA. The Giant Bullfrog inhabits a variety of vegetation types where it breeds in seasonal, shallow, grassy pans in flat, open areas. It also utilises non-permanent vleis and shallow water on margins of waterholes and dams. It prefers sandy substrates although they sometimes inhabit clay soils. No individuals or favourable breeding habitats were found on site. Communication with a number of farmers in the area did not identify any local knowledge of the species occurring there. It was therefore assessed that there was a low probability of it occurring on site.

There are no reptile species of conservation concern that have a distribution that includes the study area.

[15] http://www.birdlife.org/datazone/sitefactsheet.php?id=7103

It is unlikely that threatened, near threatened or protected species of potential concern would occur on site (Aurecon, 2012).

4.2.5 Avifauna

The bird species within the study area comprises a rich Nama-Karoo assemblage which reflects the major habitat types within the De Aar region.

A total of 134 species have been recorded from the first and second South African Bird Atlas Projects within a 25km radius of the study area. Of the 134 species, nine are red-list species, 42 are endemics or near endemics and three are red-listed endemics (namely the Black Harrier, Ludwig's Bustard and Blue Crane). Of the red-listed endemics Ludwig's Bustard and Blue Crane are likely to breed within the greater development area of the proposed PVs.

Harebottle (2012) identified a total of 21 priority species which are likely to have the greatest potential relevance relative to these PV developments. These priority species are:

(a) foraging raptors notably Secretary bird (*Sagittarius serpentarius*) and Lesser Kestrel (*Falco naumanni*) and possibly Jackal Buzzard (*Buteo rufofuscus)* and Black Harrier (*Circus maurus*);

(b) large terrestrial birds including Blue Crane (*Anthropoides paradiseus*) and Northern Black Korhaan *Eupodotis afra*) and possibly Ludwig's Bustard (*Neotis ludwigii*);

(b) endemic and biome-restricted passerines that breed and/or forage in and around the development area, notably Rufous-eared Warbler (*Stenostira scita*) and most likely African Rock Pipit (*Anthus crenatus*)*;* and

(d) waterbirds moving between the wetlands (farm dams and pans) in and around the development sites, notably Greater Flamingo (*Phoenicopterus ruber*) and various duck species.

4.2.6 Surface and groundwater resources

The study area falls within the arid region of South Africa and within the Lower Orange Water Management Area, which is managed by the DWA. The Lower Orange Water Management Area has very little useable surface runoff due to the low rainfall in the area.

De Aar's requirement for water is entirely met from groundwater resources (Emthanjeni Local Municipality, 2009). Not only is groundwater extremely crucial in this area, but it also constitutes the main source of water for many towns within the Lower Orange River Water Management Area. The recharge is limited by the low rainfall which is why the abstraction thereof must be regulated to ensure sustainability of the resource (Orange-Senqu River Awareness Kit, 2011). Two perennial rivers are located near De Aar, as shown in Figure 13, with the Elandsfontein running west of De Aar and the Brak Rivier passing De Aar to the north (Orange-Senqu River Awareness Kit, 2011).

Badenhorst Dam farm falls within the catchment of the Brak River, which is a seasonal tributary of the Orange River system. The river slows along the northern boundary of the study area with a number of small ephemeral tributaries and associated wetland areas. The most notable of the tributaries is the Sandsloot River, which flows through the town of De Aar.

The Brak River has been identified as having conservation status[16]. The other tributaries are smaller, ephemeral streams and only discernible as slightly shallow depressions with no clear associated vegetation and slightly clayey soils. Small shallow instream dams have been constructed within some of these drainage channels.

The Brak River (Figure 7) has a predominately sandy/silty substrate and drains shrubland vegetation in an area with a very low rainfall. As a result the river water is saline and turbid and seasonally flowing. The river is wide (more than 10m) with incised banks. Vegetation covers the spanned width of the channel comprising predominantly of common reed (*Phragmites australis*). The land adjacent to the Brak River consisted mainly of shrub species. A distinct riparian zone was not discernible. The results from the Index of Habitat Integrity (IHI) assessment, indicate that the instream habitat of the Brak River is still largely natural to moderately modified (B/C category) while the riparian habitat is more impacted as a result of surrounding farming activities (C/D category).

The Sandsloot River (Figure 8) has a largely natural habitat with minimal habitat disturbance, which can be attributed to activities in the urban areas upstream. Within the middle reach of the Sandsloot River, a flat area dominated by indigenous and alien trees, as well as some shrubs and sedges, was identified as a valley bottom wetland with and without a channel. This wetland would primarily be fed from groundwater. The IHI assessment for the Sandsloot River indicated that both the riparian and instream habitat integrity are considered to be moderately modified (C category) mostly as a result of the upstream activities in De Aar. In terms of the wetland habitat integrity assessment, the wetlands associated with the Sandsloot River were determined to be largely natural (A/B category).

The ephemeral streams crossing Badenhorst Dam farm are moderately modified as shown in Figure 9, with the modification occurring as a result of the surrounding farming activities (livestock grazing). The assessment indicated that both the riparian and instream habitat integrity are considered to be moderately modified (B/C category).

[16] Freshwater Ecosystem Protected Areas (FEPA) map.

Figure 7: The Brak River located approximately 20km from Badenhorst Dam (Belcher, 2012)

Figure 8: The Sandsloot tributary in De Aar (Belcher, 2012)

Figure 9: The ephemeral stream at Badenhorst Dam Farm – the area was recently burnt so there is little vegetation cover (Belcher, 2012)

4.2.7 Geology and soils

The majority of the site underlain by shale, which is a clastic sedimentary rock formed by the settling and accumulation of clay rich minerals and other sediments (see Figure 10). Due to the settling process this parent material usually takes the form of parallel rock layers which lithifies over time. The southern tip of the site is underlain by mudstone, which like shale, is a clastic sedimentary rock that is formed from the lithification of deposited mud and clay. Mudstone consists of a very fine grain size of less than 0.005mm but unlike shale it is mostly devoid of bedding (Aurecon, 2012).

The soils identified on the site are predominantly shallow and rocky with a low agricultural potential. Rocky soils (Mispah and Glenrosa Forms) cover 53% of the surveyed area while shallow duplex soils cover 44%. Most soils contained a layer that was limiting to plant growth and these layers included rock, saprolite and strongly structured cutanic horizons.

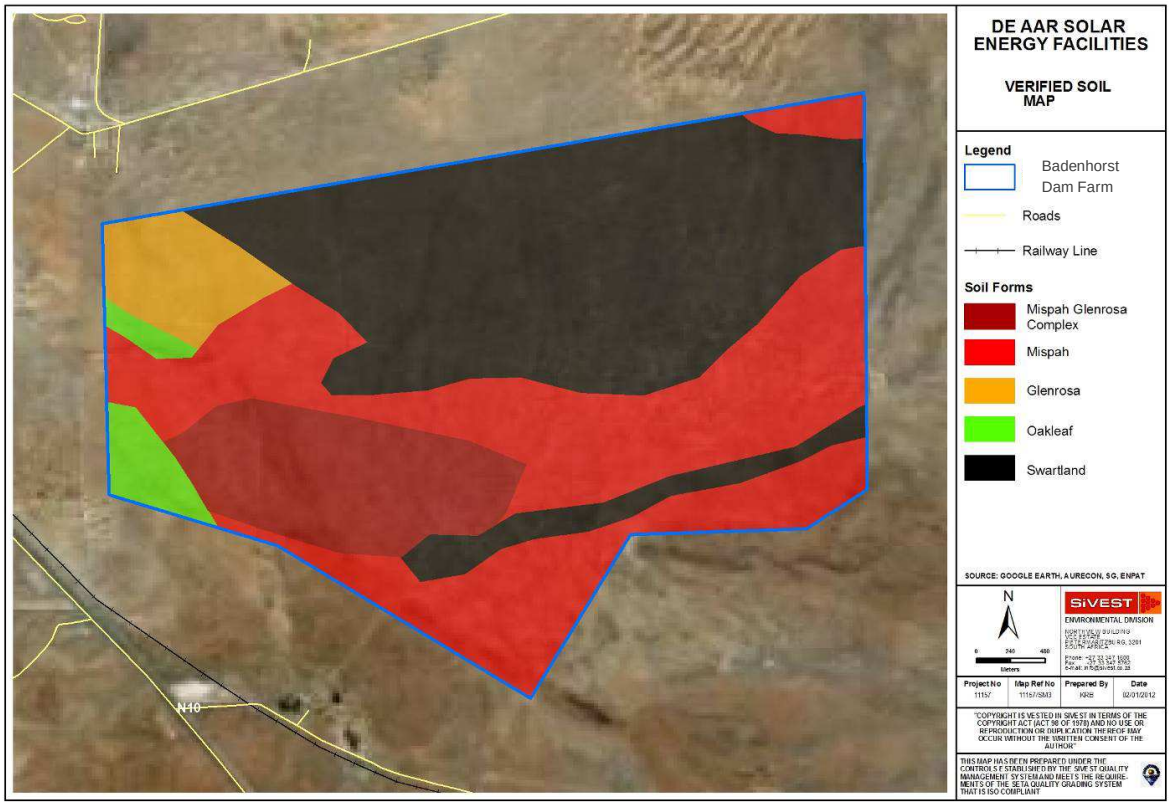


Figure 10: Verified soil map (SiVEST, 2012)

As mapped on the 1: 250 000 Colesberg geology sheet in Figure 10, the northern half of the farm area is largely underlain by dark basinal mudrocks of the Tierberg Formation (Pt) mantled with a thin cover of brown soils, alluvial and sheet wash gravels that appear greyish in satellite images.

The southern portion of the study is underlain by fluvial Lower Beaufort Group sediments of the Adelaide Subgroup (Pa) as shown in Figure 11. The latter in particular are extensively intruded by Early Jurassic dolerite sills and a narrow, sinuous dolerite dyke extends south-east to north-west across the study area towards De Aar. These intrusions weather out at surface as low rocky ridges and *koppies* that show up in rusty-brown colours in satellite images. They have baked (thermally metamorphosed) the adjacent Karoo Supergroup mudrocks to hornfels, and

any sandstones to quartzites. Dolerite colluvial rubble extends well beyond the intrusions themselves to blanket adjacent slopes and *vlaktes*.

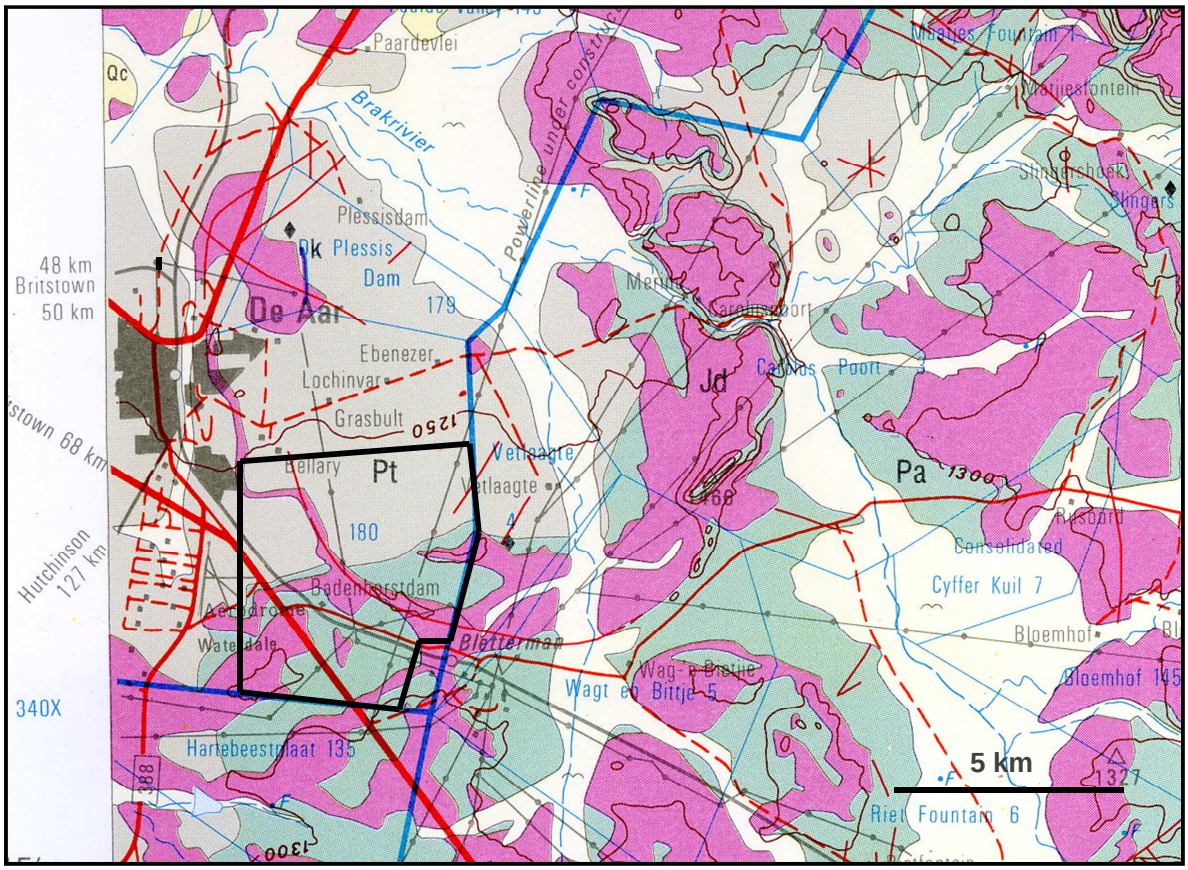


Figure 11: Geological map of the region east of De Aar, Northern Cape, showing approximate boundaries of the three solar energy facility study areas (Natura, 2012)

The following rock units are mapped within or close to the PV study areas:

- grey (Pt) = Tierberg Formation (Ecca Group) (*NB* According to the Specialist these sediments should rather be assigned to the Waterford Formation following recent fieldwork in the study area)
- pale green (Pa) = Adelaide Subgroup (Lower Beaufort Group)
- pink (Jd) = intrusive dykes and sills of the Karoo Dolerite Suite
- dark yellow (T-Qc) = Neogene to Quaternary calcretes
- white = Quaternary to Recent superficial deposits (alluvium, colluvium *etc*)
- small black diamond symbol = Kimberlite pipe (PV4 study area)

4.2.8 Agricultural potential

The agricultural potential of a site is classified based on climate, geology, land use, slope and soil characteristics.

The Badenhorst Dam farm is characterised by soils which are not suitable for arable agriculture, but remain suitable to grazing. Figure 12 indicates the agricultural potential of Badenhorst Dam farm. The southern tip of the site is associated with soils which are characterised by having a poor agricultural potential (where climate permits). However, when climate is considered (low rainfall and moisture / heat stress) the agricultural potential of the site is further reduced.

By taking all the site characteristics (climate, geology, land use, slope and soils) into account the agricultural potential for the site is classified as being extremely low for crop production while moderate to moderately low for grazing. This poor agricultural potential rating is primarily due to restrictive climatic characteristics and soil depth limitations.

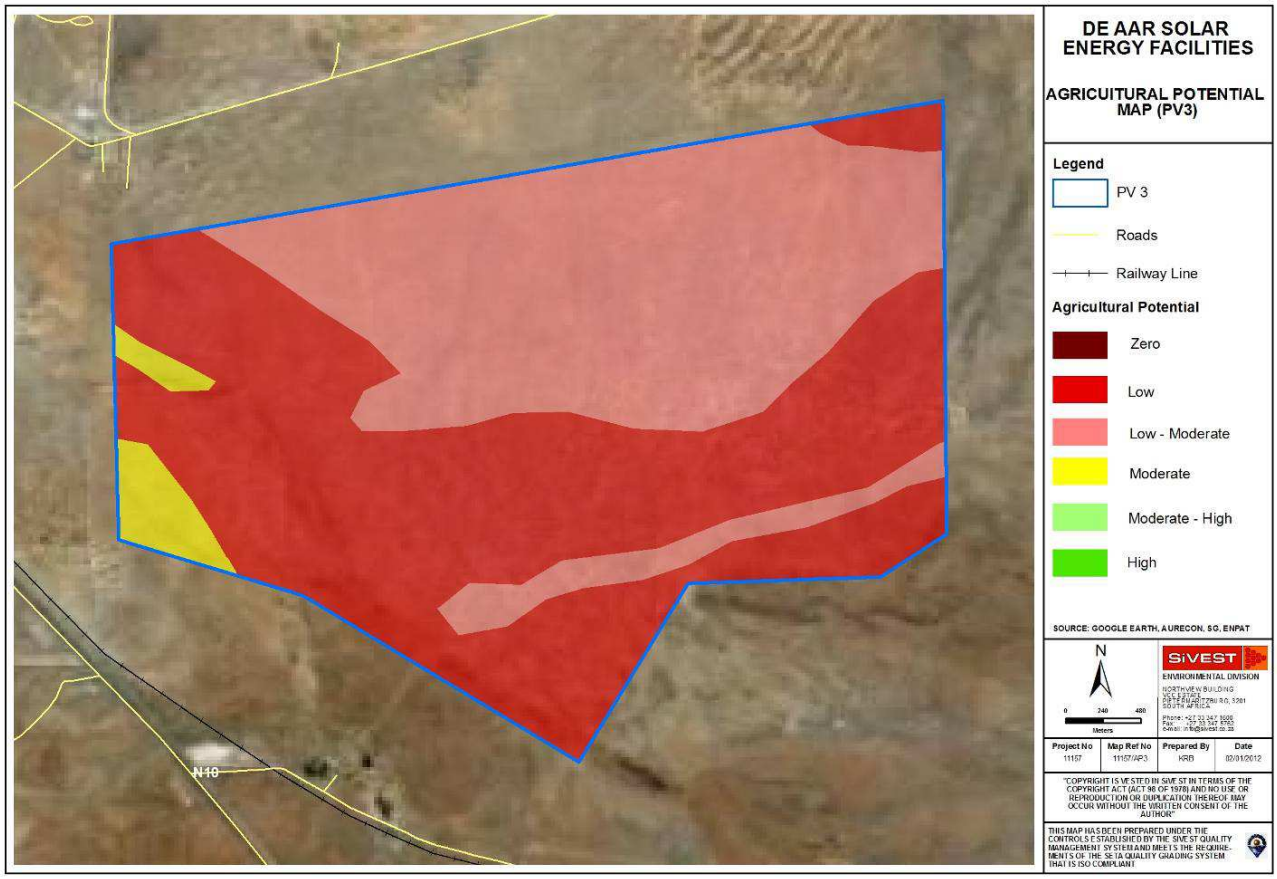


Figure 12: Agricultural Potential Map for Badenhorst Dam Farm

Water is the major limiting factor to local agricultural enterprises and the site does not contain nor does it border a perennial river / freshwater impoundment which could be used as a source of irrigation water. It was noted that urban expansion and the increasing rate of stock theft are increasing pressure on the productivity and sustainability of the farm.

4.2.9 Heritage and cultural material

Based on the history of De Aar, it is possible that heritage and cultural material relating to the Angle Boer War, *trekboere,* or farming heritage could be found on the proposed sites.

De Aar farm falls within the Karoo, which has a long pre-colonial history as testified by the many thousands of stone artefacts that can be found among surface gravels in many areas. The vast majority of these artefacts are heavily weathered indicating great antiquity and relate to the Early (ESA) and Middle Stone Ages (MSA). However, of more significance, due to their better integrity, are the Later Stone Age (LSA) sites that occur from time to time. The stone artefacts from such sites are generally unweathered or else very slightly weathered and do not occur as widespread background scatters, but are more concentrated indicating places where people actually camped. Probably the most significant aspect of Karoo archaeology is the presence of

many prehistoric stone kraals. The kraals are typically constructed on sloping ground against dolerite ridges and overlooking water sources.

While the town of De Aar only dates back to 1903, just after the cessation of the 1899-1902 Anglo-Boer War, farms were given out and surveyed in the 1800s. The railway junction dates to 1881 when Cape Town and Kimberley were linked by rail after diamonds were discovered at the latter town. It was very important to the British during the Anglo-Boer War since railway lines from Cape Town and Port Elizabeth joined here and extended on through Kimberly to Mafikeng. De Aar was also the site of the first use of wireless telegraphy in South Africa where the British employed it to maintain communications between their various columns operating in the area. However, owing to the climatic conditions in the Karoo, the wireless sets, which were designed for shipboard use, could not perform properly and were soon withdrawn from inland service. The town was laid out around the railway junction on the farm De Aar which was purchased in 1889. Two Provincial Heritage Sites occur in De Aar. These are the “Olive Schreiner house” and the “St Paul’s Church” (Aurecon, 2012).

4.2.10 Environmentally sensitive areas

Environmentally sensitive areas were identified during the EIA for PV1 on Badenhorst Dam farm (Aurecon, 2012). These onsite features include aquatic systems and sensitive heritage sites and are included in Figure 13 below.

4.2.11 Suitability of the site for solar energy technology

The Northern Cape is currently promoting the establishment of renewable energy infrastructure within its boundaries and the proposal promotes national government’s Renewable Energy Strategies and policies.

The physical characteristics of the receiving environment represent a typical flat Karoo landscape with no prominent features to define the site’s location. An important aspect which influences the choice in sites is the relative high levels of solar radiation, low levels of cloud cover and a moderate altitude, which makes the region particularly suitable for solar power generation.

Renewable energy that is produced from sustainable natural sources will contribute to sustainable development not only in the Northern Cape, but throughout South Africa. The proposed facilities will contribute greatly to the pool of renewable energy projects to be implemented. The Northern Cape has some of the highest renewable energy resource levels in the world, making it highly suitable for solar power generation. The site has relative good road access and the development will therefore be utilising existing road infrastructure. Furthermore, it is highly accessible to the national grid with an electrical substation in close proximity. The facility will provide on-going jobs to the people of De Aar.

It should therefore be concluded that the proposed project complies with all the national, provincial, regional and local objectives and that it also complies with the legal criteria.

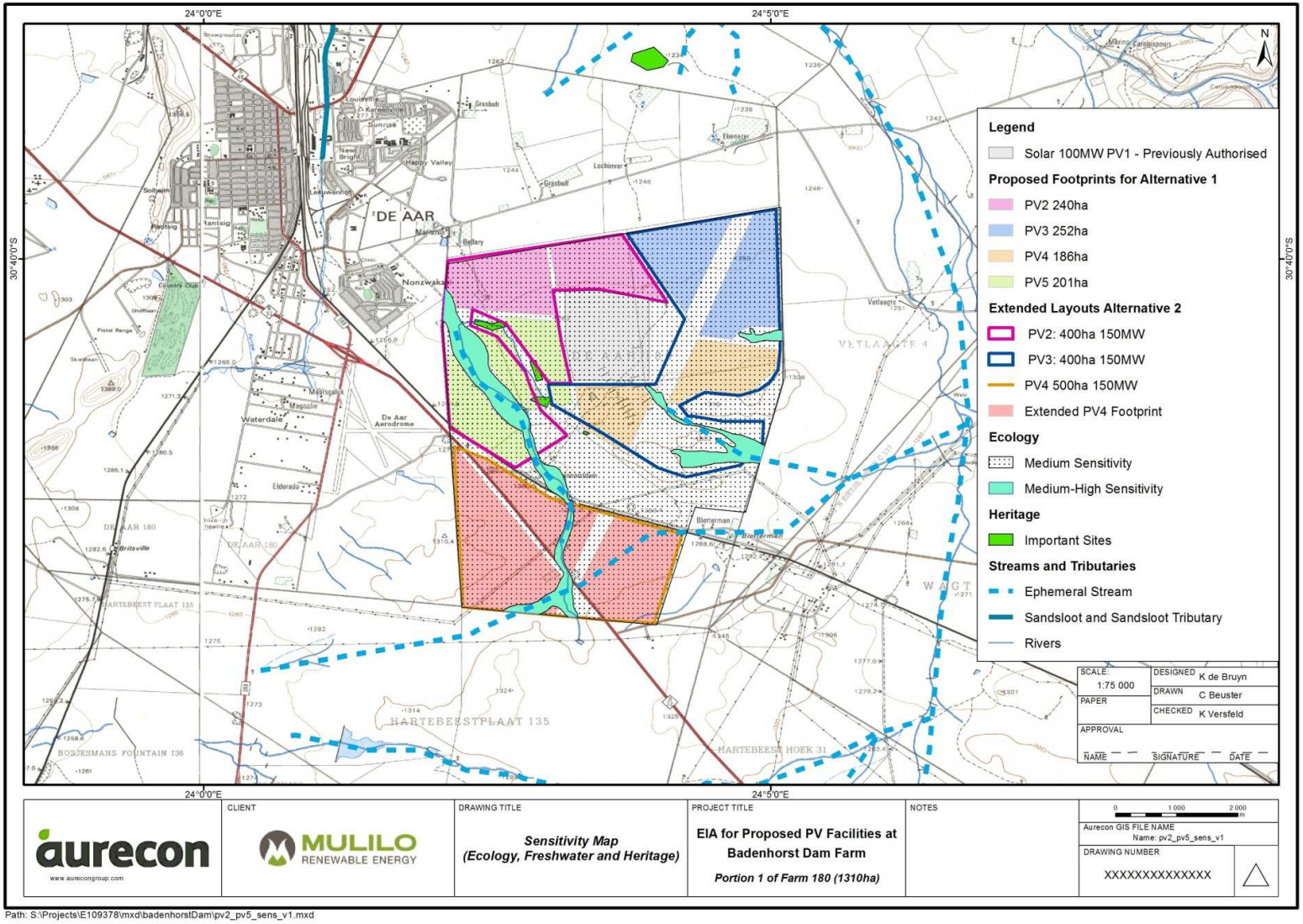


Figure 13: Environmentally sensitive areas of Badenhorst Dam

4.3 BRIEF DESCRIPTION OF THE SOCIO-ECONOMIC ENVIRONMENT

The site is located in a rural area and as such the population density is very low, with neighbouring farms located great distances from each other. Employment opportunities in the immediate area predominately stem from farming. The De Aar area has large areas of land which are very dry and the farmers struggle to earn a living from the land.

De Aar falls within the jurisdiction of the Pixley ka Seme District Municipality and the Emthanjeni Local Municipality. De Aar is a rural area with very low population density. The Emthanjeni Local Municipality had a total population of 38,612 in 2010 and a negative average annual population growth rate of -0.7% (1996-2008) (Urban-Econ, 2010 in DJ Environmental Consultants, 2010). Although the unemployment rate is 26%, the not economically active population amounts to 46.9%. The skills levels in the municipality is generally low (32% of labour force are unskilled workers) as is the annual household income (79.8% of households earn low-income annual salaries). The four main languages spoken in the Northern Cape is Afrikaans, English, IsiXhosa and Tswana.

According to a Socio-economic Impact Assessment (Urban-Econ, 2010 in DJEC, 2010), the local area has a diverse economy, while the main sectors contributing to the Gross Geographic Product (GGP) in 2008 included the financial and business services sector (21.6%), the general government sector (21.1%) and the trade sector (15.5%). The general government sector employs more than 24% of the share of total labour, while the agricultural sector employs 21.5% of the labour and a total of 19% of the labour is employed in the trade sector.

De Aar has the largest abattoir in the southern hemisphere which supplies all the major centres throughout the country with the famous "Karoo" lamb and mutton. Sheep farms around De Aar are also major suppliers of wool (Emthanjeni Local Municipality, 2009).

De Aar is a declared industrial growth point and is trying to position itself as an attractive location for industry in the Northern Cape[17]. Industrial sites are reasonably priced and De Aar is centrally located with excellent rail and road links. De Aar is the second most important railway junction in the country as its central to Gauteng, Cape Town, Port Elizabeth and Namibia (Macroplan, 2007).

4.3.1 Surrounding land uses

The surrounding land use is dominated by agricultural activities, consisting mostly of sheep and cattle grazing. The project site is currently also used for agriculture (grazing). The informal settlement of Nonzwakazi is located approximately 340m, to the north-west, from the farm boundary.

It should be noted that there are a number of environmental applications for renewable energy generation projects are being undertaken within the De Aar area. The surrounding landuse and landscape of De Aar will potentially change in the future if these projects come to fruition.

[17] http://www.deaar.co.za/, accessed 29/10/2011

5 DESCRIPTION OF THE PROPOSED PROJECT

The purpose of this section is to provide a technical description of the activities associated with the proposed PV facilities. A motivation follows the introduction to the proposed project, after which the feasible project alternatives are described. This section furthermore provides information relating to the potential impacts on the social and biophysical environment associated with all the phases of the proposed project that were identified, in consultation with authorities, I&APs and specialists.

5.1 PROPOSED PROJECT

Mulilo proposes to construct four PV facilities, each with a generation capacity of 75MW AC on Badenhorst Dam farm (Portion 1 of farm 180), near De Aar (see

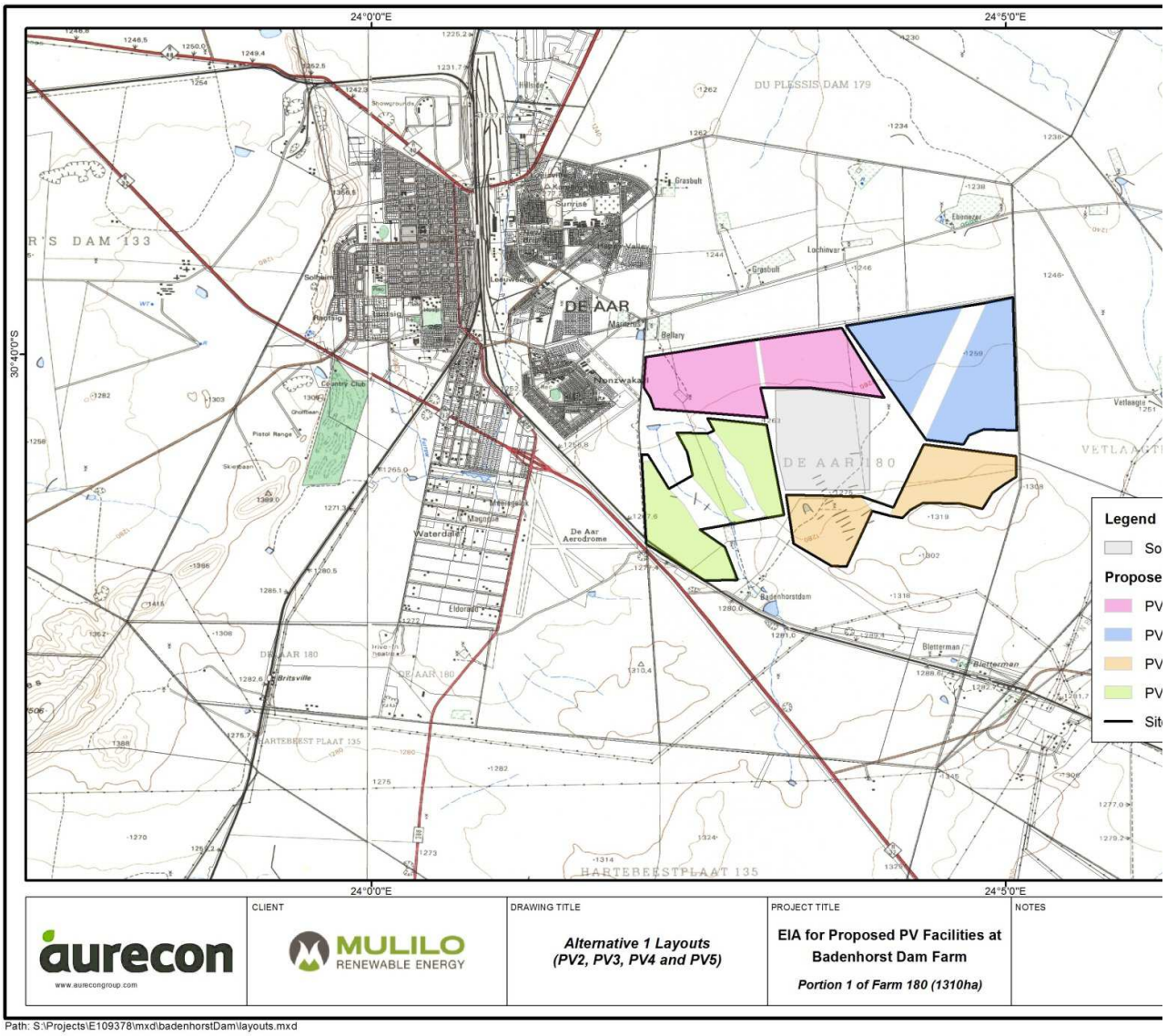


Figure 14). The total extent of the four proposed facilities would be approximately 879ha as set out in Table 10 below.

The proposed layouts have taken cognisance of the environmental sensitive areas identified during the previous EIA undertaken for PV1 (Aurecon, 2012).

Table 10: Footprints, capacities and coordinates of the four proposed facilities

Facility	Footprint	Capacity	Coordinates of middle point
PV2	240ha	75MW	30°40'11.54"S; 24° 2'56.25"E
PV3	252ha	75MW	30°40'10.16"S; 24° 4'37.07"E

PV4	186ha	75MW	30°41'14.00"S; 24° 4'8.53"E
PV5	201ha	75MW	30°41'3.40"S; 24° 2'40.53"E

Each of the proposed PV facilities would consist of the following:

- **Solar energy facility:** A photovoltaic component comprising of numerous arrays of PV panels and associated support infrastructure to generate up to 75MW per facility, through the photovoltaic effect.
- **Transmission lines:** 132kV overhead transmission lines to connect each facility to the central onsite substation or an existing Eskom substation.
- **Facility substations:** An onsite 132kV, 3 bay substation.
- **Boundary fence:** Each 75MW facility will be fenced for health, safety and security reasons.

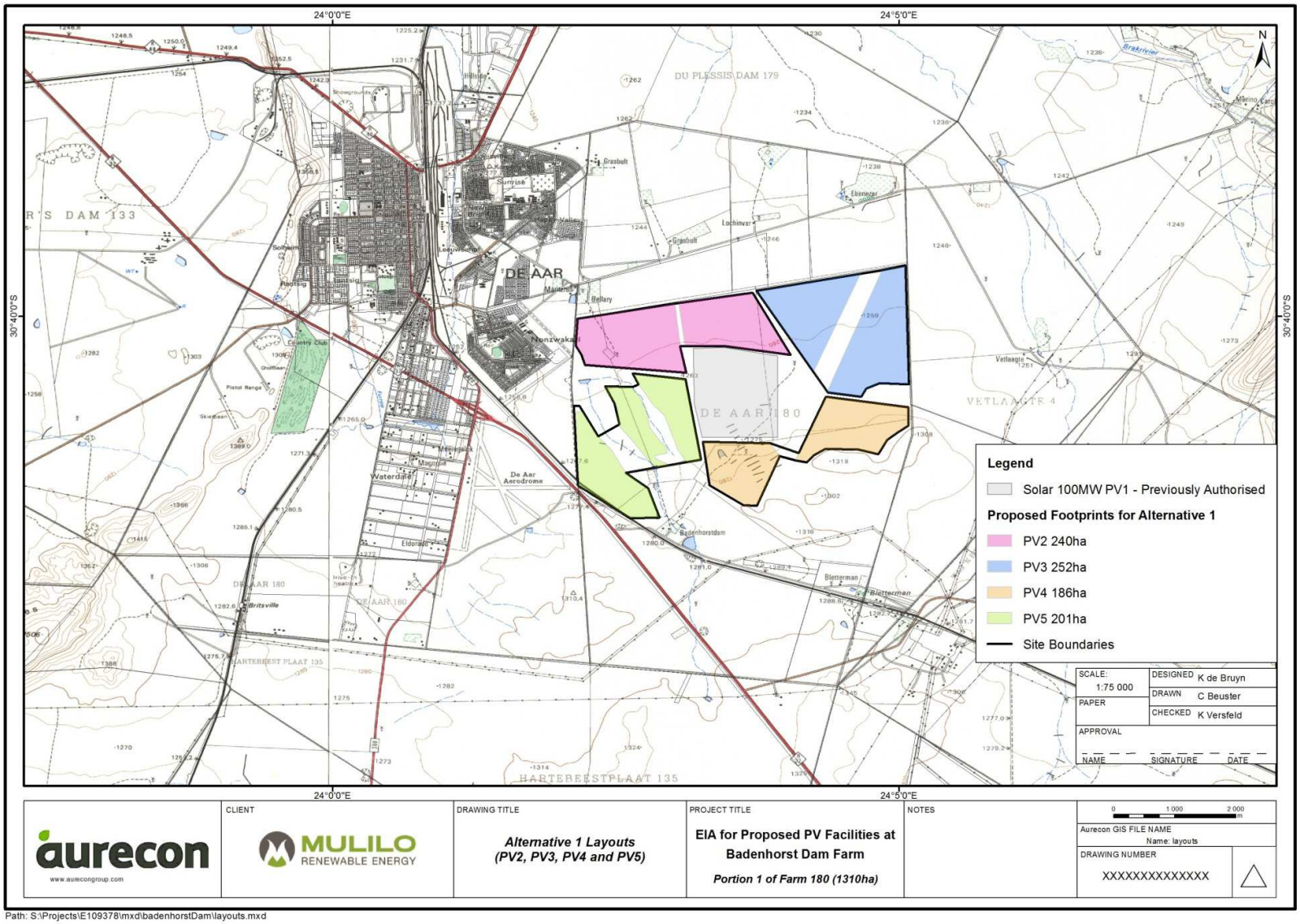


Figure 14: Proposed PV layouts (PV2 to PV5)

It is proposed that the following infrastructure be shared between the four facilities to lessen the impact on the surrounding environment:

- **Central substation:** One central 132kV substation and connection to Eskom grid. This central substation will connect the PV facilities with Eskom's Hydra substation via either an existing overhead 132kV Eskom line or by constructing a new 132kV transmission line directly to Hydra substation.
- **Roads:** Access road and internal access roads for servicing and maintenance of the site.
- **Water supply infrastructure:** It is proposed that potable water will be obtained from the Emthanjeni Municipality. Water will be transferred to the site via the municipal pipeline from the nearest municipal supply point and will be contained onsite in a jo-jo tank. However, the Municipality would need to confirm availability of capacity to do so.
- **Stormwater infrastructure:** Including drainage channels, berms, detention areas and kinetic energy dissipaters.
- **Buildings:** Buildings would likely include onsite substations, a connection building, control building, guard cabin, an electrical substation and solar resource measuring substation.

Each of the project components are described in further detail below.

5.1.1 Single axis tracking PV technology

Photovoltaic solar energy facilities use light energy from the sun to generate electricity through a process known as the PV effect. The PV cells absorb light energy which energises the electrons to produce electricity. Figure 15 depicts a typical PV facility in a landscape similar to De Aar.

Figure 15: Example of a PV facility in a landscape similar to De Aar (image courtesy of Mulilo)

The proposed PV panels are approximately 2m wide and 1m long. These panels are arranged into modules that are durable and can last up to 25 years due to the sturdiness of the structure and few

moving parts. The PV modules (which will include a number of PV panels) will be physically mounted to a galvanized steel rotation tube, single axis tracking system to ensure ground connection from the module frames to the structure. The PV modules, fixed to the tracking system, are arranged into tracker blocks as indicated in Figure 16. These tracker blocks will be uniformly aligned to facilitate efficient sun-tracking.The dimensions of a tracker block range between 88m and 113m in an east to west direction and 35m to 38m in a north-south direction (Mulilo, 2013).

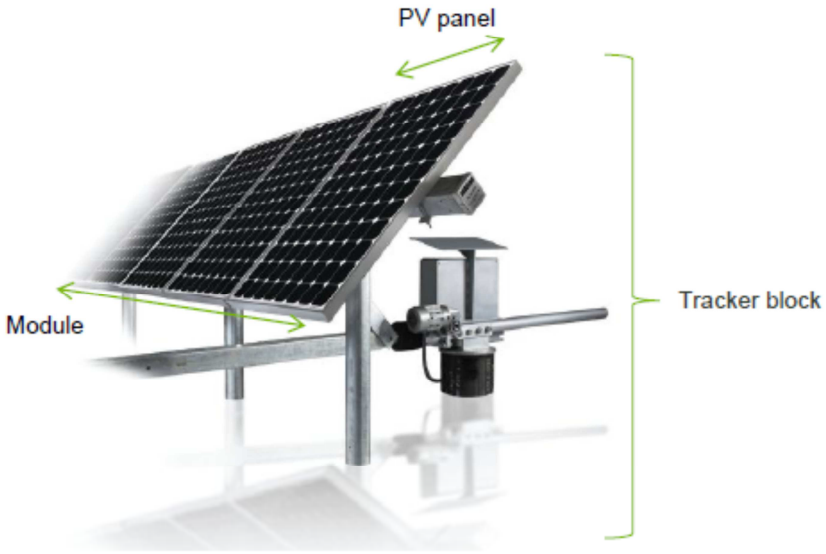


Figure 16: Single axis tracking system (image courtesy of Mulilo)

The supports of the frame will be fixed on top of the steel piles. Since there is existence of rock (dolerite and siltstone) at shallow depths, the steel piles would be embedded into a concrete pile. However, the final design of the foundations will depend on the geotechnical conditions of the site which will be determined at a later stage.

5.1.2 Transmission lines and substations

It is envisaged that each PV facility would require an onsite substation specific to each PV facility i.e. four onsite substations. These substations would feed into one central onsite substation by means of onsite overhead 132kV transmission lines.

Based on the uncertainties regarding the capacity of Eskom's substations and transmission lines, it is proposed to assess a transmission line corridor instead of assessing the preliminary layouts subject to numerous changes. The width of the proposed transmission corridor ranges from 150m to

350m. As indicated in

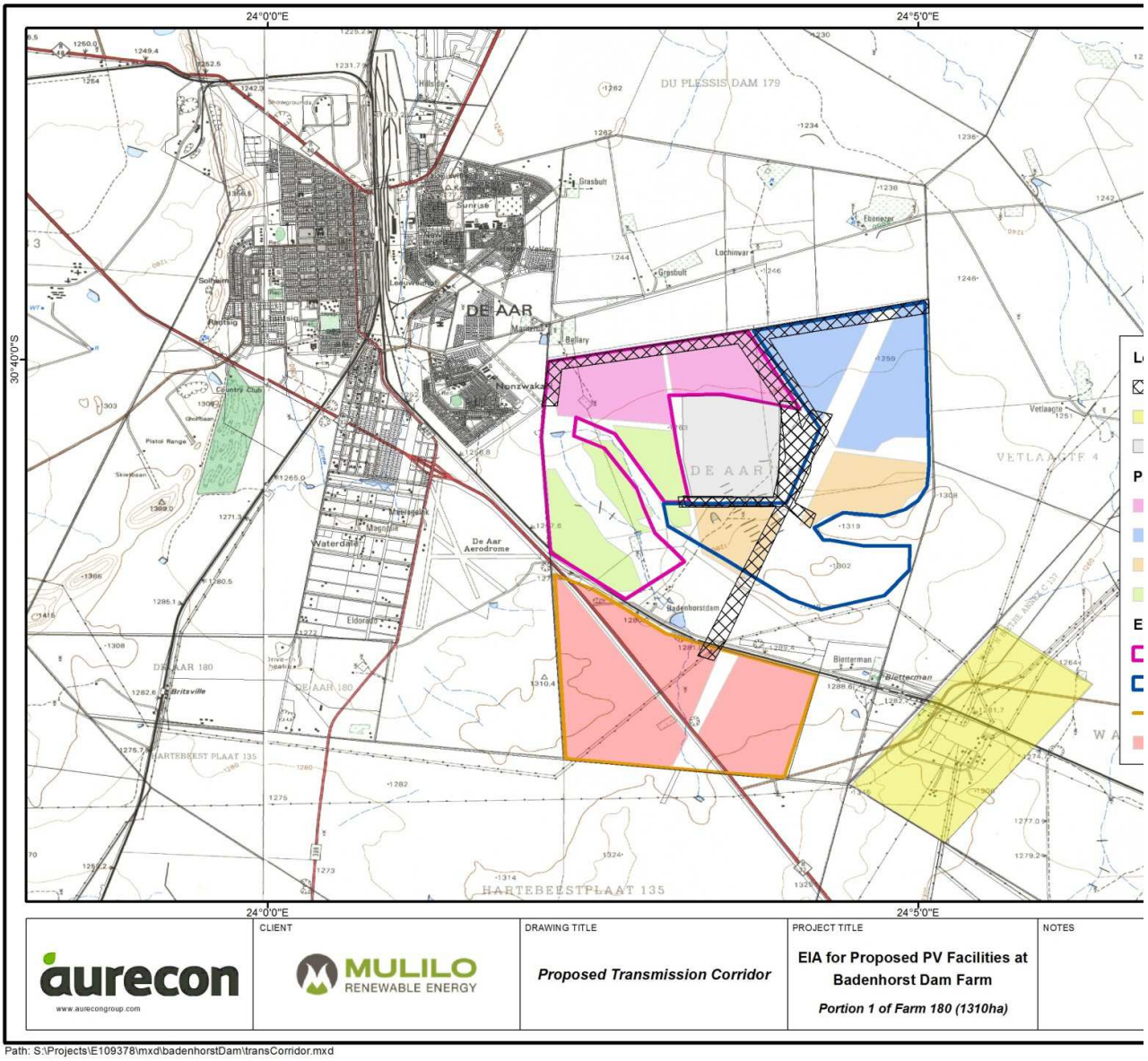


Figure 17 below, the transmission corridor forms a T- junction by following the northern boundary of the farm, from west to east, for approximately 5km. The transmission corridor extends to the southern border of the farm for approximately 5km to where it will link up to Eskom infrastructure. It is proposed that the specialists assess the proposed transmission corridor as it will cover the footprint of all of the proposed transmission lines and substations.

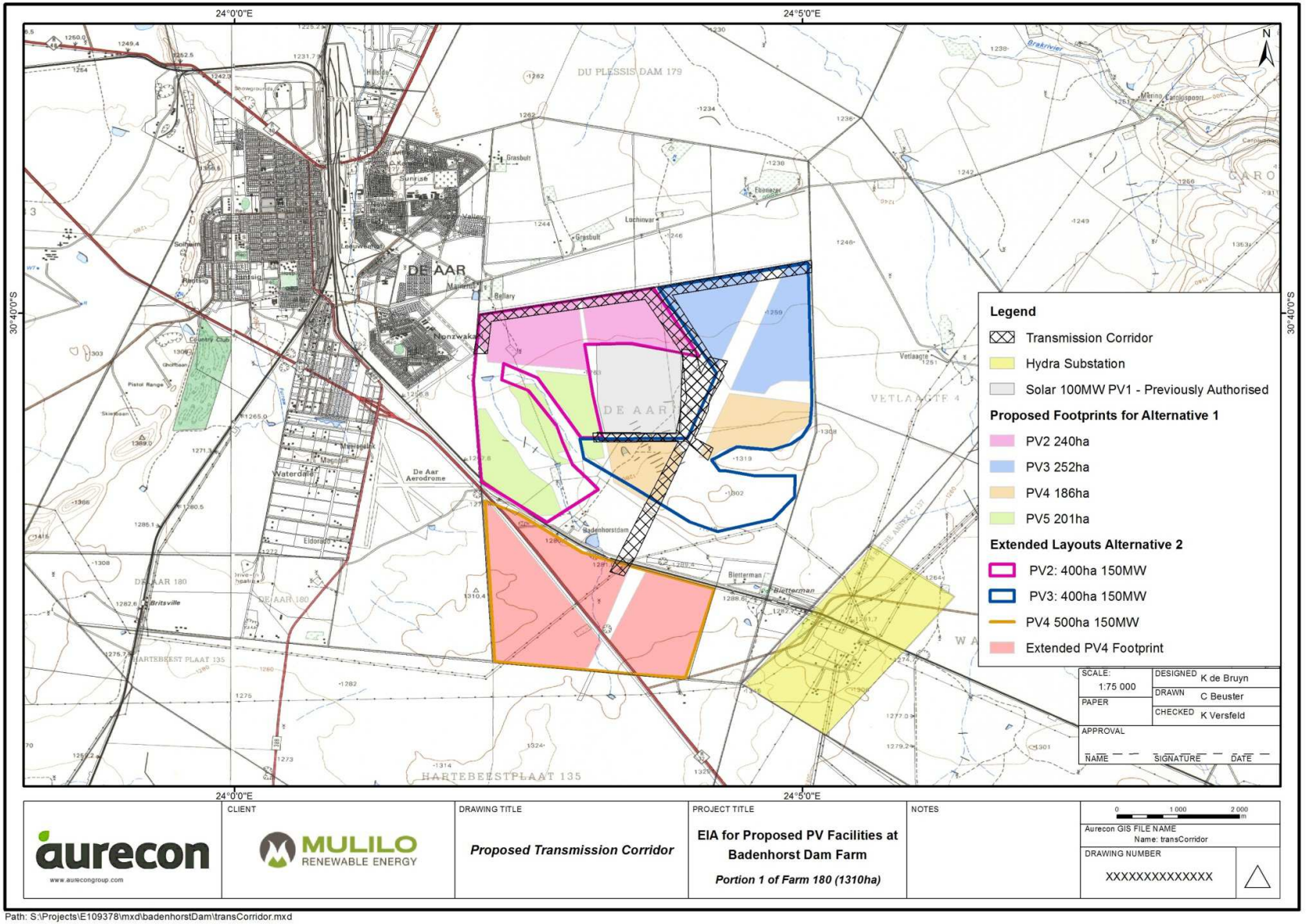


Figure 17: Proposed transmission infrastructure corridor

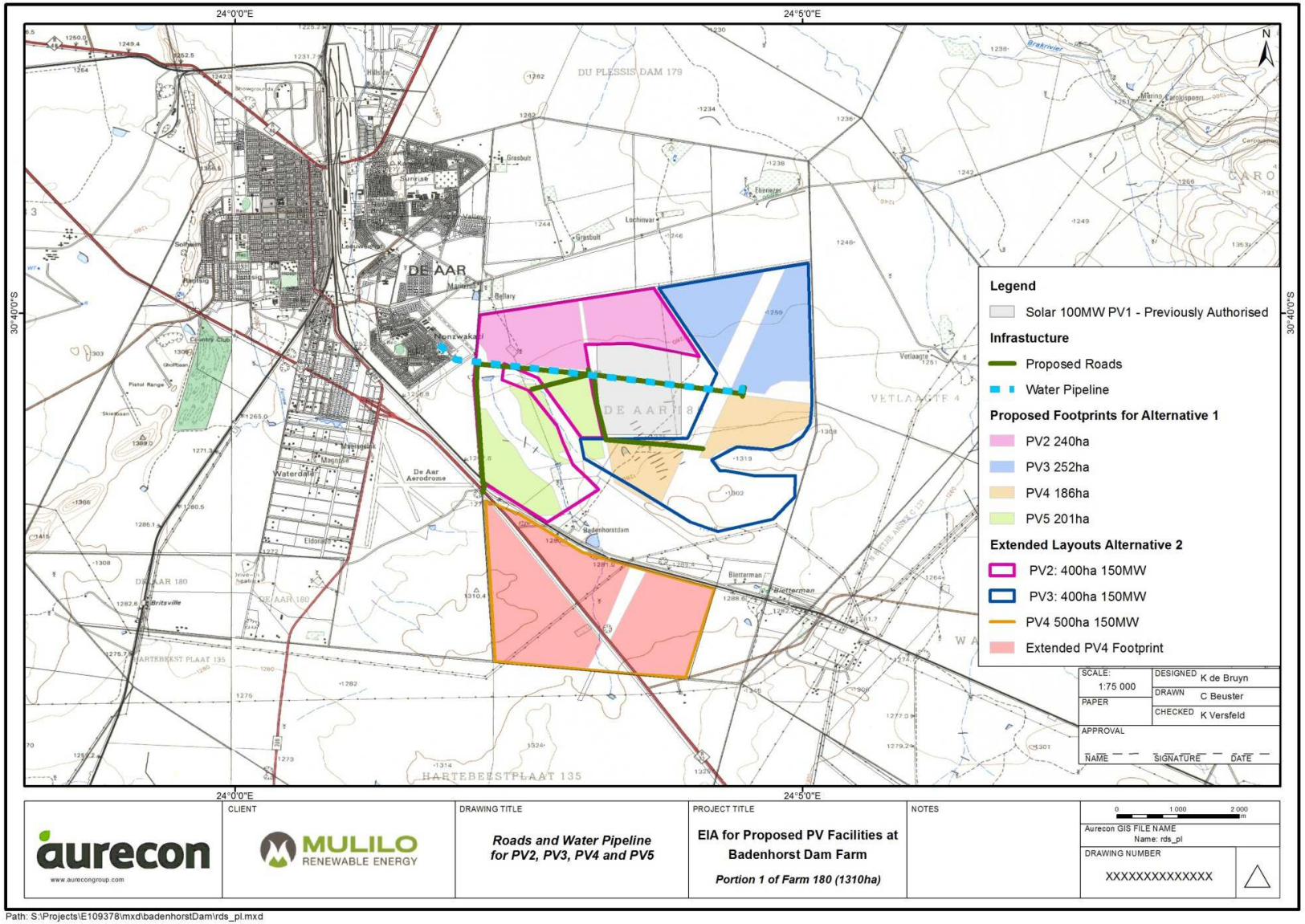


Figure 18: Proposed water pipeline and access road

5.1.3 Additional infrastructures (road, buildings, stormwater, water pipeline)

A main access road (6m in width and 5.87km long) would be constructed to access the PV facilities from the N10.

Internal access gravel roads from the main access roads to the four PV facilities would be required. The lengths of the proposed roads vary as indicated in Table 11. Where it was possible, the layout of these roads coincide with the existing dirt tracks. The proposed access and internal roads are shown in Figure 18.

Table 11: Lengths of access roads

Access roads	Length
Main access road	5.87km
PV2 internal access road	0.1km
PV3 internal access road	0.14km
PV4 internal access road	2.44km
PV5 internal access road	0.82km

The natural water flow of the site will be interrupted by the execution of planned roads, and therefore new stormwater drainage channels will be designed to facilitate natural water flow. The stormwater drainage channels will guide water flow to one of several discharge points which are where rip-rap areas will slow down the velocity of water and disperse the flow to avoid any possible erosion issue in that discharge point.

It is proposed that potable water be obtained from the Emthanjeni Municipality via a proposed underground pipeline (4.61km in length) from the nearest municipal supply point and will be contained onsite in a jo-jo tank. The Municipality still needs to confirm available capacity to facilitate this water requirement. The proposed water pipeline is depicted in Figure 18.

5.1.4 Construction phase

The construction phase of each 75MW facility would last approximately 12 to 24 months. Facilities on the same farm will be constructed consecutively depending on whether the projects are approved by the DoE and DEA.

Employment opportunities created by the construction phase equates to approximately 2,800 man months. These employment opportunities can be divided into the following employment categories:

- 80% will be created for South African citizens.
- 50% will be for black citizens.
- 15% will be skilled employees.
- 8% will be black skilled employees.
- 20% of the jobs created will be from the local community.

Accommodation will be provided for the non-local construction work-force, either in in temporary dwellings on site or in accommodation within De Aar. More detail will be provided on the accommodation of staff in the EIA phase.

Approximately 1,400kL of water will be required per facility during the duration of the construction phase.

Three laydown areas have been identified as indicated in Figure 19. Septic tanks are to be constructed at offices and serviced by the municipality on a monthly basis.

Construction vehicles are likely to make use of the existing roads, including the N10, to transport equipment and material to the construction site. Approximately 450 truckloads transporting in total 900 40-foot containers would be required during the construction period. These deliveries would be distributed over the 12 to 30 month construction period.

The existing vegetable soil (topsoil) in the area dedicated shall maintain (as much as possible) its original appearance. Topsoil shall be kept, temporarily stored on site and finally distributed over the surface of the site.

During the construction phase, different types of control measures shall be used to limit soil migration through the site. These will be described in the Environmental Management Plan (to be included in the EIA phase). The disturbed areas will be rehabilitated to as a natural vegetative state as possible.

5.1.5 Operational phase

It is anticipated that the PV facilities will last approximately 20 years. The remainder of the farm will continue to be used as grazing fields.

Employment opportunities to be created during the operational phase equates to approximately 35 man months per annum. These employment opportunities can once again be divided into the following employment categories:

- 80% will be created for South African citizens
- 50% will be for black citizens
- 45% will be skilled employees
- 14% will be black skilled employees
- 54% of the jobs created will be from the local community

Approximately 500litres of fuel and 50ℓ of lubrication oil would be stored on site. This volume falls well below the triggers as listed activity in terms of NEMA. However, the necessary precaution measures will be in place and will be included in the Life-cycle Environmental Management Plan.

To ensure that maximum quantities of sunrays can be captured by the PV panels it is important to undertake regular cleaning. Dust, dirt, pollen, and bird excretions can reduce the efficiency of PV panels. The frequency of panel cleaning would depend on the site conditions. Panels would be washed with water and a mild, organic, and non-abrasive detergent. Water for the cleaning of the panels would either be sourced from the closest Emthanjeni municipal source. Approximately 508kL of water per annum would be required per 75MW facility.

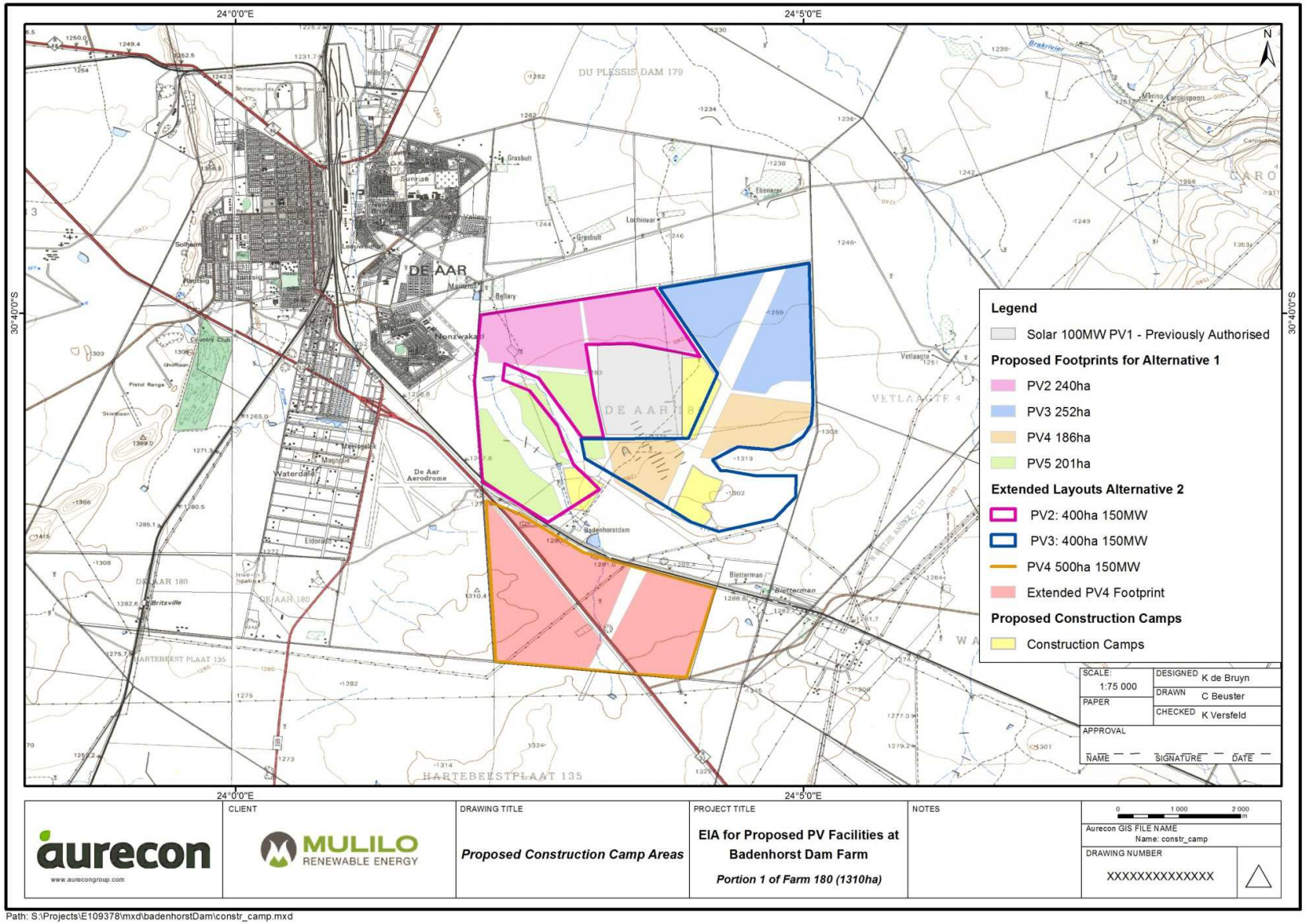


Figure 19: Proposed construction camps

5.1.6 Decommissioning phase

The PV site would be decommissioned at the end of the Power Purchase Agreement (20 years from the date of commissioning). The decommissioning is expected to take between 6 to 12 months per 75MW PV facility.

After disconnecting the PV infrastructure from the electricity network, the module components would be removed and recycled as far as possible. The structures would be dismantled and the concrete pile foundations would be removed. All underground cables would be excavated and removed. The buildings will be demolished and removed by an authorised company.

The rehabilitation of the disturbed areas would form part of the decommissioning phase. The aim would be to restore the land to its original substratum characteristics (or as near as possible). The restoration activities would include the following:

- Sub-soiling of the disturbed mineral layer to reduce the density thereof;
- Distribution of a layer of topsoil (30cm) over the disturbed areas;
- Improvement of soil composition and possible application of fertilizers; and
- Replanting with indigenous seed mix.

5.2 ALTERNATIVES

NEMA requires that alternatives be considered during the EIA process. According to DEAT “an alternative can be defined as a possible course of action, in place of another, that would meet the same purpose and need” (DEAT, 2004).

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

(a) the property on which or **location** where it is proposed to undertake the activity;
(b) the type of **activity** to be undertaken;
(c) the design or **layout** of the activity;
(d) the **technology** to be used in the activity;
(e) the **operational** aspects of the activity; and
(f) the option of not implementing the activity (“No-Go” alternative).

In addition to the list above, the 2013 DEA&DP Guidelines on Alternatives also considers the following as alternatives:

(a) **Demand alternative:** Arises when a demand for a certain product or service can be met by some alternative means (e.g. the demand for electricity could be met by supplying more energy or using energy more efficiently by managing demand).
(b) **Input alternative:** Input alternatives are applicable to applications that may use different raw materials or energy sources in their process (e.g. Industry may consider using either high sulphur coal or natural gas as a fuel source).
(c) **Routing alternative:** Consideration of alternative routes generally applies to linear developments such as power line servitudes, transportation and pipeline routes.
(d) **Scheduling and timing alternative:** Where a number of measures might play a part in an overall programme, but the order in which they are scheduled will contribute to the overall effectiveness of the end result.

(e) **Scale and Magnitude alternative:** Activities that can be broken down into smaller units and can be undertaken on different scales (e.g. for a housing development there could be the option 10, 15 or 20 housing units. Each of these alternatives may have different impacts).

An important function of the Scoping Phase is to screen alternatives to derive a list of feasible alternatives that need to be assessed in further detail in the EIA Phase. Subsequently, the following types of alternatives are the most pertinent to the proposed project:

- Layout alternative dependent on the scale and magnitude alternative;
- Technology alternative;
- Transmission line routing alternative; and
- Scale and magnitude alternative.

The alternative types pertinent to this project are described in the subsequent sections.

5.2.1 Location alternative

It is proposed that the four PV facilities be constructed at Badenhorst Dam farm (Portion 1 of Farm 180). A previous EIA, similar to this study, was undertaken at the same location (Aurecon, 2012). Therefore, information is readily available and environmental sensitive areas have been identified. These sensitive areas were taken into consideration in the preliminary designs. It therefore makes sense to further develop a site which is already well studied, suitable for the proposed development, located close to existing and proposed Eskom infrastructure, and where no fatal flaws have been identified.

It is also more economically feasible to group developments to promote infrastructure sharing. As mentioned in Section 1.2, Mulilo already received an EA for one PV facility on this farm which is further motivation for this location alternative as it could result in the following benefits:

- Sharing of supply infrastructure including water, sewage and electricity;
- Reducing the impact on the environment due to combining infrastructure and footprints;
- Utilizing a single laydown area and construction camp minimizing traffic and associated impacts with multiple camps;
- Allowing phased approach to construction activities thereby extending the construction period for employment and creating more long term employment jobs;
- Reducing the need for multiple electricity grid connection points and transmission lines;
- Motivation for the creation of an industrial zone within De Aar whereby specialised services and manufacturing processes are able to develop in response to consistent demand; and
- Improved accuracy in terms of assessing cumulative impacts during the EIA phase.

The selection of this preferred and only location alternative was furthermore based on the following characteristics of the site:

- Solar resource potential based on historic satellite data;
- Grid connectivity and close proximity to strong grid access;
- Flat, level, and open land;
- Little environmentally and socially sensitive areas; and
- Non-arable or low arable potential of the land.

Based on the above motivation, it is proposed to only assess one location alternative namely Badenhorst Dam Farm (Portion 1 of Farm 180), De Aar.

5.2.2 Layout alternative dependent on the scale and magnitude alternatives

As previously mentioned, the DoE introduced a capacity limit of 75MW for solar facilities. The proponent are hopeful that the DoE will realise the benefits of having combined facilities, as discussed in previous section, and are therefore proposing two scale and magnitude alternatives. In other words, the capacity (MW) of the facilities will determine the layout of the facilities.

Layout Alternative 1

This alternative consists of the four proposed 75MW PV facilities and associated infrastructure as indicated in

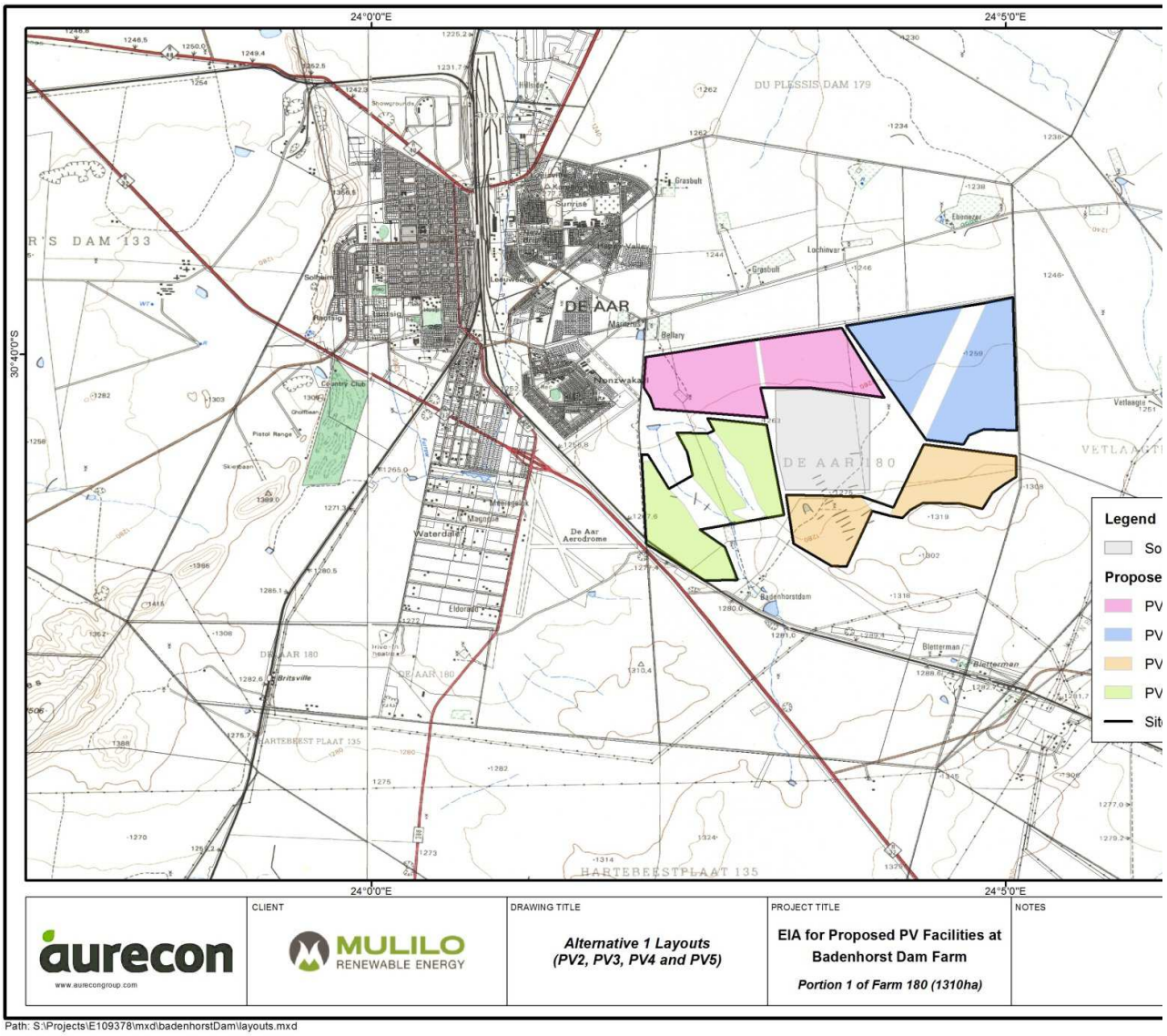


Figure 14 referred to as PV2, PV3, PV4 and PV5. These layouts take cognisance of the 75MW DoE cap and the environmentally sensitive areas as identified by Aurecon (2012).

Layout Alternative 2

This alternative consists of three 150MW PV facilities. The layout for these was developed by extending and combining some of the proposed 75MW facilities. This alternative is thus not limited to the DOE's 75MW cap per project. By increasing the capacities it has the benefit of utilising industries at scale thereby reducing associated development and construction costs which reduces lending rates and essentially lower the tariff of electricity sold.

As indicated in Table 12 below the layouts of Alternative 2 more or less overlaps with the Alternative 1 layouts, with the exception of PV4. Extended PV2 is approximately the same extent as PV2 and PV5 combined and extended PV3 is similar to the combined layout of PV3 and PV4. The proposed layout for extended PV4 is located at the southern boundary of the farm as shown in Figure 22.

Table 12: Layout alternatives

Alternative Layout 1	PV2	PV5	PV3	PV4	-
Alternative Layout 2	**Extended PV2**		**Extended PV3**		**Extended PV4**
					Southern section of the farm

Table 13 includes details of the proposed extended layouts.

Table 13: Footprints, capacities and coordinates of the three alternative layouts

Facility	Footprint	Capacity	Coordinates of middle point
Extended PV2	400ha	150MW	30°40'48.69"S; 24°2'37.61"E
Extended PV3	400ha	150MW	30°40'55.63"S; 24°4'32.49"E
Extended PV4	500ha	150MW	30°42'38.28"S; 24°3'5.45"E

Layout of additional infrastructure

It is proposed that one layout for the proposed roads and water pipeline be assessed. The layouts provided took the environmentally sensitive areas into consideration and follows the shortest viable route as shown in Figure 18.

5.2.3 Technology alternative

A number of sites are proposed for wind energy facilities in the surrounding area which indicates that the proposed site could also be suitable for wind power. However, the selection of the Badenhorst Dam farm was based on the requirements for solar energy. Therefore, all of the technology alternatives considered revolves around the Solar PV technologies.

5.2.3.1 Solar panel alternatives

Three solar panel types were considered for the proposed plants: concentrated photovoltaic (CPV), concentrated solar power (CSP) and conventional PV solar cells. Information gathered through

previous EIAs (Aurecon, 2012), as well as the recent technology advances informed this investigation.

Figure 20: CPV panel using optics to concentrate the sunlight (image courtesy of Mulilo)

CPV technology make use of optics such as lenses or curved mirrors to concentrate sunlight onto a small area of solar PV cells to generate electricity as shown in Figure 20. This technology type converts the concentrated sunlight directly to electricity via the photovoltaic effect and is considered to be more cost effective than conventional PV solar cells in that it requires a smaller area of photovoltaic material. However, it does require active solar tracking to be effective.

Similar to CPV technology, CSPs use mirrors or lenses to concentrate sunlight onto a small area to generate electricity directly via a heat engine, e.g. a steam turbine. Conventional PV technology on the other hand does not make use of any mirrors or lenses and generates electricity by converting solar radiation energy into a DC current which then needs to be converted to an AC current to connect to the grid.

The conventional PV and CPV technologies require less water (19L/MWh of water per day) than the CSP system which needs approximately 3,420L/MWh of water per day during the operational period. Therefore, due to the scarcity of water in this area, and the large volume of water required for the CSP system, only conventional PV and CPV technologies will be considered for the proposed solar facilities.

5.2.3.2 Mounting Alternatives

In terms of the mounting alternatives, single axis tracking systems will be considered along with fixed axis tracking systems. This decision will be made by the proponent closer to detail design phase after taking into consideration the economic viability, water requirements, land requirements, efficiency and potential environmental impacts of the proposed solar panel types.

In a fixed axis tracking system the PV panels are installed at a set tilt and cannot move, whereas in a single axis tracking system the panels follow the sun to ensure maximum exposure to sunlight as indicated in Figure 21.

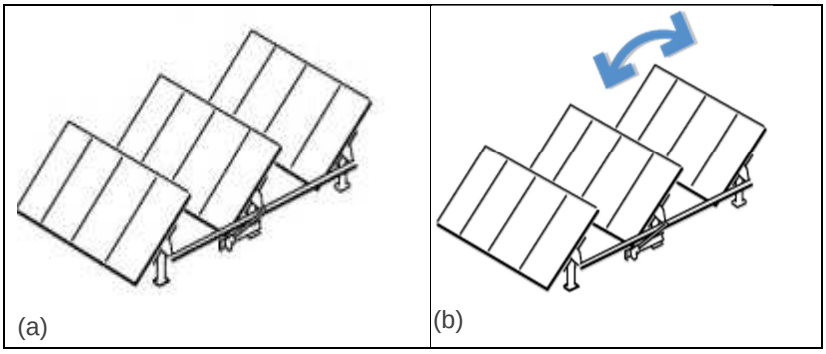


Figure 21: Fixed axis tracking system (a) and single axis tracking system (b)

The photovoltaic single axis tracking technology has the following benefits:

- The panels are the highest efficiency panels with the highest efficiency inverter, maximizing the system output. The installation costs are less as fewer panels are required.
- The panel's anti-reflective glass and exceptional low-light performance characteristics enhances energy delivery; and
- By minimising shading and grouping trackers closer together, this highly efficient technology produces the most energy per hectare of any tracking system. It requires up to 20% less land than conventional crystalline fixed tilt systems and up to 60% less than thin film technology. These highly efficient panels not only require less land, but also less concrete, steel and cabling per MW.

This mounting system is also based on the *"light on land"* philosophe meaning to respect the existing site conditions and avoiding unnecessary soil disturbance.

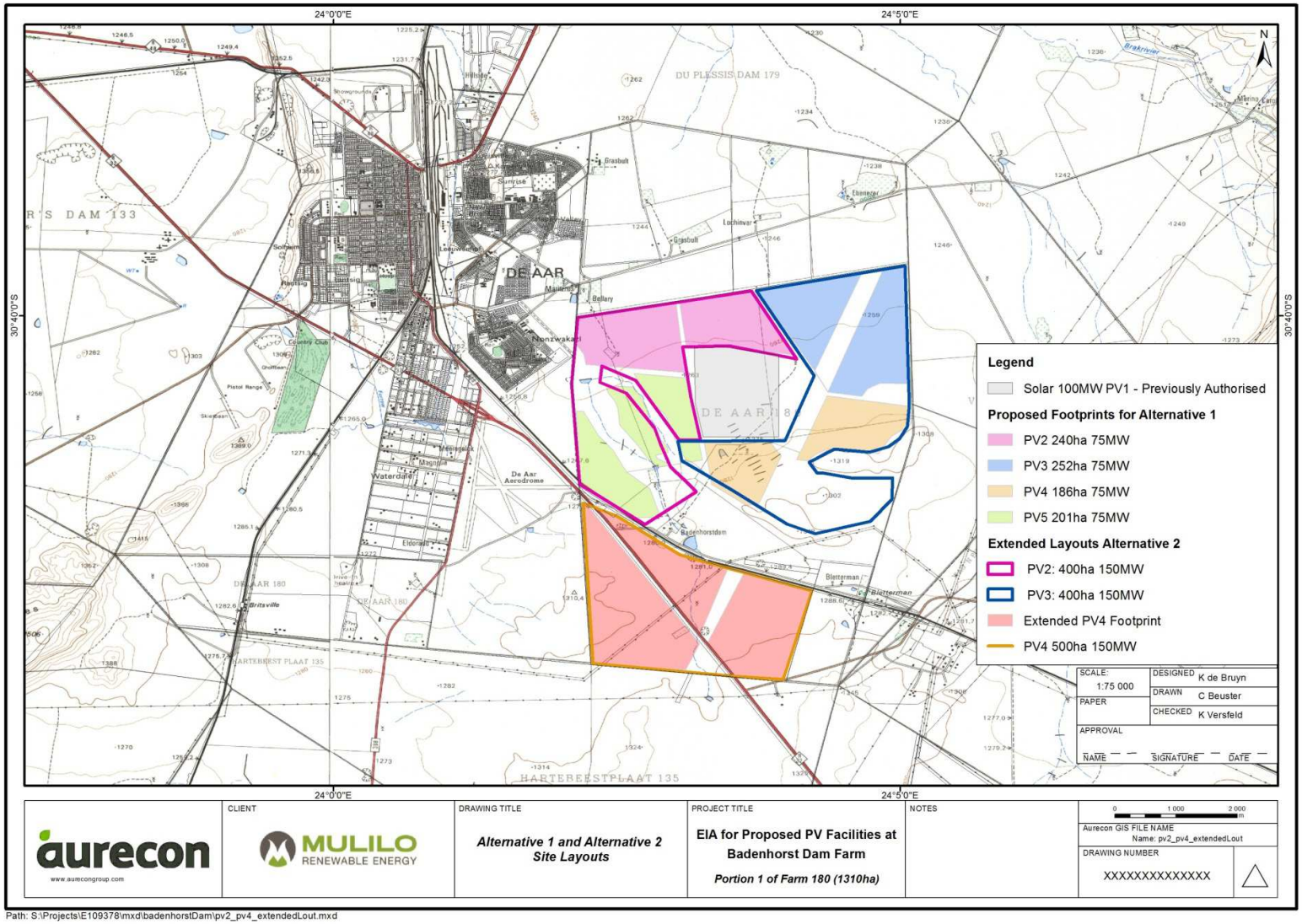


Figure 22: Proposed extended layouts

5.2.4 Transmission line routing and substations alternative

It is envisaged that each PV facility would require an onsite substation specific to each PV facility i.e. four onsite substations. These substations would feed into one central onsite substation by means of onsite overhead 132kV transmission lines.

Based on the uncertainties regarding the capacity of Eskom's substations and transmission lines, it is proposed to assess a transmission line corridor instead of assessing the preliminary layouts which could be subject to changes. The width of the proposed transmission corridor ranges from 150m to 350m. Using the middle of the transmission corridor as a starting point, one arm of the transmission line corridor traverses the site in a north-westerly direction towards the northern boundary of the farm, while the other arm of the transmission line corridor traverses the farm in a south-westerly direction (approximately 5km) to the southern border of the farm. From there it will link up to Eskom infrastructure (as indicated in

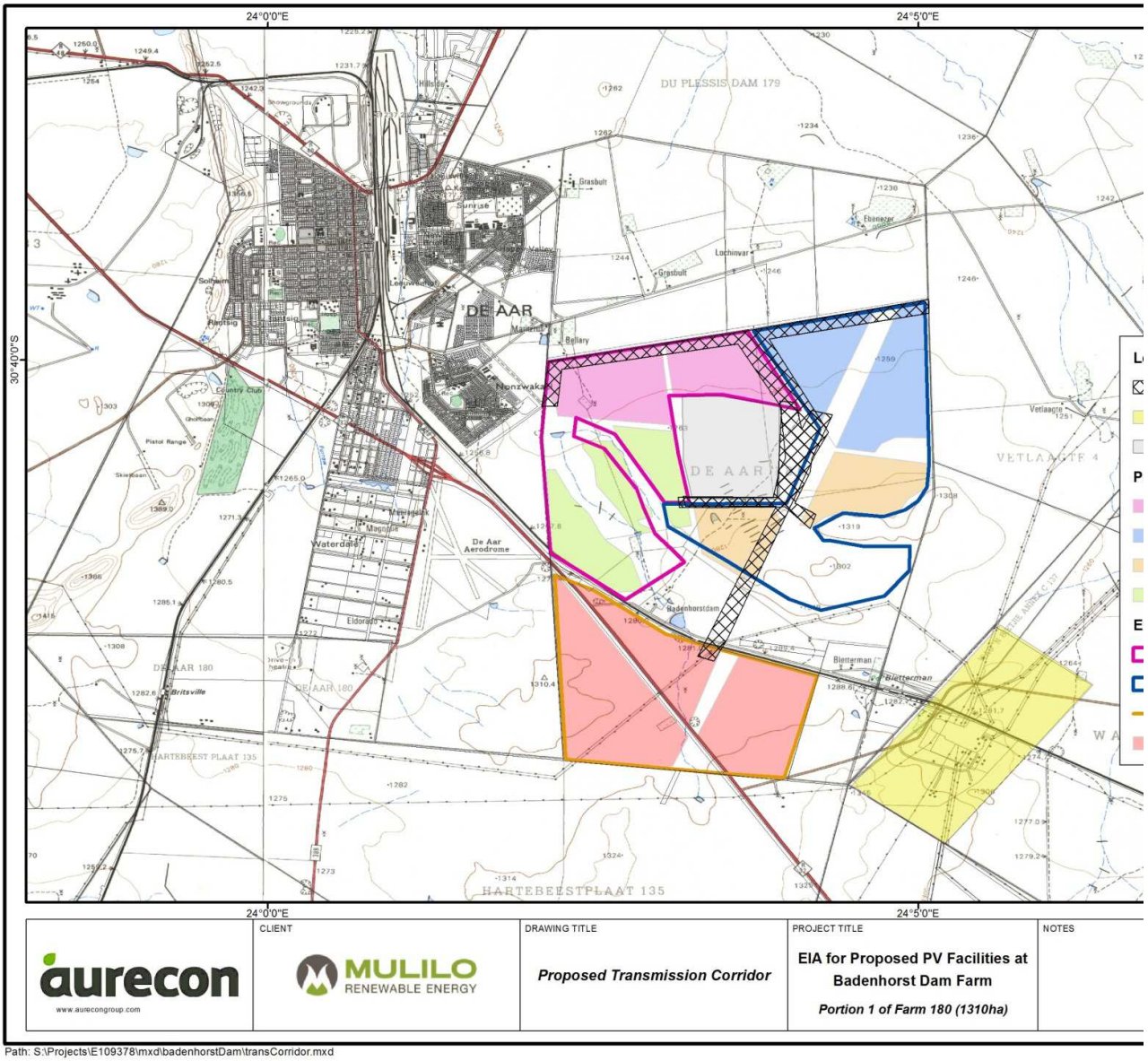


Figure 17). At the northern border of the farm, the transmission corridor forms a T-junction by following the northern boundary of the farm, from west to east, for approximately 5km where it will

link up to Eskom infrastructure, either on the western border of the farm or on the eastern border of the farm. It is proposed that the specialists assess the proposed transmission corridor as it will cover the footprint of all of the proposed transmission lines and substations.

5.2.5 No-Go alternative

The assessment of alternatives must at all times include the "no-go" option as a baseline against which all other alternatives must be measured. The option of not implementing the activity must always be assessed and to the same level of detail as the other feasible and reasonable alternatives. The "no-go" option is taken to be the existing rights on the property, including the approved PV facility, and this includes all the duty of care and other legal responsibilities that apply to the owner of the property.

This alternative will also be assessed in the EIA phase.

5.2.6 Conclusion on Alternatives

DEA&DP 2013 guideline for Alternatives states that *"every EIA process must identify and investigate alternatives, with feasible and reasonable alternatives to be comparatively assessed. If, however, after having identified and investigated alternatives, no feasible and reasonable alternatives were found, no comparative assessment of alternatives, beyond the comparative assessment of the preferred alternative and the option of not proceeding, is required during the assessment phase. What would, however, have to be provided to the Department in this instance is proof that an investigation was undertaken and motivation indicating that no reasonable or feasible alternatives other than the preferred option and the no-go option exist."*

Based on the investigations and reasons provided earlier, it is proposed that the following alternatives be assessed:

- **Location alternative:** Badenhorst Dam Farm (Portion 1 of Farm 180)
- **Layout alternatives as determined by scale and magnitude alternatives:** (Alternative 1 and Alternative 2)
- **Additional routing infrastructure:** One routing alternative for access roads and water pipeline
- **Technology alternatives:**
    - Solar Panel alternative: CPV and conventional PV
    - Mounting Alternatives: Fixed axis tracking system and single axis tracking system
- **Transmission line routing:** one transmission corridor
- **No-Go alternative**

5.3 MOTIVATION FOR THE PROJECT

The 2009 DEA&DP Guideline for Need and Desirability[18] highlights the obligation for all proposed activities which trigger the environmental regulations to be considered in light of (amongst others)

[18] DEA&DP (2009) Guideline on Need and Desirability, NEMA EIA Regulations Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning (DEA&DP).

the National Framework for Sustainable Development[19], the spatial planning context, broader societal needs, and financial viability. This information allows the authorities to contemplate the strategic context of a decision on the proposed activity. This section seeks to provide the context within which the need and desirability of the proposed activity should be considered.

The need for renewable energy is well documented and reasons for the desirability of solar energy include:

- Utilise the most abundant natural resource available to South Africa;
- Meeting nationally appropriate emission targets in line with global climate change commitments;
- Enhancing energy security by diversifying generation; and
- Creating a more sustainable economy.

5.3.1 Utilise resources available to South Africa

As illustrated in Figure 23, South Africa is subject to some of the highest levels of solar radiation in the world with an average daily solar radiation that varies between 4.5 kilo-watt hour per square kilometre (kWh/m^2) and $6.5kWh/m^2$. This, in comparison to about $3.6kWh/m^2$ for parts of the United States and about $2.5kWh/m^2$ for Europe and the United Kingdom (Department of Minerals and Energy, 2003), reveals that South Africa has considerable solar resource potential which must be utilised.

South Africa generates most of its required electricity from coal of which there is a ready supply of at the local level. However, national government is on the verge of augmenting the existing generation capacity of thermal and nuclear power plants with renewable energy power generation, thus creating the framework that will lead to an increase in the supply of clean energy for the nation.

[19] Republic of South Africa (2008) People – Planet – Prosperity: A National Framework for Sustainable Development in South Africa. Pretoria: Department of Environmental Affairs (DEA), Republic of South Africa [Internet]. Available from: http://www.environment.gov.za [Accessed 29 March2011].

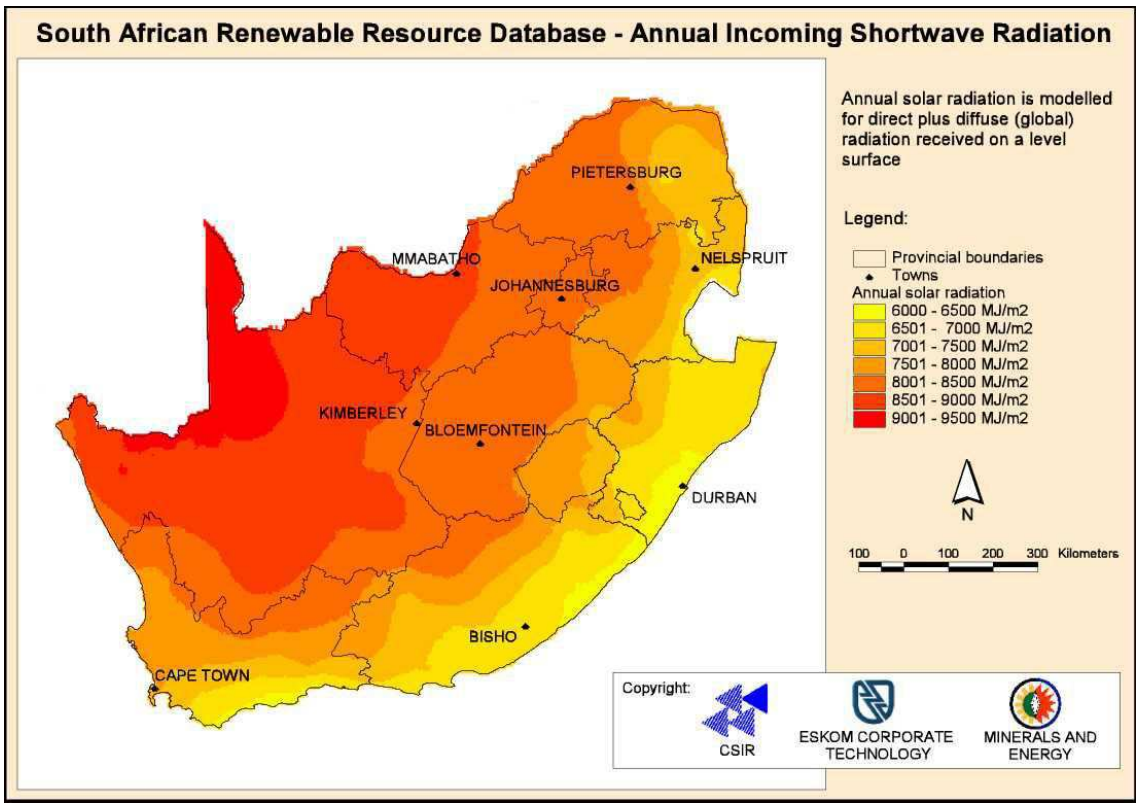


Figure 23: Annual solar radiation for South Africa (Department of Minerals and Energy, 2003)

5.3.2 Meeting nationally appropriate emission targets in line with global climate change commitments

As can be seen by the numerous policies and legislation described in Section 2.6, the need for renewable energy is well documented. Due to concerns such as climate change, and the on-going exploitation of non-renewable, resources, there is increasing international pressure on countries to increase their share of renewable energy generation. The proposed PV projects are expected to contribute positively towards climate change mitigation.

Renewable energy is recognized internationally as a major contributor in protecting the climate, nature and the environment, as well as providing a wide range of environmental, economic and social benefits that can contribute towards long-term global sustainability.

Solar energy is a source of “green” electricity as for every 1MWh of “green” electricity used instead of traditional coal powered stations, one can:

- Save 1,290 liters of water;
- Avoid 8.22kg of Sulphur Dioxide (SO_2) emissions;
- Avoid 1,000kg of Carbon Dioxide (CO_2) emissions including transmission losses;
- Avoid 142kg of ash production; and
- Contribute to social upliftment.

5.3.3 Enhancing energy security by diversifying generation

The establishment of the proposed PV power generation facilities would strengthen the existing electricity grid for the area. Moreover, the project will contribute towards meeting the national energy target as set by the Department of Energy (DoE). Should the proposed PV site and development identified by Mulilo be acceptable, it is considered viable that long term benefits for the community and society in De Aar would be realised as highlighted above.

The proposed projects would also have international significance as it contributes to South Africa being able to meet some of its international obligations by aligning domestic policy with internationally agreed strategies and standards as set by the United Nations Framework Convention on Climate Change (UNFCCC), Kyoto Protocol, and United Nations Convention on Biological Diversity (UNCBD) all of which South Africa is a signatory to.

5.3.4 Creating a more sustainable economy

The Northern Cape, and particularly the De Aar area, has large tracts of land which are very dry and the farmers do their best to earn a living from the land. The towns are generally small and operate on a survival socio-economic level. The need to improve the quality of life for all, and especially for the poor, is critical in South Africa. It is expected that the proposed project will contribute directly to the upliftment of the individuals and the societies in which they live. Skills development and the transfer thereof will be one of the top priorities and local community involvement will be enhanced as far as possible. Approximately 2,800 man months will be required during the construction phase depending on the procurement method and the primary contractor.

In addition, the following potential benefits could be realised:

- Reducing the demand on scarce resources, such as water as the generation of energy from PV facilities uses less water per MW/h than coal-fired facilities;
- Reducing pollution as the generation of energy from PV facilities produces far less pollution per MW/h than coal-fired facilities;
- Local economic development; and
- Local skills development.

Numerous studies and reports have attempted to quantify the employment creation potential of renewable energy per unit of power installed or generated. AGAMA Energy (2003) established that solar PV has the largest creation potential over all the renewable technologies as indicated in Table 14.

Table 14: Renewable energy employment potential in terms of the gross direct jobs created per GWh for the various technologies (Agama Energy, 2003)

	Employment per GWh					
Technology	**Fuel**	**Manufacture**	**Installation**	**O&M**	**Other**	**Total**
	/GWh	**/GWh**	**/GWh**	**/GWh**	**/GWh**	**/GWh**
Solar thermal	0	3	7	0.4	0	10.4
Solar PV	0	32.9	21.2	4.4	3.5	62
Wind	0	8.4	1.3	2.6	0.3	12.6
Bio-energy	0	3.55	3.55	7.2	0	14.3
Hydro	0	8.4	1.3	2.6	0.3	12.6

Table 15 indicates how the NEMA suitability principles are applicable to the proposed project.

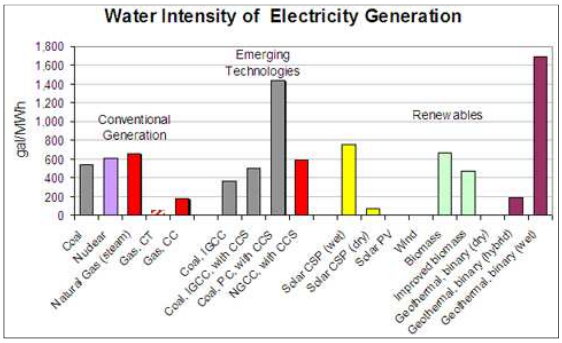
Table 15: The applicability of NEMA Sustainability Principles to the proposed project

NEMA Sustainable Development Principle	Consideration for this proposed activity and EIA Process
(1) The principles set out in this section apply throughout the Republic to the actions of all organs of state that may significantly affect the environment and – • Shall apply alongside all other appropriate and relevant considerations, including the State's responsibility to respect, protect, promote and fulfil the social and economic rights in Chapter 2 of the Constitution and in particular the basic needs of categories of persons disadvantaged by unfair discriminations; • Serve as the general framework within which environmental management and implementation plans must be formulated; • Serve as guidelines by reference to which any organ of state must exercise any function when taking any decision in terms of this Act; or any statute provision concerning the protection of the environment; • Serve as principles by reference to which a conciliator appointed under this Act must make recommendations; and • Guide the interpretation, administration and implementation of this Act, and any other law concerned with the protection of management of the environment.	All principles must be considered in the application and consideration for authorisation.
(2) Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.	This EIA process will consider both the natural and socio-economic environment and mitigation measures will be provided in response to this principle.
(3) Development must be socially, environmental and economically sustainable.	As previously mentioned, the farmers of De Aar do their best to earn a living from the land. The need to improve the quality of life for all, and especially for the poor, is critical in South Africa. It is expected that the proposed project will contribute directly to the upliftment of the individuals and the societies in which they live. The proposed project would also include the following benefits that would contribute to environmentally and social sustainability: Reducing the demand for scarce resources, such as water since the generation of energy from PV facilities uses less water per MW/h than coal-fired facilities; • Reducing pollution as the generation of

	energy from PV facilities produces far less pollution per MW/h than coal-fired facilities; • Local economic development; and • Local skills development. • Construction industry businesses will benefit from an increase in the demand for their goods, materials and services. • Increased business productivity will directly result to improved spending power • Increase in the competitiveness of the region in terms of energy generation.
(4) (a) Sustainable development requires the consideration of all relevant factors including the following:	
That the disturbance of ecosystems and loss of biological diversity are avoided, or where they cannot be altogether avoided, are minimised and remedied;	Disturbance of the ecosystem and loss of biological diversity will be minimised through design measures and appropriate mitigation measures. The advantage of the developing Badenhorst Dam Farm, is that this site has already gone through intensive EIA investigations and environmentally sensitive areas have been identified. These sensitive areas have thus informed the design phase to ensure that sensitive areas are avoided to limit the disturbance of ecosystems. Furthermore, a LEMP will be compiled to ensure that mitigation measures proposed in this EIA process are implemented during the planning, construction, operational and decommissioning phases.
That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;	A LEMP will be compiled to ensure that mitigation measures proposed in this EIA process are implemented during the planning, construction, operational and decommissioning phases.
That the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where is cannot be altogether avoided, is minimised and remedied;	A heritage impact assessment was undertaken during the EIA process for PV1 (ACO Associates, 2012 and Almond, 2012). However, the impact on the heritage resources (including palaeontology) will be investigated during the EIA phase to confirm the previous findings.
That waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;	This project shall generate the least amount of waste possible by properly planning material procurement (ordering, transportation and delivery), ensuring proper material handling and storage to reduce the avoidable generation of wastage (i.e. broken and damaged materials) and reusing potential waste materials on site wherever possible. Of the inevitable waste that is generated, as many of the waste materials as

	economically feasible shall be recovered and sorted for donation, reuse elsewhere or stored separately for recycling.
That the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;	This project will increase South Africa's generation capacity through renewable energy technologies and would not utilise non-renewable energy. Advantages of solar power are many. Although solar power is an energy source that we have only recently tapped into, it may easily become the most important energy source of the future. Solar energy systems have very little impact on the environment, making them one of the cleanest power-generating technologies available today. While they are converting the sun's rays into electricity or hot fluids, they produce no air pollution, hazardous waste, or noise. The more electricity and heat that we convert from the sun's rays decreases our reliance and dependence on fossil fuels and on imported sources of energy. Finally, solar energy can be an effective economic development driver. In addition, the following are benefits of solar energy: • Solar power is a renewable and natural resource. Solar power is non-polluting. Unlike oil, solar power does not emit greenhouse gases or carcinogens into the air. • Light and energy from the sun costs nothing. Once you purchase the equipment to collect and convert energy from the sun, it costs you nothing to run. • Solar cells require little maintenance • Solar cells can last a lifetime. • Solar power is silent.
That the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised. and equitable, and takes into account the consequences of the depletion of the resource;	This PV project will utilise solar energy to generate electricity. The most significant renewable resource being utilised is water, which would be required for the cleaning of the solar panels. The graph[20] below provides a comparative assessment of the water intensity of various types of electrical generation technologies. As can be seen from the graph below, the water intensity of

[20] http://www.westernresourceadvocates.org/water/waterenergy.php

	solar PV facilities is so low that the value is not visible on the graph, in comparison to other energy generation technologies. 
That a risk-averse and cautious approach is applied which takes into account the limits of current knowledge about the consequences of decisions and actions; and	Limitations and gaps in knowledge have been highlighted and taken into account in the EIA process. The information that will be provided in the EIA will be sufficient for decision-making purposes, and where there is uncertainty with predictions, monitoring will be recommended.
That negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.	The possible impacts on the people of De Aar will be investigated throughout the EIA process, and mitigation measures proposed which aim at reducing negative impacts, will be included in the LEMP.
(b) Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option.	This EIA will be undertaken in accordance with the legal requirements as a fundamental guiding principle.
(c) Environmental justice must be pursued so that adverse environmental impacts shall not distribute in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons.	The EIA process, including the public participation process, outlined the possible impacts on the various groupings of people of De Aar and mitigation measures are proposed to reduce negative impacts, including the vulnerable and disadvantaged.
(d) Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing must be pursued and special measures may be taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination.	Environmental resources, such as ecology, freshwater ecosystems, and land use, will be considered and avoidance or mitigation measures will be provided in the LEMP to ensure that none of these resources are compromised thereby limiting access thereto.
(e) Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle.	The EIA process will consider the environmental, health and safety consequences of the development through the construction and operational life of the project.
(f) The participation of all interested and affected parties in environmental governance must be	Ample opportunity for public participation will be provided to all I&APs throughout the EIA process.

promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation by vulnerable and disadvantaged persons must be ensured.	
(g) Decisions must take into account the interests, needs and values of all interested and affected parties, and this includes recognising all forms of knowledge, including traditional and ordinary knowledge.	The EIA process has taken cognizance of all interests, needs and values espoused by all interested and affected parties.
(h) Community wellbeing and empowerment must be promoted through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means.	The EIA process has taken cognizance of all interests, needs and values espoused by all interested and affected parties. Ample opportunity for public participation will be provided to all I&APs throughout the EIA process.
(i) The social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment.	This will be undertaken during the EIA phase.
(j) The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers must be respected and protected.	The project area is subject to both the health and safety requirements of the Operational Health and Safety Act.
(k) Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law.	The EIA process will be thoroughly documented and all relevant information known to the EAP, as well as written comments received, will be included in the reporting for consideration by the authorities.
(l) There must be intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment.	The relevant authorities have been notified of the project and provided with opportunity to comment. This authority involvement process has been documented in the EIA documentation.
(m) Actual or potential conflicts of interest between organs of state should be resolved through conflict resolution procedures.	There has been no conflict between Departments to date.
(n) Global and international responsibilities relating to the environment must be discharged in the national interest.	The establishment of the proposed De Aar PV power generation facilities would strengthen the existing electricity grid for the area. Moreover, the project will contribute towards meeting the national energy target as set by the DoE. Renewable energy is recognized internationally as a major contributor in protecting the climate, nature and the environment, as well as providing a wide range of environmental, economic and social benefits that can contribute towards long-term global sustainability.
(o) The environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.	The impacts will be documented in the EIA process to inform decision-makers regarding potential ramifications of the proposed project so that an informed decision can be taken in this

	regard.
(p) The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage, or adverse health effects must be paid for those responsible for harming the environment.	The mitigation measures recommended to minimise negative impacts and enhance positive ones are for implementation and therefore for the cost of the proponent.
(q) The vital role of women and youth in environmental management and development must be recognised and their full participation therein must be promoted.	Public participation of all interested and affected parties has been promoted and opportunities for engagement will be provided during the EIA process.
(r) Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems required specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.	Specialist assessments will be undertaken to investigate the biophysical and social impacts that this project may have. The outcome of the specialist's assessments will indicate how significant impacts could be mitigated. Furthermore, the proposed development is not sited within a sensitive, vulnerable, highly dynamic, or stressed ecosystem.

The need and desirability of the project is described in Table 16 below.

Table 16: Specific questions as detailed in the Need and Desirability Guideline

NEED (TIMING) **Question**	**Response**
1. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved Spatial Development Framework (SDF) agreed to by the relevant environmental authority i.e. is the proposed development in line with the projects and programmes identified as priorities within the Integrated Development Plan (IDP)?	The area proposed is currently zoned as Agricultural land. The portion which is being leased by the proponent from the landowner has relatively low agricultural potential (SiVest, 2012). Therefore the development of the farm for renewable energy production will not result in the loss of high yielding agricultural land. Furthermore the additional income would safeguard the economic sustainability of the farm. Even though the IDP does not specifically allow for renewable energy projects, solar energy was identified as one of the local municipality's strong points which should be developed. Other needs that were identified include sustainable developments (economically, socially and environmentally) and job creation. The Emthanjeni SDF (Macroplan, 2007) proposed that industrial development must continue a northerly direction, alongside the railway lines. The area proposed for the PV solar facility at Badenhorst Dam is located to the North of the railway line.

	The proposed PV plant would create job opportunities for a wide skill level. In addition, Mulilo has committed to developing a training strategy to train and employ people from the local community.
2. Should development, or if applicable, expansion of the town/ area concerned in terms if this land use (associated with the activity being applied for) occur at this point in time?	Yes, the activity is in line with the Pixley ka Seme District Spatial Development Framework which recognises the need for sustainable land management, job creation and the development of new skills.
3. Does the community/ area need the activity and the associated land use concerned (is it a societal priority)?	Yes. The De Aar region has an unemployment rate of 26 % and limited employment opportunities. The proposed PV facilities would not only be a source of income for the landowner, but it would create job opportunities for the local community as the construction and operation of the PV plant require a wide range of skill levels. Secondary economic impacts may include an increase demand on the service industry through the demand for accommodation and other services. Renewable energy that is produced from sustainable natural sources will contribute to sustainable development not only in the Northern Cape, but throughout South Africa. The proposed facilities will contribute greatly to the pool of renewable energy projects to be implemented. The Northern Cape has some of the highest renewable energy resource levels in the world, making it highly suitable for solar power generation.
4. Are there necessary services with appropriate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?	It is anticipated that water requirements during the construction and operational phases would be met via the Emthanjeni Municipality in De Aar. However, the applicant still needs to confirm whether sufficient capacity is available. Estimated water requirements: • Construction Phase: 75 MW would require roughly 1400kℓ over a period of 12 – 24 months. • Operational Phase: 508 kℓ of water per year or 1.4kL per day.
5. Is this development provided for in the infrastructure planning of the municipality, and if not, what will the implication be on the infrastructure planning of the municipality (priority	No. It should be noted that once the proposed PV plant is operational, there would be a very limited requirement for municipal services.

and placements of services)?	
6. Is this project part of a national programme to address an issue of national concern or importance?	Yes. The establishment of the proposed De Aar PV power generation facilities would strengthen the existing electricity grid. Moreover, the project would contribute towards meeting the national energy target as set by the DoE.
DESIRABILITY (PLACING) **Question**	**Response**
1. Is the development the best practicable environmental option (BPEO) for this land/ site?	Yes. De Aar is a very arid region and farmers are struggling to make a living from the land. The area, specifically Badenhorst Dam Farm, being proposed for the PV facilities has very little agricultural potential which is why the proposed facility is the best practicable environmental option for this site.
2. Would the approval of this application compromise the integrity of the existing approved Municipal IDP and SDF as agreed to by the relevant authorities.	No. The activity is in line with the Pixley ka Seme District SDF which recognizes the need for: • Sustainable developments; • New skills development; and • Economic development. The proposed PV plant would not only be a source of income to the farmers, but it would also create job opportunities for the local community as the construction and operation of the PV plant would require a wide range of skill levels.
3. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in Environmental Management Framework (EMF)), and if so, can it be justified from in terms of sustainability considerations?	No. The Emthanjeni municipality does not have an EMF in place.
4. Do location factors favour this land use (associated with the activity applied for) at this place?	Yes. The sites were selected based on the following criteria: • Solar resource potential based on historic satellite data; • Grid connectivity and close proximity to strong grid access; • Flat, level, and open land; and • Non-arable or low arable potential land.
5. How will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/ natural environment)?	Potential impacts associated with the proposed upgrade will be discussed and assessed during the EIA phase. Refer to the Plan of Study for EIA in Section 6.
6. How will the development impact on people's health and wellbeing (e.g. in terms of noise, odours, visual character and sense of place, etc.)?	Potential impacts associated with the proposed upgrade will be discussed and assessed during the EIA phase. Refer to the Plan of Study for EIA in Section 6.
7. Will the proposed activity or the land use	The socio-economic impacts will be assessed

associated with the activity applied for, result in unacceptable opportunity costs?	and discussed in the EIA phase. Refer to the Plan of Study for EIA in Section 6.
8. Will the proposed land use result in unacceptable cumulative impacts?	Potential cumulative impacts associated with the proposed upgrade will be discussed and assessed during the EIA phase. Refer to the Plan of Study for EIA in Section 6.

5.4 POTENTIAL SOCIO-ECONOMIC AND BIOPHYSICAL IMPACTS IDENTIFIED DURING SCOPING PHASE

Various impacts on the biophysical and socio-economic environment are anticipated to occur throughout the construction and operational phase. These impacts are described in the sections below.

The identification of potential impacts which may occur as a result of the proposed activities is broad to cover the operational phase as well as the construction phase of the project. In cases where there is currently inadequate information to facilitate assessment of the potential impact, a draft Terms of Reference (ToR) and proposed specialist consultant is provided in Section 6. Impacts of lesser importance are also screened out, with reasons provided, to ensure that the Environmental Impact Assessment Report (EIAR) is focused on the potentially significant impacts.

5.4.1 Construction phase impacts on the biophysical and socio-economic environment

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

- Disturbance of flora and fauna, in particular avifauna;
- Sedimentation and erosion;
- Increased traffic;
- Impacts on palaeontology and heritage resources;
- Impacts on surface water resources;
- Impact on agricultural resources;
- Social impacts (positive and negative);
- Visual Impacts;
- Storage of hazardous substances on site;
- Noise pollution; and
- Dust.

The significance of construction phase impacts is likely to be limited by their relatively short duration, since the construction phase per 75MW facility would last approximately 12 to 24 months. Many of the construction phase impacts could be mitigated through the implementation of an appropriate LEMP.

During the EIA Phase, the construction phase impacts on the biophysical and socio-economic environment will be assessed, in terms of the methodology outlined in the Plan of Study for EIA (see Section 6). The construction phase impacts and the mitigation measures proposed to reduce the significance of the negative impacts and enhance the positive impacts will be incorporated into

the LEMP. The LEMP will be compiled as part of the EIA process, and submitted as part of the EIAR, to provide mitigation and ascribe responsibilities for many of the construction phase impacts.

5.4.1.1 Disturbance of flora and fauna in particular avifauna

This impact considers impacts beyond the permanent footprint impacts of the proposed PV energy facility. During the construction phase the vegetation within the footprint of the activity would be cleared in order to construct the PV solar facility. This might result in a loss of habitat and or habitat fragmentation. It should be borne in mind that the site is currently being used for grazing which would over time have had an impact on the biodiversity.

The proposed project could disturb animals through physical barriers, which may cause animals to leave the area. It is expected that any affected fauna or avifauna would generally be mobile and would relocate during the construction phase and are likely to recolonise the area, once the construction phase has been completed and the disturbed areas rehabilitated. The significance of this impact must nonetheless be considered beyond the permanent footprint of the proposed PV solar energy facility. Transmission lines could impact on bird species. Therefore, it is proposed that an avifaunal impact assessment and an ecological impact assessment be undertaken. The ToR for these studies is included in Section 6.5.1 and Section 6.5.2.

5.4.1.2 Sedimentation and erosion

The sediment loads of any drainage channels or pans may increase due to the excavations on the site, the potential laying of infrastructure across drainage lines and other construction related activities. In addition, due to the arid conditions, dust might contribute to sedimentation loads. Mitigation measures will be in place to prevent sedimentation and erosion and it is therefore not expected to be a significant impact.

5.4.1.3 Impact on traffic

Approximately 450 truckloads transporting in total 900 40-foot containers would be required during the construction period. Construction vehicles are likely to make use of the existing roads, including the N10, to transport equipment and material to the construction site.

The impact on traffic is however not expected to be significant as these truckloads would be distributed throughout the construction period (12 to 24 months per 75MW facility).

5.4.1.4 Impacts on paleontology and heritage resources

Heritage resources include archaeological material (e.g. rock paintings, stone tools), paleontological material (e.g. fossilised materials) and cultural heritage material (e.g. old graveyards, fences or ruins of buildings). The proposed PV facility may result in the destruction of heritage resources and affect the scenic routes and sense of place. Therefore a Heritage Impact Assessment and Paleontological Impact Assessment will be undertaken to assess the heritage and paleontological resources on site. The ToR for these studies is included in Section 6.5.5 and Section 6.5.6.

5.4.1.5 Impacts on surface water resources

The proposed layout of the sites are be located outside of the identified freshwater features, and therefore limited impact on the ecological conditions of these features are expected. However,

should the clearing of the land result in eroded areas, then it could result in habitat disturbance, proliferation of alien vegetation, and impairment of surface water quality and an increase in turbidity. Therefore a Freshwater Ecology Impact Assessment will be undertaken. The ToR for the Freshwater Ecology Impact Assessment is described in Section 6.5.3.

5.4.1.6 Impact on agricultural resources

The establishment of the PV facility may cause temporary or permanent loss of agricultural land and or food security production. In South Africa there is a scarcity of high potential agricultural land, with less than 14% of the total area being suitable for dry land crop production. Consequently areas which can sustainably accommodate dry land production need to be protected from non-agricultural land uses.

Even though the agricultural potential for the site was previously classified as being extremely low for crop production and moderate to moderately low for grazing (SiVest, 2012), an Agricultural Impact Assessment will be undertaken to confirm the previous findings. The ToR for this assessment is included in Section 6.5.8.

5.4.1.7 Social impacts

The construction of PV facilities could potentially have a number of positive significant socio-economic impacts on the current environment. Positive impacts include employment creation, not only direct opportunities at the respective sites, but also secondary industries which will develop in response to the development of De Aar as a renewable energy hub. Aside from the creation of job opportunities, Mulilo will also initiate a training strategy to up-skill local people thereby facilitating employment. Preference will also be given to local suppliers of components for the construction of the facility. Given that there is a large body of information available regarding the potential socio-economic impacts of PV facilities, it is proposed that the EAP assess the potential impact of the proposed project on the local socio-economic environment.

5.4.1.8 Visual Impacts

The potential exists that the proposed PV facility and associated infrastructure would be visible from many kilometres away. Therefore a Visual Impact Assessment will be undertaken to determine the significance of the potential impacts and to determine appropriate mitigation measures. The ToR is included in Section 6.5.7.

5.4.1.9 Storage of hazardous substances on site;

Hazardous substances would be stored on site during the construction phase. These substances may include amongst other things, hydrocarbons (i.e. fuel), curing compounds, shutter oil, and cement.

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

5.4.1.10 Noise pollution

An increase in noise pollution would be expected from the operation of heavy machinery during the construction period, as well as due to the increased traffic. The severity of this impact is likely to be reduced due to the low numbers of people in close proximity to the site. Therefore, noise will not be assessed by a specialist.

5.4.1.11 Dust impacts

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

5.4.2 Operational phase impacts biophysical and socio-economic environment

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

- Impact on the flora;
- Impact on fauna (avifauna);
- Sedimentation and erosion;
- Impact on surface water resources;
- Impact on hydrology;
- Impact on local economy (employment) and social conditions;
- Visual impacts; and
- Impact on energy production.

5.4.2.1 Impact on flora

Sections of the site would be cleared during the construction phase resulting in barren areas. As the sites will be allowed to return to its natural state, there is a risk that alien invasive plant species could establish within these areas. Mitigation measures to control establishment of potential alien invasive plants will be detailed in the LEMP. It is also recommended that an ecology impact assessment be undertaken, due to the possible extent of potential impact. The ToR for the studies is included in Section 6.5.1.

5.4.2.2 Impact on fauna including avifauna

A number of red listed bird species may be found in the vicinity of the proposed site. These birds might endeavour to nest in or near the proposed facility. Overhead transmission lines could also impact on bird populations.

As mentioned previously bird droppings on the PV panels can reduce the efficiency of the panels which is why nesting within the boundaries of the facility is not preferred. It is recommended that an avifaunal impact assessment be undertaken, to ascertain the potential impact on birds and the potential impact of birds on the proposed facility. Six months of bird monitoring will also be

undertaken to determine the species that are locally occurring. The ToR is described in Section 6.5.2.

5.4.2.3 Sedimentation and erosion

Should the land not be revegated following the construction phase, sediment loads of any drainage channels or pans may increase. Due to the arid conditions, dust might contribute to sedimentation loads. Mitigation measures will be in place to prevent sedimentation and erosion and it is therefore not expected to be a significant impact.

5.4.2.4 Impact on hydrology

De Aar relies entirely on groundwater abstraction to meet the town's potable water needs. Potable water would be required during the operational phase for the cleaning of solar panels to maintain the efficiency of the panels. The use of water and the selection of appropriate cleaning products need to be managed appropriately to prevent any contamination to groundwater. Water would be sourced from the municipality.

The site that has been identified for the proposed PV facility is relatively flat. While this may be beneficial from a site layout perspective, it does create an increased risk of flooding. Previously a hydrology impact assessment was undertaken (Aurecon a, 2012), to ascertain the potential impact on stormwater runoff and the potential impact of flooding on the proposed facility. It was determined that there is a low risk of flooding on Badenhorst Dam, but another Hydrology assessment will be undertaken nonetheless, to verify these results. The ToR is described in Section 6.5.4

5.4.2.5 Impact on Freshwater

The proposed layout of the sites is located outside of the identified freshwater features, and therefore limited impact on the ecological conditions of these features is expected. However, a Freshwater Ecology Impact Assessment will be undertaken to confirm this. The ToR for the Freshwater Ecology Impact Assessment is described in Section 6.5.3.

5.4.2.6 Impact on local economy (employment) and social conditions

It is expected that the proposed project would contribute directly to the upliftment of the individuals and the societies in which they live which is critical in South Africa. During project development by Mulilo, skills development and transfer would be one of the priorities and local community involvement would be enhanced as far as feasible. The establishment of the proposed PV facility would create a number of direct and indirect employment opportunities.

There would be a wide level of skills required during the construction and operation of the facility. As noted previously, approximately 2,800 man months would be required during the construction phase (12 to 24 months). Increased employment opportunities would allow for an improvement in social conditions for those who obtain employment.

Given that there is a large body of information available regarding the potential socio-economic impacts of PV facilities, it is proposed that the EAP assess the potential impact of the proposed project on the local socio-economic environment.

5.4.2.7 Visual impacts

The flat plains which characterise the project area are covered by low-lying shrubs and grass. Therefore, any tall structures, such as existing power lines, are visible for many kilometres. The potential therefore exists that the proposed solar panels or associated infrastructure would be visible from great distances. As such it is recommended that a specialist Visual Impact Assessment be undertaken to ascertain potential impacts on visual aesthetics. The ToR is included in Section 6.5.7.

5.4.2.8 Impact on energy production

Historical trends in electricity demand in South Africa have shown a consistent increase in demand. There have been some years where the demand levels off or decreases, but over the long term there has been an increasing trend on electricity demand. The reserve margin remains extremely low and the supply capacity is still limited. The proposed PV solar energy facility would be able to provide power to assist in meeting the energy demand within South Africa.

Given that there is a large body of literature with regards to energy demand in South Africa, as described in Section 2, it is proposed that the EAP assess the potential impact of the proposed project on energy production in South Africa.

6 PLAN OF STUDY FOR EIA

The purpose of this Section is to describe the Plan of Study for the EIA Phase to ensure that this EIA process satisfies the requirements of NEMA. This section furthermore describes the assessment methodology that will be utilised in determining the significance of the construction, operational and decommissioning impacts associated with the proposed project on the socio-economic and biophysical environment.

6.1 PURPOSE OF THIS PLAN OF STUDY FOR EIA

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

6.2 DESCRIPTION OF THE ACTIVITY

The nature of the activity is described in detail in Section 5.1, but in brief the proposed project would consist of the following:

- **Technology:** A photovoltaic component comprising of numerous arrays of PV panels to generate up to 75MW AC per facility, through the photovoltaic effect.
- **Transmission lines (132kV) and substations**.
- **Boundary fencing:** Each 75MW facility will be fenced for health, safety and security reasons.
- **Roads:** one access road and internal access roads for servicing and maintenance.
- **Water supply infrastructure.**
- **Stormwater infrastructure:** Including drainage channels, berms, detention areas and kinetic energy dissipaters.
- **Buildings:** Buildings would likely include onsite substations, a connection building, control building, guard cabin, an electrical substation and solar resource measuring substation.

6.3 POTENTIAL ENVIRONMENTAL IMPACTS IDENTIFIED DURING SCOPING

Section 5.4 has identified the range of potential environmental impacts associated with the proposed project. During this scoping exercise a shortlist of potentially significant environmental impacts was identified for further, more detailed investigation during the EIA Phase. Specifically the following potential environmental impacts have been identified:

- Construction phase impacts on the biophysical and socio-economic environments:
  - Disturbance of flora and fauna, in particular avifauna;
  - Sedimentation and erosion;
  - Increased traffic;
  - Impacts on palaeontology and heritage resources;

  - Impacts on surface water resources;
  - Impact on agricultural resources;
  - Social impacts;
  - Visual Impacts;
  - Storage of hazardous substances on site;
  - Noise pollution; and
  - Dust.
- Operational phase impacts on the biophysical environment and social environment:
  - Impact on the flora;
  - Impact on fauna (avifauna);
  - Sedimentation and erosion;
  - Impact on surface water resources;
  - Impact on hydrology;
  - Impact on local economy (employment) and social conditions;
  - Visual impacts; and
  - Impact on energy production.

6.4 METHOD OF ASSESSING THE SIGNIFICANCE OF POTENTIAL ENVIRONMENTAL IMPACTS

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

For each impact, the **EXTENT** (spatial scale), **MAGNITUDE** and **DURATION** (time scale) would be described. These criteria would be used to ascertain the **SIGNIFICANCE** of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place. The mitigation described in the EIAR would represent the full range of plausible and pragmatic measures but does not necessarily imply that they would be implemented.[21]

The tables below indicated the scale used to assess these variables, and defines each of the rating categories.

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

Table 17: Assessment criteria for the evaluation of impacts

CRITERIA	CATEGORY	DESCRIPTION
Extent or spatial influence of impact	**Regional**	Beyond a 10km radius of the candidate site.
	Local	Within a 10km radius of the candidate site.
	Site specific	On site or within 100m of the candidate site.
Magnitude of impact (at the indicated spatial scale)	**High**	Natural and/ or social functions and/ or processes are *severely* altered
	Medium	Natural and/ or social functions and/ or processes are *notably* altered
	Low	Natural and/ or social functions and/ or processes are *slightly* altered
	Very Low	Natural and/ or social functions and/ or processes are *negligibly* altered
	Zero	Natural and/ or social functions and/ or processes remain *unaltered*
Duration of impact	**Construction period**	Up to 4 years
	Short Term	Up to 5 years after construction
	Medium Term	5-15 years after construction
	Long Term	More than 15 years after construction

The **SIGNIFICANCE** of an impact is derived by taking into account the temporal and spatial scales and magnitude. The means of arriving at the different significance ratings is explained in Table 18.

Table 18: Definition of significance ratings

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

Once the significance of an impact has been determined, the **PROBABILITY** of this impact occurring as well as the **CONFIDENCE** in the assessment of the impact would be determined using the rating systems outlined in Table 19 and Table 20 and respectively. It is important to note that the significance of an impact should always be considered in concert with the probability of

that impact occurring. Lastly, the **REVERSIBILITY** of the impact is estimated using the rating system outlined in Table 21.

Table 19: Definition of probability ratings

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

Table 20: Definition of confidence ratings

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

Table 21: Definition of reversibility ratings

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

6.5 NEED FOR ADDITIONAL INFORMATION: SPECIALIST STUDIES

Based on the potential environmental impacts, it is proposed to undertake the following specialist studies as listed in Table 22, in order to address the suite of potential environmental impacts.

Table 22: Specialist studies to be undertaken

Assessment	Company	Contact
Visual Impact Assessment	Visual Resources Management Africa	Steve Stead
Palaeontological Impact Assessments	Natura Viva	John Almond
Ecological Impact Assessment	David Hoare Consulting	David Hoare
Avian Impact Assessment	Avisense	Andrew Jenkins
Agricultural Assessment	SiVest	Kurt Barichievy
Heritage Impact Assessment	ACO Associates	Tim Hart
Aquatic Impact Assessment	Blue Science	Toni Belcher
Hydrology Impact Assessment	SiVest	Richard Hirst

The ToR for these investigations is outlined below. A short summary of the various specialist consultants is provided below the ToR. Curriculum Vitae's are available upon request.

6.5.1 Proposed ToR for Ecology Impact Assessment

The proposed ToR for the ecology specialist study is as follows:

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

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

Dr David Hoare of David Hoare Consulting cc will undertake the requisite Ecological assessment. Dr Hoare has undertaken over 300 ecological specialist consulting projects over the past 5 years and has 14 years of experience as a specialist environmental consultancy. Dr Hoare is a registered professional member of the South African Council for Natural Scientific Professions (reg. no. 400221/05) and is subject to a Code of Conduct administered by the Council to ensure professional conduct.

6.5.2 Proposed ToR for the Avifauna Impact Assessment

The proposed ToR for this specialist study is as follows:

- Undertake the requisite field work to directly assess the habitats present within the inclusive impact zone, and to determine the *in situ* avifauna and identify any significant bird flight corridors present in the area;
- 6-months bird monitoring;
- Integrate the-site information with bird atlas (SABAP 1 & 2) and any other relevant bird data available for the general area to develop an inclusive, annotated list of the avifauna expected to occur on the site;
- Highlight Red Data species, endemic, restricted-range or other species of particular concern which may be present in the study area;
- Identify, describe and assess potential direct and indirect and cumulative impacts resulting from the proposed development both on the footprint and the immediate surrounding area during construction and operation;
- Assessment of cumulative impacts; and
- Recommend mitigation measures to reduce or eliminate potential negative impacts on avifauna and improve positive impacts.

Andrew Jenkins from Avisense will undertake the requisite avifaunal impact assessment. Mr Jenkins has been involved in co-ordinating and managing various national bird programmes since the early 1990s. Mr Jenkins sits on the Advisory Committee of the Birds of Prey Programme of the Endangered Wildlife Trust, is a member of the Birds & Wind Energy Specialist Group (convened by BirdLife South Africa and the EWT), and was the primary author of the "Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa", released by BAWESG in March/April 2011, and revised in February 2012.

6.5.3 Proposed ToR for the Aquatic Impact Assessment

The proposed ToR for the aquatic specialist studies are as follows:

- Summary of available information pertaining to surface water (streams, dams and wetlands) in close vicinity to the sites;
- Undertake water quality and biotic assessments sampling for stream, wetland and dam condition assessments;
- Describe and determine importance, functionality and trophic state of the water resources;
- Assess the potential impact of the change in site hydrology (quantity) and water chemistry (quality) on any streams, dams and wetlands during the construction and operational phases;
- Assessment of cumulative impacts;
- Evaluate (a) magnitude, frequency of occurrence, duration and probability of impacts, (b) the local, regional, and national significance of predicted impacts, (c) the level of confidence in findings relating to potential impacts, (d) the degree to which the impact can be reversed, and (e) cumulative impacts that may occur as a result of the activities which include mining and associated overburden dumping;
- Recommend mitigation measures aimed at minimising the potential negative impacts and enhancing potential positive impacts while retaining reasonable operational efficiencies;
- List additional or required permitting and/or licensing requirements; and
- Take cognisance of the Wetland Delineation Guideline Document of the Department of Water, and if applicable the DEA&DP draft guideline: "Guideline for involving biodiversity specialists in EIA processes[22].

An aquatic impact assessment will be undertaken by Toni Belcher to determine the risk of flooding of the site. Toni Belcher is an Aquatic scientist (*Pr.Sci.Nat.* 400040/10) and holds a M.Sc. in Environmental Management. She has extensive knowledge and experience in water education; aquatic ecosystem monitoring and assessments; Environmental Impact Assessments; river classification and environmental water requirements; Integrated Water Resource Management; river, wetlands and estuary management; water resource legislation; and water resource institutions.

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

6.5.4 Proposed ToR for the Hydrology Assessment

The proposed ToR for the storm water specialist study is as follows:

- Prepare the following:
  - Storm water management report;
  - Existing surface hydrology drawing;
  - Proposed plant storm water layout drawing; and
  - Proposed storm water details.

Richard Hirst, an Engineering Director from SiVest, will undertake the hydrology study.

6.5.5 Proposed ToR for the Heritage Impact Assessment

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

- Conducting a detailed desk-top level investigation to identify all archaeological, cultural and historic sites in the proposed development areas;
- Undertaking field work to verify results of desktop investigation;
- Document (GPS coordinates and map) all sites, objects and structures identified on the candidate sites;
- Submit the relevant application form, as required by South African Heritage Resources Agency and Northern Cape Provincial Heritage (Boswa ya Kapa Bokone);
- Compile a report which would include: Identification of archaeological, cultural and historic sites within the proposed development areas;
- Assess the sensitivity and significance of archaeological remains in the site;
- Evaluation of the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources, in terms of the scale of impact (local, regional, national), magnitude of impact (low, medium or high) and the duration of the impact (construction, up to 10 years after construction (medium term), more than 10 years after construction (long term));
- Assessment of cumulative impacts;
- Recommendation of mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance;
- The preparation of a heritage resources management plan which includes recommendations on the management of the objects, sites or features, and also guidelines on procedures to be implemented if previously unidentified cultural resources are uncovered during later developments in the area. Please note this will only be required if heritage resources are discovered;
- Consideration of relevant guidelines; and
- Cognisance must be taken of the Department of Environmental Affairs and Development Planning guideline: “Guideline for involving heritage specialists in EIA processes[23].

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

The Heritage Impact Assessment will be undertaken by ACO Associates which was established in late 2008 as an allied operation to the Archaeology Contracts Office at the University of Cape Town. With 22 years of accumulated experience, and having completed over 800 projects, members of ACO Associates cc are equipped to handle assignments ranging from detailed, sensitive excavations, to large-scale field surveys and assessments of historic places.

6.5.6 Proposed ToR for the Palaeontology Impact Assessment

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

- Conducting a detailed desk-top level investigation to identify all palaeontological significant geological units in the proposed development areas;
- Undertaking field work, if necessary, to verify results of desktop investigation;
- Document (GPS coordinates and map) all sites, objects and structures identified on the candidate sites;
- Submit the relevant application form, as required by South African Heritage Resources Agency and Northern Cape Provincial Heritage (Boswa ya Kapa Bokone);
- Compile a report which would include:
    - Identification of palaeontologically significant sites within the proposed development areas;
    - Assess the sensitivity and significance of palaeontological resource of the site;
    - Evaluation of the potential impacts of construction, operation and maintenance of the proposed development on palaeontological resources, in terms of the scale of impact (local, regional, national), magnitude of impact (low, medium or high) and the duration of the impact (construction, up to 10 years after construction (medium term), more than 10 years after construction (long term));
    - Assessment of cumulative impacts;
    - Recommendation of mitigation measures to ameliorate any negative impacts on areas of palaeontological importance;
    - The preparation of a heritage resources management plan which includes recommendations on the management of the objects, sites or features, and also guidelines on procedures to be implemented if previously unidentified palaeontological resources are uncovered during later developments in the area;
    - Consideration of relevant guidelines; and
    - Cognisance must be taken of the Department of Environmental Affairs and Development Planning guideline: “Guideline for involving heritage specialists in EIA processes”[24].

Dr John Almond of Natura Viva cc will undertake a palaeontology desktop study. Dr Almond has a doctorate in Earth Sciences (Palaeontology) and over 25 years’ experience in the palaeontology.

6.5.7 Proposed ToR for the Visual Impact Assessment

The proposed ToR for this Visual Impact Assessment is as follows:

- Source and review baseline information;

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

- Undertake a level 3 impact assessment to include the following areas of study for the preferred layout, Alternatives, and the 'No-go' Alternative in a Visual Impact Assessment report;
- Identify issues raised relating to visual, aesthetic and scenic resources through any existing reports, baseline studies and framework plans, any public scoping phase, and site visits. The study must take into account the expected community response as well as the applicable South African standards;
- Describe the receiving environment and the proposed project in terms of landscape types, landscape character and land use patterns;
- Describe the sense of place and contributing factors, (spatial and non-spatial);
- Establish the view catchment area, view corridors, viewpoints and receptors;
- Determine the relative visibility or visual intrusion of the proposed project;
- Determine the relative compatibility or conflict of the project with the surrounding land uses in terms of visibility;
- Determine significant and or sensitive receptors;
- Indicate potential visual impacts using established criteria and including:
    - Potential lighting impacts at night,
    - Consideration of impacts at the construction phase,
    - Consideration of the implications of the phased development,
- Describe alternatives, mitigation measures and monitoring programs;
- Describe the opportunities and constraints of the alternatives;
- Use mapping and photo-montage techniques as appropriate; and
- In terms of evaluation criteria, use the criteria specific for Visual Impact Assessments listed in the Department of Environmental Affairs and Development Planning guideline document "Guideline for involving visual and aesthetic specialists in EIA processes".

The Visual Impact Assessment will be undertaken by Mr Steve Stead of Visual Resources Management Africa. Mr Stead is a member of the Association of Professional Heritage Practitioners (APHP) Western Cape and also an accredited Visual Impact Assessment practitioner member of the Association (2011).

6.5.8 Proposed ToR for the Agricultural Impact Assessment

The ToR for the proposed Agricultural Impact Assessment study is as follows:

- Compile a detailed desktop assessment for the proposed development areas;
- Broadly assess the soil and agricultural potential of the sites and receiving environment by interrogating relevant spatial and numeric datasets. The soil assessment must include the following as per DEAs requirements:
    - Identification of the soil forms present on site;
    - The size of the area where a particular soil form is found;
    - GPS reading of soil survey points;
    - The depth of the soil at each survey point;
    - Soil colour;
    - Limiting factors;
    - Clay content; and
    - Slope of the site.
- Provided shape files containing the soil forms and relevant attribute data as depicted on the maps:

- Undertake field verification which includes a soil survey. During this survey each soil sample point will be described to form and family level according to "Soil Classification - A Taxonomic System for South Africa" as well as noting relevant soil characteristics such as clay content, depth and limiting layers. In terms of area under assessment, the following information has been provided to us.
- Combine the information gained during the soil survey with verified climate, water resource, topographic, local agricultural practices and crop data in order to provide a spatial classification of the sites based on its soil characteristics and associated agricultural potential.
- Compile a detailed soil and land use impact assessment based on the predicted impacts resulting from the proposed activities. The detailed soil assessment of the site in question must incorporated a radius of 50m surrounding the site, on a scale of 1:10 000 of finer.
- Investigate direct and indirect impacts, ecosystem functionality impacts as well as the effect of cumulative impacts on the receiving environment. Detailed mitigation measures will, where necessary, be described in order to reduce / ameliorate the soil and land use impacts identified during the impact assessment. Aurecon's impact method statement will be used to assess the significance of the potential impacts.
- Compile an agricultural potential report to meet the Department of Agriculture's requirements and to encompass the findings of the desktop assessment, soil survey, agricultural evaluation and impact assessment.

The Agricultural Impact Assessment will be undertaken by Mr Kurt Barichievy of SiVest. Mr Barichievy is a registered Professional Natural Scientist (Registration No. 400129/11) and holds a MSc. Degree in Hydrology.

6.6 REASONABLE PROJECT ALTERNATIVES IDENTIFIED DURING SCOPING

Pursuant to this Scoping exercise, which was based on input from authorities, I&APs and various specialists, a shortlist of reasonable project alternatives has been identified for further, more detailed investigations during the EIA Phase, namely:

- **Location alternative:** Badenhorst Dam Farm (Portion 1 of Farm 180)
- **Layout alternatives as determined by scale and magnitude alternatives:** (Alternative 1 and Alternative 2)
- **Additional routing infrastructure:** One routing alternative for access roads and water pipeline
- **Technology alternatives:**
  - Solar Panel alternative: CPV and conventional PV
  - Mounting Alternatives: Fixed axis tracking system and single axis tracking system
- **Transmission line routing:** one transmission corridor
- **No-Go alternative**

6.7 THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

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

- A brief overview of the potential environmental impacts and reasonable alternatives identified during the Scoping investigation.
- A summary of the key findings of the various specialist studies as they pertain to the affected environment.
- An overview of the public participation process conducted during the EIA process.
- A detailed assessment of the significance of the potential environmental impacts for the various project alternatives. This assessment, which would use the methodology outlined in Section 6.4, would be informed by the findings of the specialist studies, and professional judgement.
- An overview of the full range of mitigation measures including an indication of how these would influence the significance of any potential environmental impacts, together with a LEMP. The mitigation measures would be informed by the specialist studies, professional experience and comments received from I&APs.
- A set of recommendations regarding the way forward would be provided, should any of the proposed alternatives be authorised in terms of NEMA.

6.8 PUBLIC PARTICIPATION PROCESS DURING THE EIA PHASE

The purpose of the PPP is to provide I&APs with adequate opportunity to provide input into the EIA process. Consultation with I&APs therefore forms an integral component of an EIA process and enables *inter alia* directly affected and neighbouring landowners, authorities, civic groups, stakeholders, and the general community to raise and/or identify issues and concerns relating to the proposed activity, which they feel should be addressed in the EIA process. The approach to this PPP has taken cognisance of the DEA&DP Guideline on Public Participation (2013) and DEA's Integrated Environmental Management Guideline Series 7[25]: June 2010 which complies with sections 54 to 58 of R. 543 of the NEMA EIA Regulations. The proposed PPP to be undertaken during the EIA phase are described in Section 2.6.5.

6.8.1 Stages at which the Authorities are consulted

In terms of Sections 24 O (2) and (3) of the NEMA (as amended), the following state departments will be sent hard and or electronic copies of all reports. As with I&APs, State departments will be provided with 40-days to comment on draft reports and 21-days to comment on final reports. The competent authority (DEA) will be notified of the State departments who were provided with copies of the report.

6.9 PROPOSED PROGRAMME

It is envisaged that EIA process would take approximately 12 months to complete.

6.10 PERSONNEL

Aurecon have selected a group of highly experienced specialists and multi-disciplinary practitioners in order to execute this project as efficiently as possible. The Project Director, Mr Andries van der Merwe is appropriately qualified and registered with the relevant professional bodies. Mr van der

[25] Public Participation in the EIA Process

Merwe is a certified Environmental Engineer registered with the Engineering Council of South Africa (*PrEng*) and holds a B Eng (Civil) degree. Mr van der Merwe has over 13 years' experience in the field of impact assessment.

Ms Corbett, an Associate in the Cape Town office, has a Bachelors of Science (Hons) Degree in Environmental and Geographical Science, specialising in Environmental Management, from the University of Cape Town. She has seven years' experience in the environmental field. Ms Corbett is a Registered Professional Natural Scientist with the South African Council for Natural Scientific Professions.

Miss Karen Versfeld is an Environmental Practitioner with over seven years' experience in the field. Miss Versfeld has a Master of Science Degree in Water Resource Management from the University of Pretoria and is registered as a Candidate Natural Scientist with SACNASP.

Mrs Karen de Bruyn is an Environmental Practitioner with three years' experience in the field. Mrs de Bruyn has a Masters of Philosophy in Environmental Management and is also a Certified Natural Scientist with SACNASP.

Miss Grace Shihepo is currently employed as an Environmental Consultant at Aurecon`s Cape Town office. With an MSc in Environmental Science, specialising in Environmental Planning and Management, Grace has over eight years' experience within the field of environmental science.

Aurecon and the above environmental assessment practitioners (EAPs) are bound by the codes of conduct for EAPSA and SACNASP. The Curriculum Vitae's of the key Aurecon staff is included in Annexure C.

7 CONCLUSION

This section concludes the report.

7.1 WAY FORWARD

The current phase of the Public Participation Process commenced on 30 April 2013 and Interested and Affected Parties were afforded 40-days to provide comments on this DSR, until **10 June 2013**. The DSR were lodged in the De Aar Public Library, Emthanjeni Municipal buildings and on the Aurecon website and potential I&AP's were notified of the availability of the report

Cognisance will be taken of all comments in compiling the final report, and the comments, together with the project team and proponent's responses thereto, will be included in the final report. Where appropriate, the report will be updated.

Once the FSR has been completed, including the CRR, it will be submitted to the DEA for review.

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

(a) Accept the report and advise the Environmental Assessment Practitioner (EAP) to proceed with the tasks contemplated in the Plan of Study for EIA;
(b) Request the EAP to make such amendments to the report as the competent authority may require; or
(c) Reject the Scoping Report if it
    (i) Does not contain material information required in terms of these regulations, or
    (ii) Has not taken into account guidelines applicable in respect of Scoping Reports and Plans of Study for EIA.

8

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TABLE OF ANNEXURES

Annexure A

Application Form
Acknowledgement from DEA

Annexure B

Annexure B1- List of potential Interested and Affected Parties
Annexure B2- Site Notices
Annexure B3- Advertisements

Annexure C

CVs of Project Team

- Andries van der Merwe
- Louise Corbett
- Karen Versfeld
- Karen de Bruyn
- Grace Shihepo

9 REPORT TRANSMITTAL NOTE

No of Hard-copies	No of E-copies	DISTRIBUTION RECORD (hard copy)			
		To (Name)	Organisation	Rev	Date sent
1 of Draft and 5 of Final	1	Kim Balutto	Department of Environmental Affairs	Draft	24 April 2013
0	1	Jacoline Mans	National Department of Agriculture, Forestry and Fisheries: Directorate: Land Use and Soil Management	Draft	24 April 2013
1	0	Mev. C. Kloppers	Emthanjeni Local Municipality	Draft	24 April 2013
1	0	Martha Gweyi	De Aar public library	Draft	24 April 2013
1	1	Thato Molese	Department of Environmental Affairs and Nature Conservation (DEANC)	Draft	24 April 2013
2	1	John Geeringh or Wilson Mulaudzi	Eskom Holdings Limited	Draft	24 April 2013
0	1	Dr Mariagrazia Galimberti	South African Heritage Resources Agency (SAHRA)	Draft	24 April 2013
0	1	Provincial Manager	Northern Cape Provincial Heritage: Boswa ya Kapa Bokone;	Draft	24 April 2013
0	1	Ivan Ermanus	Pixley ka Seme District Municipality	Draft	24 April 2013
0	1	Dr Kegaliwe	Department of Agriculture (Northern Cape)	Draft	24 April 2013
0	1	Shaun Cloete	Department of Water Affairs: Deputy Director Lower Orange WMA	Draft	24 April 2013
0	1	SP Mokuele	Department of Energy (Northern Cape): Regional Energy Director	Draft	24 April 2013
6 draft and 9 of Final	10	Total			

Distributed by : **Karen de Bruyn**

(Full name) (Signature)

Unit/Office : Cape Town Delivery Centre **Date :** 30 April 2013