

**PROPOSED DEVELOPMENT OF A 3,15 MW PV PLANT ON FARM
RE/154, PIKETBERG, WESTERN CAPE.**

ENVIRONMENTAL MANAGEMENT PROGRAMME

DEADP Ref: 16/3/3/1/F5/2028/23

**(INCLUDING THE WASTE, WATER USE AND ELECTRICITY CONSUMPTION MINIMIZATION AND
MANAGEMENT PLAN)**

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TABLE OF CONTENTS

ABBREVIATIONS	i
DEFINITIONS	ii
REFERENCES	v
SECTION 1 - INTRODUCTION AND BACKGROUND	1
SECTION 2 – SITE SPECIFIC INFORMATION	3
CIVIL SERVICES	7
SECTION 3 – ENFORCEMENT, MONITORING AND AUDITING	21
SECTION 4 - GENERIC CONSTRUCTION PHASE EMP - IMPLIMENTATION	27
REFERENCES	76
SUB SECTION 1 - INTRODUCTION	77
SUB SECTION 2 - WASTE REDUCTION	78
SUB SECTION 3 - WASTE MINIMIZATION PLAN	81
SUB SECTION 4 – WATER USE AND MANAGEMENT PLAN	84
ANNEXURE 1 DECLARATION OF UNDERSTANDING BY THE DEVELOPER	85
ANNEXURE 2 DECLARATION OF UNDERSTANDING BY THE ENGINEER	86
ANNEXURE 3 DECLARATION OF UNDERSTANDING BY THE CONTRACTOR	87
ANNEXURE 4 INCIDENT AND ENVIRONMENTAL LOG	88

LIST OF TABLES

TABLE 1: PROPOSED DEVELOPMENT OF A 3,15 MW PV PLANT ON FARM RE/154, PIKETBERG, WESTERN CAPE, PRE-CONSTRUCTION (PLANNING) PHASE EMP.	29
Table 2: ADDITIONAL CONDITIONS FOR THE PROPOSED DEVELOPMENT OF A 3,15 MW PV PLANT ON FARM RE/154, PIKETBERG, WESTERN CAPE, EMP	35
Table 3: PROPOSED DEVELOPMENT OF A 3,15 MW PV PLANT ON FARM RE/154, PIKETBERG, WESTERN CAPE, CONSTRUCTION PHASE EMP (Materials)	39
Table 4: PROPOSED DEVELOPMENT OF A 3,15 MW PV PLANT ON FARM RE/154, PIKETBERG, WESTERN CAPE, CONSTRUCTION PHASE EMP (Plant).....	46
Table 5: PROPOSED DEVELOPMENT OF A 3,15 MW PV PLANT ON FARM RE/154, PIKETBERG, WESTERN CAPE, CONSTRUCTION PHASE EMP (Construction).....	52
Table 6: PROPOSED DEVELOPMENT OF A 3,15 MW PV PLANT ON FARM RE/154, PIKETBERG, WESTERN CAPE, <i>OPERATIONAL</i> PHASE EMP (General)	67
Table 7: PROPOSED DEVELOPMENT OF A 3,15 MW PV PLANT ON FARM RE/154, PIKETBERG, WESTERN CAPE, <i>OPERATIONAL</i> PHASE EMP (EA conditions)	74

ABBREVIATIONS

DEA&DP	Department of Environmental Affairs and Development Planning
DEA.....	Department of Environmental Affairs
DWS.....	Department of Water and Sanitation

EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme
EO	Environmental Officer
ESO	Environmental Site Officer
GNEC	Guillaume Nel Environmental Consulting
I&AP	Interested and Affected Parties

DEFINITIONS

Alien species - Plants and animals which do not arrive naturally in an area - they are brought in by humans. Alien plants often force indigenous species out of the area. Rooikrans is a good example of alien species in the Cape.

Alternative - A possible course of action, in place of another, that would meet the same purpose and need defined by the development proposal. Alternatives considered in the EIA process can include location and/or routing alternatives, layout alternatives, process and/or design alternatives, scheduling alternatives or input alternatives.

Aspect – Element of an organisation's activities, products or services that can interact with the environment.

Auditing - A systematic, documented, periodic and objective evaluation of how well the environmental management programme is performing with the aim of helping to safeguard the environment by: facilitating management control which would include meeting regulatory requirements. Results of the audit help the organisation to improve its environmental policies and management systems.

Biodiversity - The rich variety of plants and animals that live in their own environment. Fynbos is a good example of rich biodiversity in the Cape.

Built environment - Physical surroundings created by human activity, e.g. buildings, houses, roads, bridges and harbours.

Conservation - Protecting, using and saving resources wisely, especially the biodiversity found in an area.

Contamination - Polluting or making something impure.

Corrective (or remedial) action - Response required to address an environmental problem that is in conflict with the requirements of the EMP. The need for corrective action may be determined through monitoring, audits or management review.

Degradation - The lowering of the quality of the environment through human activities, e.g. river degradation, soil degradation.

Ecology - The scientific study of the relationship between living things (animals, plants and humans) and their environment.

Ecosystem - The relationship and interaction between plants, animals and the non-living environment.

Environment - Our surroundings, including living and non-living elements, e.g. land, soil, plants, animals, air, water and humans. The environment also refers to our social and economic surroundings, and our effect on our surroundings.

Environmental Impact Assessment (EIA) - An Environmental Impact Assessment (EIA) refers to the process of identifying, predicting and assessing the potential positive and negative social, economic and biophysical impacts of a proposed development. The EIA includes an evaluation of alternatives; recommendations for appropriate management actions for minimising or avoiding negative impacts and for enhancing positive impacts; as well as proposed monitoring measures.

Environmental Management System (EMS) - Environmental Management Systems (EMS) provide guidance on how to manage the environmental impacts of activities, products and services. They detail the organisational structure, responsibilities, practices, procedures, processes and resources for environmental management. The ISO14001 EMS standard has been developed by the International Standards Organisation.

Environmental policy - Statement of intent and principles in relation to overall environmental performance, providing a framework for the setting of objectives and targets.

Fynbos - Low-growing and evergreen vegetation found only in the south Western Cape. Fynbos is known for its rich biodiversity.

Habitat - The physical environment that is home to plants and animals in an area, and where they live, feed and reproduce.

Hazardous waste – Waste, even in small amounts, that can cause damage to plants, animals, their habitat and the well-being of human beings, e.g. waste from factories, detergents, pesticides, hydrocarbons, etc.

Impact - A description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.

Indigenous species - Plants and animals that are naturally found in an area.

Infrastructure - The network of facilities and services that are needed for economic activities, e.g. roads, electricity, water, sewerage.

Integrated - Mixing or combining all useful information and factors into a joint or unified whole. See Integrated Environmental Management.

Integrated Environmental Management (IEM) - A way of managing the environment by including environmental factors in all stages of development. This includes thinking about physical, social, cultural and economic factors and consulting with all the people affected by the proposed developments. Also called "IEM".

Land use - The use of land for human activities, e.g. residential, commercial, industrial use.

Mitigation - Measures designed to avoid, reduce or remedy adverse impacts

Natural environment - Our physical surroundings, including plants and animals, when they are unspoiled by human activities.

Over-utilisation - Over-using resources - this affects their future use and the environment.

Policy - A set of aims, guidelines and procedures to help you make decisions and manage an organisation or structure. Policies are based on people's values and goals. See Integrated Metropolitan Environmental Policy.

Process - Development usually happens through a process - a number of planned steps or stages.

Proponent – Developer. Entity which applies for environmental approval and is ultimately accountable for compliance to conditions stipulated in the Environmental authorisation (EA) and requirements of the EMP.

Recycling - Collecting, cleaning and re-using materials.

Resources - Parts of our natural environment that we use and protect, e.g. land, forests, water, wildlife, and minerals.

Scoping Report - A report presenting the findings of the scoping phase of the EIA. This report is primarily aimed at reaching closure on the issues and alternatives to be addressed in the EIA (in the case of a full EIA process).

Stakeholders - A subgroup of the public whose interests may be positively or negatively affected by a proposal or activity and/or who are concerned with a proposal or activity and its consequences. The term includes the proponent, authorities and all interested and affected parties.

Storm water management – Strategies implemented to control the surface flow of storm water such that erosion, sedimentation and pollution of surface and ground water resources in the immediate and surrounding environments are mitigated. This is specifically important during the construction and decommissioning phases of a project.

Sustainable development - Development that is planned to meet the needs of present and future generations, e.g. the need for basic environmental, social and economic services. Sustainable development includes using and maintaining resources responsibly.

Sustainability - Being able to meet the needs of present and future resources.

Waste Management – Classifying, recycling, treatment and disposal of waste generated during construction and decommissioning activities.

Wetlands - An area of land with water mostly at or near the surface, resulting in a waterlogged habitat containing characteristic vegetation species and soil types e.g. vleis, swamps.

Zoning - The control of land use by only allowing specific type development in fixed areas or zones

REFERENCES

DEAT (1992) Integrated Environmental Management Guideline Series, Volumes 1-6, Department of Environmental Affairs, Pretoria.

DEAT (2004a) Environmental Management Plans, Integrated Environmental Management, Information Series 12, Department of Environmental Affairs and Tourism (DEAT), Pretoria.

Department of Environmental Affairs and Development Planning Generic Environmental Management Plan Guideline, prepared by Strategic Environmental Focus, 2007

CITY OF CAPE TOWN: ENVIRONMENTAL MANAGEMENT PROGRAMME (2002) Specification EM – 02/07: ENVIRONMENTAL MANAGEMENT, Ver 5 (03/2002)

Lochner, P. 2005. Guideline for Environmental Management Plans. CSIR Report No ENV-S-C 2005-053 H. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

National Environmental Management Act 107 of 1998 (NEMA)

SECTION 1 - INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION AND BACKGROUND

The Le Roux Group (Broodkraal Landgoed (Pty) Ltd), will use this Planning, Construction and Operational Phase Environmental Management Programme (EMP) as a tool in managing the impacts of the application for the proposed development of a solar power plant on Farm RE/154, Piketberg, Western Cape. After environmental approval from the Department of Environmental Affairs and Development Planning (DEADP) in terms of the Environmental Impact Assessment Regulations – National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), which replaced the regulations under the Environment Conservation Act, 1989 (Act No. 73 of 1989) and has been effective as of 3 July 2006.

This document is based on the EMP Guideline provided by DEA&DP which was compiled in accordance with the Integrated Environmental Management (IEM) philosophy which aims to achieve a desirable balance between conservation and development (DEAT, 1992). IEM is a key instrument of the National Environmental Management Act [NEMA] (Act No. 107 of 1998). NEMA promotes the integrated environmental management of activities that may have a significant effect on the environment, while IEM prescribes a methodology for ensuring that environmental management principles are fully integrated into all stages of the development process. It advocates the use of several environmental and management tools that are appropriate for the various levels of decision-making. One such tool is an Environmental Management Programme (EMP).

The IEM guidelines intend encouraging a pro-active approach to sourcing, collating and presenting information in a manner that can be interpreted at all levels. The basic principles underpinning IEM are that there be:

- informed decision-making;
- accountability for information on which decisions are taken;
- accountability for decisions taken;
- a broad meaning given to the term environment (i.e. one that includes physical, biological, social, economic, cultural, historical and political components);
- an open, participatory approach in the planning of proposals;
- consultation with interested and affected parties;
- due consideration of alternative options;
- an attempt to mitigate negative impacts and enhance positive aspects of proposals;
- an attempt to ensure that the 'social costs' of development proposals (those borne by society, rather than the developers) be outweighed by the 'social benefits' (benefits to society as a results of the actions of the developers);
- democratic regards for individual rights and obligations;

- compliance with these principles during all stages of the planning, implementation and decommissioning of the proposals (i.e. from 'cradle to grave'), and
- The opportunity for public and specialist input in the decision-making process.

These principles are in line with NEMA, which has repealed a number of the provisions of the Environment Conservation Act, 1989 [ECA] (Act No. 73 of 1989), and is focussed primarily on co-operative governance, public participation and sustainable development. The Environmental Impact Assessment Regulations that took effect in July 2006 regulate the procedures and criteria for the submission, processing, consideration and decision on applications for environmental authorisation of listed activities.

1.2 SCOPE AND TERMS OF REFERENCE

The general principles contained within this document apply to all **PRE-CONSTRUCTION, CONSTRUCTION AND OPERATIONAL** activities.

Principles of this EMP:

This EMP is compiled using the following concepts and implementation requirements so that the higher principles of sustainable development are realised:

- **Continuous improvement.** The project proponent (or implementing organisation) must be committed to review and to continually improve environmental management, with the objective of improving overall environmental performance.
- **Broad level of commitment.** A broad level of commitment will be required from all levels of management as well as the workforce in order for the development and implementation of this EMP to be successful and effective.
- **Flexible and responsive.** The implementation of the EMP must be responsive to new and changing circumstances, i.e. rapid short-term responses to problems or incidents. The EMP is a dynamic "living" document and thus regular planned review and revision of the EMP must be carried out.
- **Integration across operations.** This EMP is integrated across existing line functions and operational units such as health, safety and environmental departments in a company/project. This is done to change the redundant mindset of seeing environmental management as a single domain unit.
- **Legislation.** It is understood that any development project during its construction phase is a dynamic activity within a dynamic environment. The Developer, Engineer, Contractor and sub-contractor must therefore be aware that certain activities conducted during construction may require further licensing or environmental approval, e.g. river or stream diversions, bulk fuel storage, waste disposal, etc. The Contractor must consult the RE, EO and ECO on a regular basis in this regard.

SECTION 2 – SITE SPECIFIC INFORMATION

2.1 PROPOSED ACTIVITY AND LOCAL CONTEXT

Guillaume Nel Environmental Consultants (GNEC) has been appointed by the le Roux Group to facilitate the Environmental Impact Assessment (EIA) process required by the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) for Basic Assessment for the proposed development of a solar power plant on Farm RE/154, Piketberg, Western Cape.

To accommodate the proposed development, application in terms of NEMA is made for the development of a facility for renewable energy production covering an area larger than 1 hectare outside urban areas.

After the legislated 30 day public participation round, it was highlighted by the DEA&DP that some additional information should be provided. This includes more detail on locations, associated powerlines and stormwater infrastructure. The powerlines indicated on the engineers drawing (previous SDP) was wrongfully indicated as proposed powerlines – these are existing powerlines and have been corrected in the updated SDP. As seen in Figure 1 as well. The Powerlines are 11kVa capacity. Furthermore, the department highlighted that the ELU of the farm should be indicated to highlight sufficient water for the cleaning of the solar panels. Further details on the water use of the farm indicated that there is more than enough water available to wash the panels.

In addition to the above, the DWS and DEADP requested additional clarity regarding the applicability of the NWA and need for a WULA. Further information has been provided in the form of proving that the proposed development is located a significant distance from the 1:100 year floodline, therefore, not triggering Section 21 (c) and (i), [In response to the DWS comments in the first public participation round, the location of the 1:100 year floodline was determined in order to prove that the PV plant will be located a considerable distance from any NWA zone of regulation and therefore does not trigger Section 21 c and i. Since the 1:100 year floodline has been determined, the 100m zone of regulation does not apply. The watercourse is determined to be a tributary and not a wetland, therefore, the 500m zone of regulation also does not apply. The BAR has been updated to reflect this 1:100 floodline and its location compared to the development, with the argument that the development does not trigger Section 21 c and i.](#)

Location:

The proposed development site, a 3,6 Ha portion of Farm RE/154 is located in the Swartland Municipality near Piketberg on the R399. The farm entrance is located south of the Wittewater area (Figure 14). The proposed development site covers 1 ha on agricultural land.

The proposed development site is bordered to the north by a utility area consisting of electrical and water storage infrastructure. Further towards the north farm worker cottages, other agricultural sheds and the Berg River are located. Towards the south and east of the development site, previously cultivated land can be found.

Please refer to **Figure 1 and 2** for a Locality Map.

Locality of the proposed PV Plant (corner coordinates):

NW corner:

32°56'48.52"S 18°41'6.34"E

NE corner:

32°56'48.72"S 18°41'13.89"E

SW corner:

32°56'54.29"S 18°41'6.71"E

SE corner:

32°56'54.21"S 18°41'14.20"E

Locality of the Substation:

32°56'46.96"S 18°41'4.02"E

Land Use, Land Cover and Site Description:

Towards the west of site an unnamed tributary of the Berg River is located. The development site is planned at least 70m from the bank of the watercourse. A large farm dam is located within this tributary. A Freshwater Verification Investigation has been conducted by FEN Consultants to determine if any other watercourses are located on site.

The proposed development site is situated on agricultural land, outside urban areas. Currently the site is not cultivated and exists as an open unused portion of agricultural land. The site has been ploughed in 2009 and potentially for years before 2009. Furthermore, the site has been ploughed/cleared in 2022 but not cultivated. The site has been transformed from its natural state due to these previous agricultural activities having a notable transformative effect on the vegetation and seedbank of the area.

According to the National Vegetation Map (2018) the vegetation type occurring on the proposed development site is Swartland Shale Renosterveld. This vegetation type is critically endangered according to the NATIONAL LIST OF ECOSYSTEMS THAT ARE THREATENED AND IN NEED OF PROTECTION. Although the vegetation type historically occurring on the site is critically endangered, the site has been transformed by agricultural activities and does not currently support Swartland Shale Renosterveld.

According to the Western Cape Spatial Biodiversity Plan, no CBA's are mapped on the proposed development site. A small portion of terrestrial CBA is mapped within the unnamed tributary adjacent to the development site. Furthermore, no ESA's or Other Natural Areas has been classified on or near the development site.



Figure 1: Photograph taken towards the East illustrating the elongated portion of the rectangle of the proposed development as it lays towards the East.

Topography:

The proposed development site has a very slight slope of 3%, sloping from east to west towards the unnamed tributary. Elevation changes within the specific site where the solar panels are planned from 25m.a.s.l. in the east to 19 m.a.s.l. in the west. The dominant flow type on the development site is shallow overland flow or sheet flow. No concentrated flow paths are located on site.

FEN Consultants were appointed to verify whether any wetlands are located on site and delineated the tributary to the west. The unnamed tributary will not be impacted by the proposed development because the development is planned at least 70m from the banks of the tributary. No other wetlands are located on or near the development site.

Please refer to **Figure 2** for a Locality Map.

Please refer to **Figure 3** for an Aerial Image of the Site.

Please refer to **Figure 4** for a development layout.

2.2 PROJECT DESCRIPTION

The applicant proposes to develop a ground mounted Solar Power Plant (Footprint 3,6 ha) with the ability to generate approximately 3145 kW. Additionally, to accommodate the proposed development the ground surface needs to be levelled. The solar panels are planned to be located near existing electrical and utility infrastructure on open unused agricultural lands. The site is situated near fields of shade netting for table grapes.

The solar power plant will mainly be used to service the Broodkraal farm packhouses and coolers in order to increase agricultural productivity.

The Solar Power Plant description:

Project Size: 3145 kWp.

- Orientation: Portrait
- Angle of Inclination: 15
- Rows Per table:3
- Modules per Row: Varied
- Embedded Depth of the Foundation: 1400mm
- Clearance of module edge to ground: 600mm
- Total number of foundations: 1008mm
- Total number of tables: 72
- Total number of modules: 6912

Module Details:

- Length: 2094mm
- Width: 996mm
- Height: 40mm
- Wp: 455mm

Existing powerlines (11kV) towards the north and west will be utilised to convey electricity.

Please refer to Figure 3 below for a layout of the proposed development.

See Figure 4 for the proposed services solution.

See Figure 5 for a detailed description of the proposed farmstall on the Northern Island.

See Figure 6 for an outline of the project proposal and location of the floodlines.

See Figure 7 for a detailed illustration of the proposed development with associated infrastructure.

CIVIL SERVICES

Water:

No additional water will be required for the solar power plant. No toilets or other structures will be erected on site other than the solar panels. Water will only be required to clean the solar panels during the operational phase. To ensure optimum efficiency the panels would have to be cleaned regularly with soft water and biodegradable soap. Rainwater will be used to clean the solar panels in a “self cleaning” manner during the rainy seasons and water will only be required to wash the panels in the dry season.

It is estimated that about 2L of water is required per panel and that washing will take place twice per year. Therefore, for Broodkraal se 3.15MW PV plant: 6912 Modules x 2L water x 2 times per year = 27 648L (27,7 cubic meters)

The Broodkraal farm currently has sufficient water use rights to be able to wash the solar panels.

The entire farm has a total of 7 180 000 cubic meters of water available. Currently Broodkraal irrigates about 550 ha of cultivated land and the applicant indicated that about 7000 cubic meters are required per hectare. Therefore, the farm utilizes (7000 x 550) 3 850 000 cubic meters and has 7 180 000 cubic meters of water available indicating sufficient water available to cleaning the solar panels.

Proof of water use rights are attached in Appendix M.

Sanitation:

No additional sewerage will be generated from the proposed solar power plant. No toilets or other structures will be constructed on the proposed site.

Roads:

Dirt roads will be utilised within the solar power plant along the perimeter. Access will be gained from the northern border of the site.

Stormwater:

Stormwater from the solar power plant will be allowed to follow the natural drainage pattern towards the west. It is proposed that the PV plant will utilize the natural drainage of the site to handle stormwater, status quo will remain. It is important to mention that the site is relatively flat and no concentrated flow paths exist on the proposed development site. The slope percentage of the site is an average of 3% with a NNW facing aspect. Water is expected to run in a NNW direction via shallow overland flow. The shallow gradient, will not result in erosion or the excessive transport of sediment towards waterways. As a mitigation measure, it is proposed to maintain the narrow corridor of existing vegetation adjacent to the tributary to the west of the site to act as a buffer against potential runoff.

Additionally, mitigation measures of the Freshwater Specialist should be implemented during the operational phase as indicated in the EMPr.

Electricity:

The solar power plant will be connected to the private Switching Station. Location indicated in above section.

The solar power plant will generate a total 3145 kW current into the private Broodkraal farm and farm village network. This electricity will be used to keep the freezers at the packhouses running together with pumps and the workers village. It is planned to export 600 kVA into the external ESKOM network and extract the 600 kVA at another facility owned by the Le Roux Group.

The powerlines indicated on the engineers drawing (previous SDP) was wrongfully indicated as proposed powerlines – these are existing powerlines and have been corrected in the updated SDP. As seen in Figure 1 as well. The Powerlines are 11kVa capacity and will not be upgraded but retained.

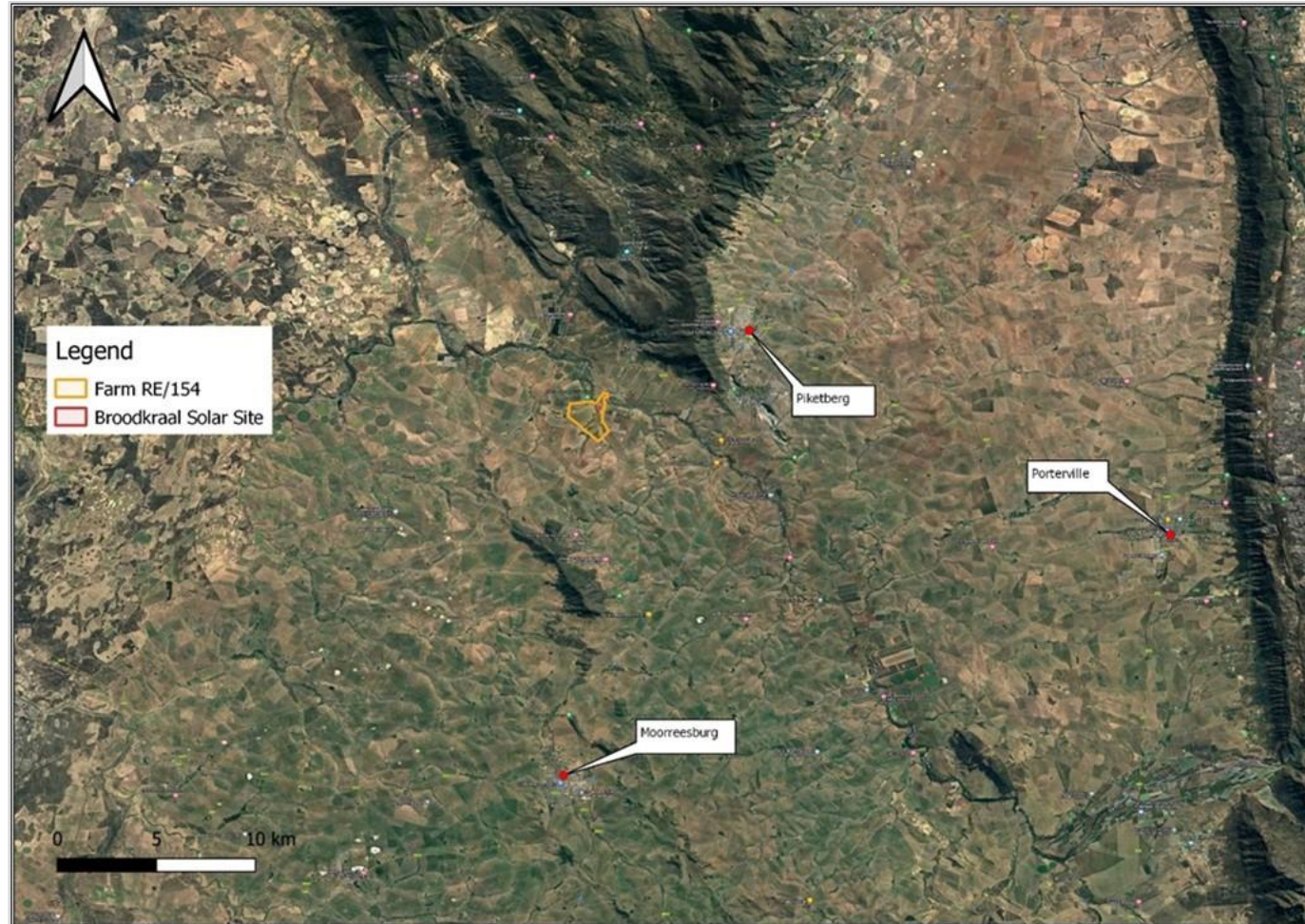


FIGURE 1: LOCALITY MAP OF THE PROPOSED DEVELOPMENT SITE.

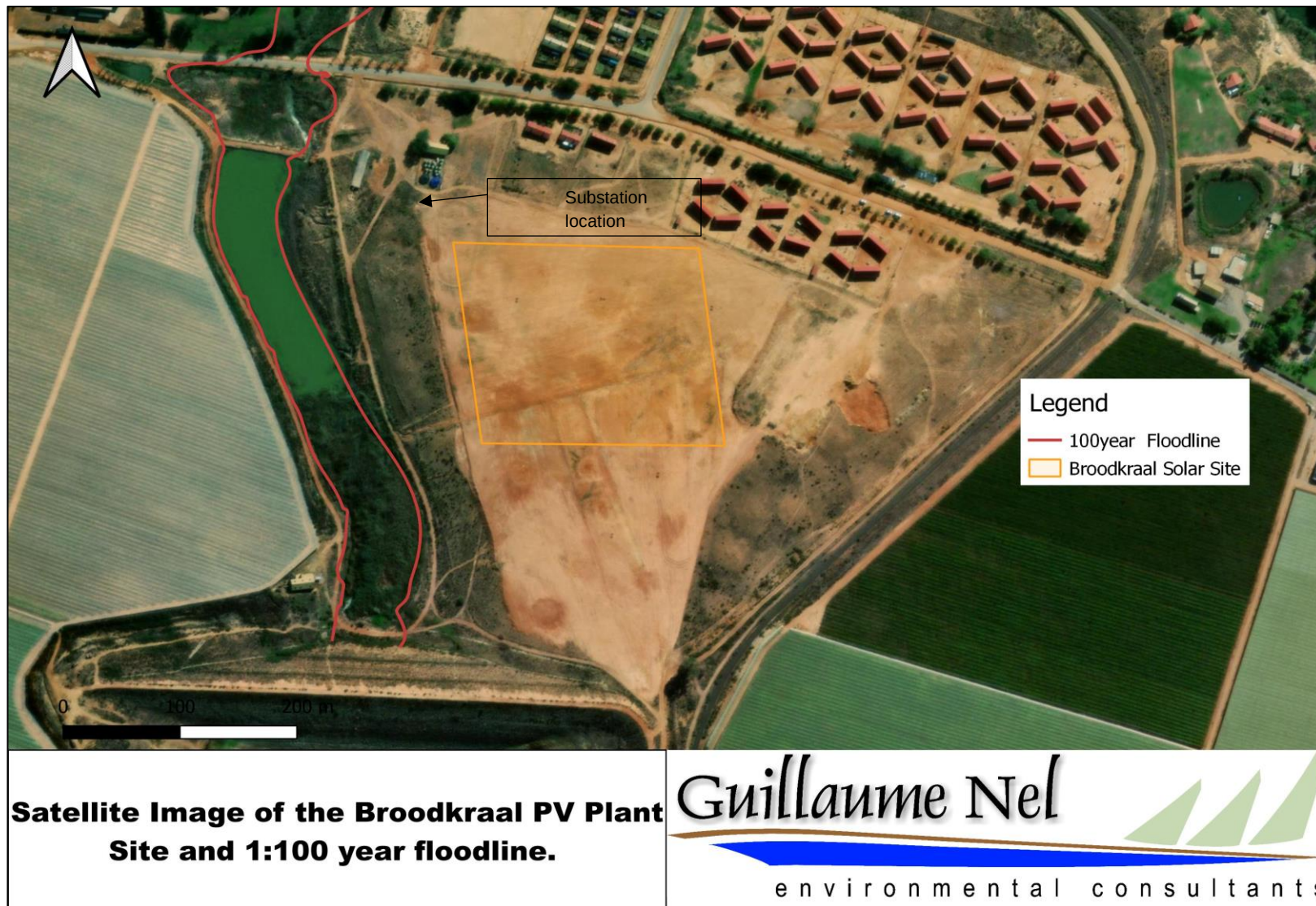


FIGURE 2: SATELLITE IMAGE OF THE PROPOSED DEVELOPMENT SITE INDICATING THE 1:100 YEAR FLOODLINES OF THE TRIBUTARY OF THE BERG RIVER.

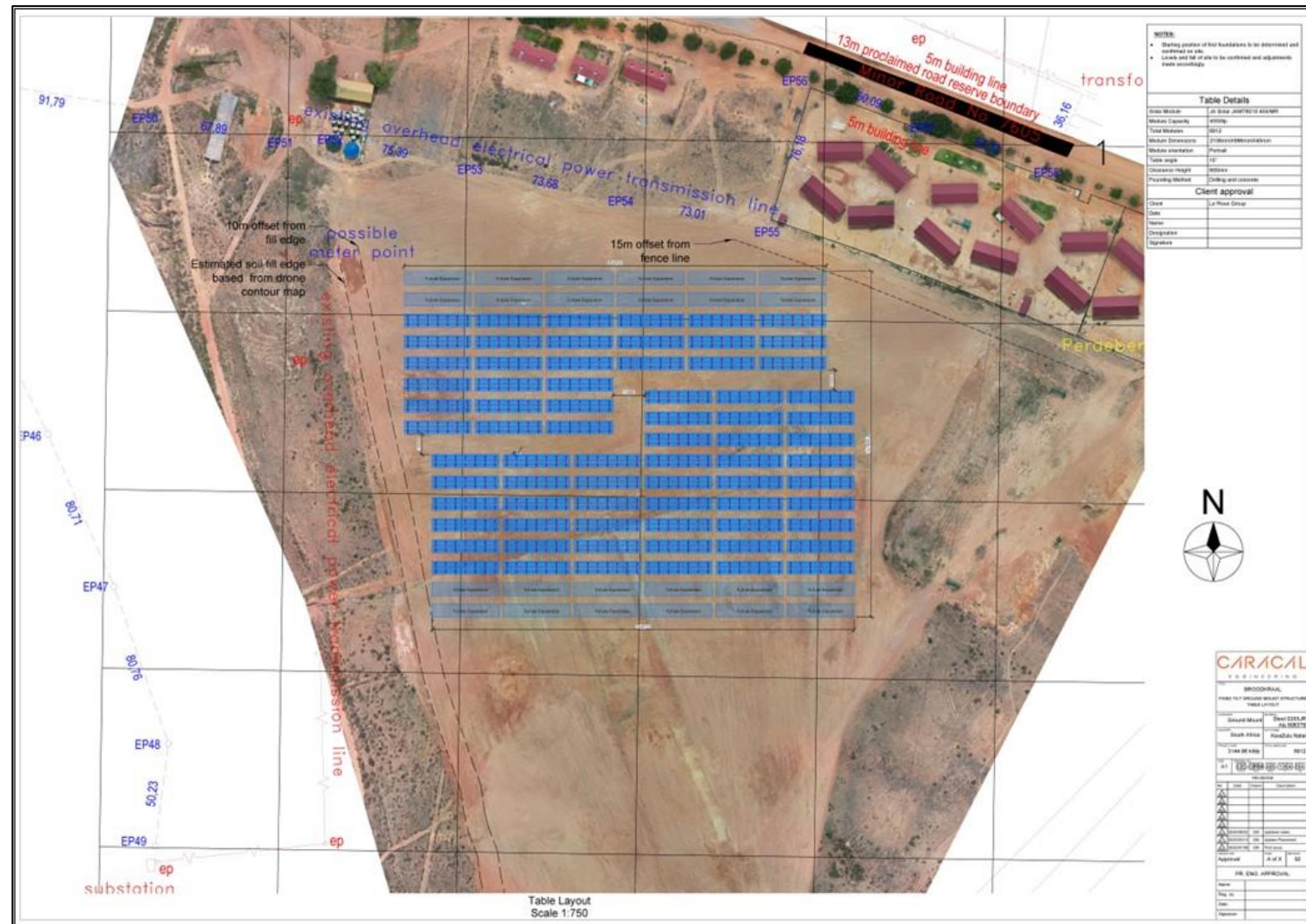


FIGURE 3: PROPOSED DEVELOPMENT PLAN

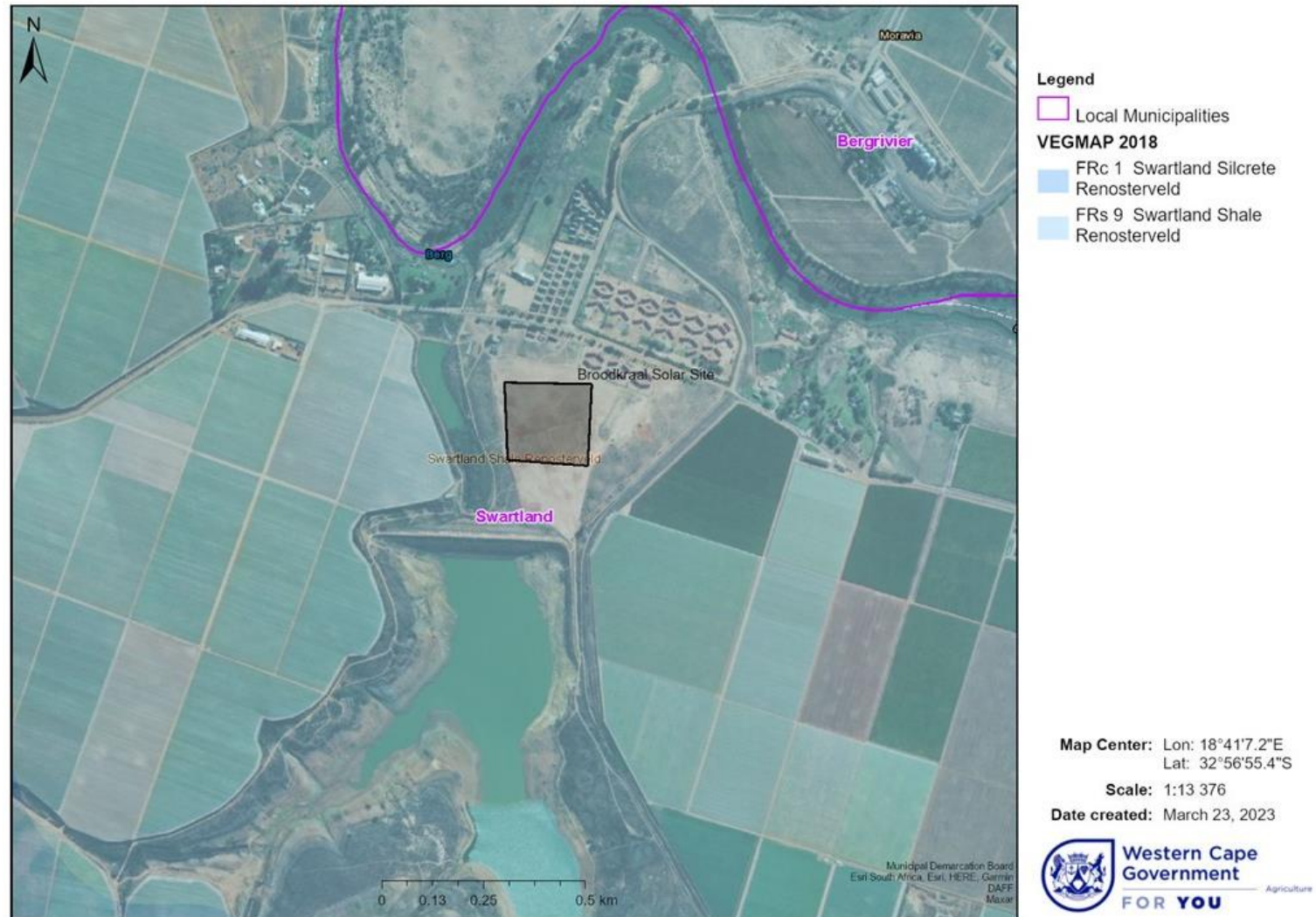


FIGURE 4: VEGETATION MAP OF THE PROPOSED DEVELOPMENT SITE.

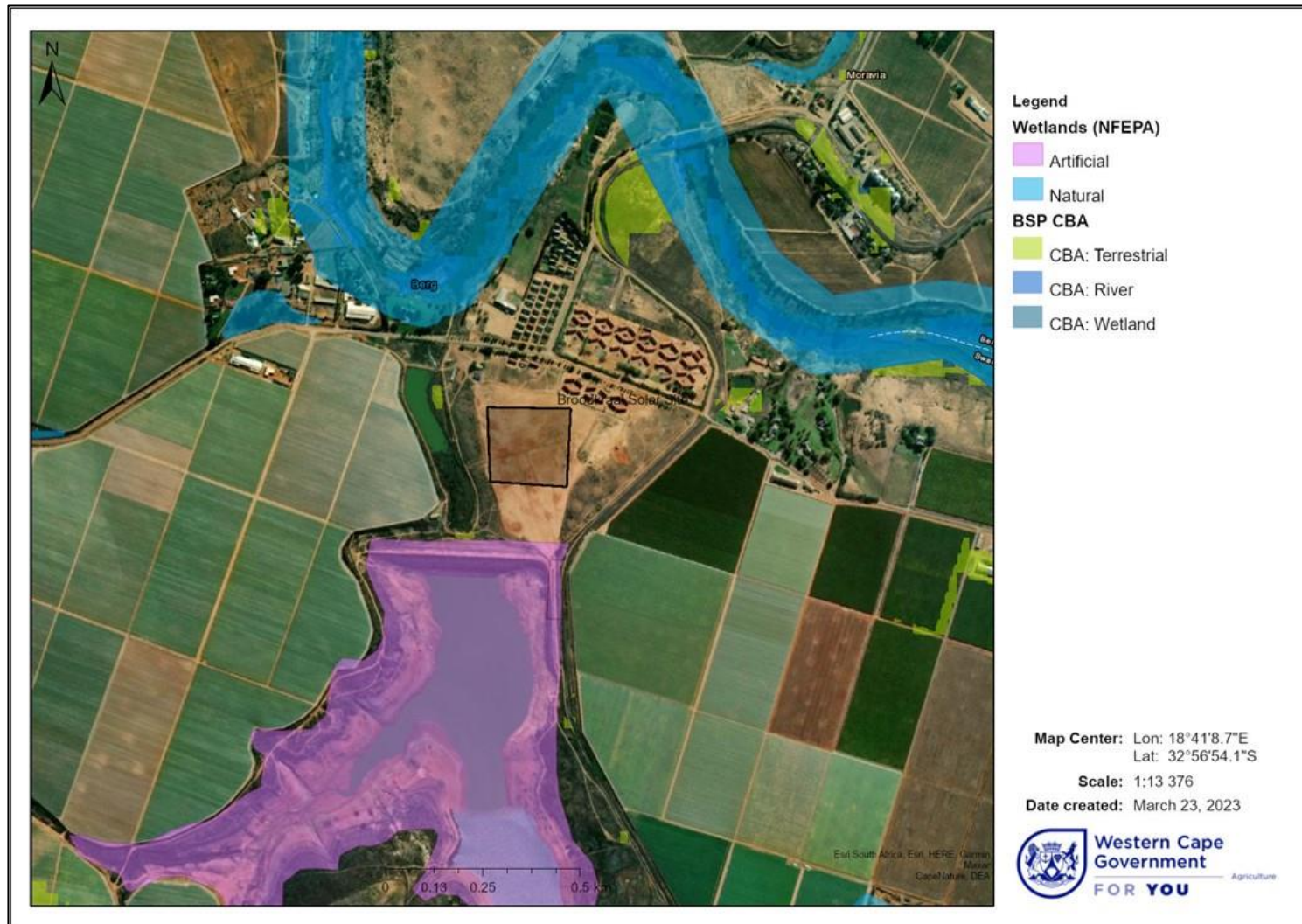


FIGURE 5: BIODIVERSITY OVERLAY MAP FOR THE PROPOSED DEVELOPOMENT SITE.



FIGURE 3: FRESHWATER FEATURES NEAR THE DEVELOPMENT SITE.



FIGURE 4: NO-GO AREAS AS IDENTIFIED BY THE SPECIALISTS.

2.1.1 Summary of impacts associated with the proposed activity.

Surface Water:

The site on which the solar power plant is planned is not in close proximity to aquatic resources.

FEN Consultants were appointed to verify whether any wetlands are located on site and delineated the tributary to the west. The unnamed tributary will not be impacted by the proposed development because the development is planned at least 70m from the banks of the tributary. No other wetlands are located on or near the development site.

While the freshwater systems located outside the study area are not considered highly sensitive to changes in the landscape due to the historical and ongoing impacts, and no direct impacts are expected to these freshwater ecosystems from the proposed solar development, indirect impacts or edge effects from the construction and operation of the proposed solar development are likely and may lead to cumulative impacts on a local scale.

Towards the west of site an unnamed tributary of the Berg River is located. The development site is planned at least 70m from the bank of the watercourse. A large farm dam is located within this tributary. A Freshwater Verification Investigation has been conducted by FEN Consultants to determine if any other watercourses are located on site.

Biodiversity Aspects:

The proposed development site is situated on agricultural land, outside urban areas. Currently the site is not cultivated and exists as an open unused portion of agricultural land. The site has been ploughed in 2009 and potentially for years before 2009. Furthermore, the site has been ploughed/cleared in 2022 but not cultivated. The site has been transformed from its natural state due to these previous agricultural activities having a notable transformative effect on the vegetation and seedbank of the area.

According to the National Vegetation Map (2018) the vegetation type occurring on the proposed development site is Swartland Shale Renosterveld. This vegetation type is critically endangered according to the NATIONAL LIST OF ECOSYSTEMS THAT ARE THREATENED AND IN NEED OF PROTECTION (GN 1002 of 9 December 2012). Although the vegetation type historically occurring on the site is critically endangered, the site has been transformed by agricultural activities and does not currently support Swartland Shale Renosterveld.

While the freshwater systems located outside the study area are not considered highly sensitive to changes in the landscape due to the historical and ongoing impacts, and no direct impacts are expected to these freshwater ecosystems from the proposed solar development, indirect impacts or edge effects from the construction and operation of the proposed solar development are likely and may lead to cumulative impacts on a local scale.

Geographical and Physical Aspects:

The proposed development site has a very slight slope of 3%, sloping from east to west towards the unnamed tributary. Elevation changes within the specific site where the solar panels are planned from 25m.a.s.l. in the east to 19 m.a.s.l. in the west. The dominant flow type on the development site is shallow overland flow or sheet flow. No concentrated flow paths are located on site.

FEN Consultants were appointed to verify whether any wetlands are located on site and delineated the tributary to the west. The unnamed tributary will not be impacted by the proposed development because the development is planned at least 70m from the banks of the tributary. No other wetlands are located on or near the development site.

Heritage and Cultural Aspects:

The proposed development is located on an area larger than 0.5ha and will change the character of the site. However, a preliminary desktop study identified no sensitive heritage resource near the proposed development.

A Notice of Intent to Develop was submitted to Heritage Western Cape, whereafter comment was received that there is no reason to believe that the proposed development will impact heritage resources.

David Gibbs Landscape Architect, Environmental Planner and Heritage Practitioner has been appointed as visual specialist to conduct a Landscape and Visual Impact Assessment for the proposed solar power plant.

Broodkraal farm lies within the Swartland rural agricultural environment known predominantly for its wheatfields and rooibos tea cultivation. The Swartland is a rural cultural landscape of high visual significance and aesthetic value, (given the degree of intactness, integrity, and legibility) with an agricultural character with rural settlements. It is an environment with important components of distinctive character, valued for tangible as well as intangible attributes. Thus, the cultural landscape context and receiving environment of the Broodkraal solar farm has high visual / aesthetic quality and significance. Given this context, this assessment will consider the potential impact of the proposal from a cultural landscape perspective, with respect to the landscape character analysis of the site within its local and broader contexts.

However, as the footprint of the proposal is relatively small and is located on a site already disturbed and somewhat degraded, the significance of the visual impact is expected to be low, and negligible in extent when compared with the existing shade-netting infrastructure within the immediate vicinity. The specialist report incorporates the landscape character analysis and serves as the Visual Impact Statement in lieu of a full Visual Impact Assessment report, which has not been deemed necessary by the specialist.

The following visual resources were identified:

- Regional context: (background)
 - Geographic landmarks – Berg River and Piketberg Mountains (including Wittewater),
 - Continuity of agricultural landscape within the context of the Berg River Valley
 - Swartland cultural landscape character
- Local context: (mid-ground)
 - Rural landscape - agricultural character, including
 - Wheatfields, Broodkraal dam, Moravia Bridge,
 - mature trees /, vineyards and farm settlement
 - Surrounding farms: including:
- Site context: (foreground)
 - The site itself is low in visual resources. It is bounded by the railway line to the east (with vineyard under shade netting beyond this), the Broodkraal Dam to the south (though the dam wall blocks visibility of the dam itself from the project site), the Broodkraal village to the north, and more vineyards under shade-netting to the west.

Impacts on visual resources:

The project site has a degree of visual exposure due to its lack of vegetation cover and exposure to elevated vantage points, however other features surrounding the site provide a degree of visual screening from adjacent properties at grade. These include: the Broodkraal dam wall, the Broodkraal village, street trees along the village edge, and most obviously, the hectares of shade-netting on either side of the project site.

The extent of the existing shade-netting covers a far greater area than the proposed solar facility, which will fit comfortably within the context of the farm and is in support of the farming project. Whereas it is unlikely to cause noticeable visual impacts to receptors when perceived from surrounding neighbouring farms, or from the R399, or from Wittewater or Dunn's Castle; it is likely to impact the foreground views of the houses immediately adjacent - in the Broodkraal farm workers village to the north. The interface between the proposed project and the existing village should receive some mitigation to address this.

Conclusion of the Visual Specialist:

The development proposal is supportive of the agricultural development strategies for the area and no fatal flaws are implicit within the proposed site layout plan, localized visual impacts perceived by the immediate receptors can be reduced through the application of the mitigation measures as described, i.e., landscape screening/edge treatment along the village interface.

The planning and layout of the proposed solar farm has responded well to contextual cultural landscape informants, including visual indicators and view considerations, resulting in the selection

of an already disturbed site within minimal footprint. Views from neighbouring farms are unaffected by the proposal. Meaningful mitigation of the onsite visual impacts (i.e., impacts upon the Broodkraal farm village adjacent) through landscape treatment can reduce the significance of the visual impacts to 'neutral', meaning that the proposal would cause no discernible deterioration to the existing views or visual resources.

Considered holistically, therefore, the Visual Impact of the proposed solar farm (post mitigation) will cause little detrimental effect upon visual resources, environment or on human well-being; and with the implementation of the mitigation measures as described, should remain within visual, heritage and environmental quality standards, targets, and legal requirements; to the approval of the Swartland Municipality (Environment and Heritage Resources Management Section).



Figure 5: Critical interface to address.

Socio-Economic Aspects:

The area in which the proposed development is located is a rural agricultural setting. A small agricultural community of farm workers are located in the farm Broodkraal and on the other side of the R399, known as Wittewater. A large portion of these farm workers are employed on the surrounding farms. The proposed development is in line with the national objectives in achieving sustainable development. It will create job opportunities and reduces reliance on non-renewable resources. Furthermore, the development is in line with provincial objectives.

The proposed development will support the provincial quest towards sustainability with the implementation of renewable energy. The proposed solar power plant will be used on the farm of Broodkraal. The agricultural unit of Broodkraal is currently being used for the production of citrus and fruit. On the farm large packhouses are located with cooling abilities. Along with the packhouses there are various pumps located on site, this large equipment is being used in the agricultural process

on Broodkraal and is vital to the productivity of the farm. With Eskom implementing loadshedding at an increased rate, the electricity provision to the cooling houses and pumps are compromised and this in turn has an impact on the productivity of the farm. Loadshedding makes standby electricity increasingly expensive.

Broodkraal produces export quality grapes and international clients place a premium on sustainability and the use of solar power in production and in the use of cooling practices. In addition to the pressure created by Eskom's loadshedding, the existing pressures at South African ports results in a need to store produce for longer and rely heavily on standby electricity. This makes the process increasingly expensive and places the financial sustainability of the farm in danger. It is estimated that the use of solar power could cut electricity costs in half. Moreover, the solar power plant will directly contribute socio-economically in the form of job-creation during the construction phase and operational phase, and indirectly it will enable investments in the agricultural productivity of Broodkraal farm.

Furthermore, a large agricultural village of farm workers are located on the Broodkraal farm. This rural community will have better access to basic services which has the potential to increase their well-being and living standards. Furthermore, the addition of the solar power plant will ensure equal access to services such as electricity, especially in rural areas and small farming communities. While the reliable electricity provision to the small farming community will increase the living standards of farm workers, the addition of solar power will increase the productivity and financial sustainability of the Broodkraal farm. This indirectly secures multiple jobs and perhaps provides capacity for expansion of the agricultural activities on the farm.

2.1.2 Environmental management policy and commitments

The proponent understands the importance of conserving the environment and will endeavor to apply all necessary mitigation measures to conserve and maintain sensitive areas and prevent environmental degradation.

2.1.3 Interpretations

The implementation of the EMP is not an additional or "add on" requirement. The EMP is legally binding through NEMA and the relevant EA. This EMP is to be used during the planning, construction and operational phases of the proposed project. The Environmental Control Officer, appointed by the developer after environmental approval, must use this EMP during the ECO audits to determine the developer's compliance to it.

Further on, the proponent is to ensure that through the project tender process the EMP forms part of the Project Construction Contract Document to be incorporated in line with:

General project specifications; and

- SANS 1200 A or SANS 1200 AA, as applicable.

The proponent is also to ensure that through any tender or appointment process, the operational EMP forms part of the management contract with all service providers and contractors, for a period of time as stipulated by the DEA&DP during which the development will be audited for compliance to the operational EMP. This EMP is compiled in line with relevant legislation and general construction project specifications. However, to ensure sound environmental practice, the measures as described in the operational EMP should be implemented for the full operational life of the development.

2.1.4 Project phase

The first part of this EMP is specifically compiled for the period of time prior to commencement of and activities associated with construction of the above-mentioned activity, and for the operational phase of the proposed development.

If and when applicable, where specific activities of the proposed development fall outside of the general principles contained herein, the Department will attach further 'activity – specific' EMP's as appendices to this document.

2.1.5 Role players and responsibility matrix

In order for the EMP to be successfully implemented, all the role players involved in the project need to co-operate. For this to happen, role players must have a clear understanding of their roles and responsibilities in the project, must be professional, form respectful and transparent relationships, and maintain open lines of communication. The EMP therefore clearly defines the role players involved and indicates their role in the implementation of the generic EMP.

Typically, these role players or the project team may include the Authorities (A), Other Authority (OA), Developer/Proponent (D), Consulting Engineers (CE), Resident Engineer (RE), Environmental Officers (EO), Environmental Site Officer (ESO), Environmental Control Officer (ECO), Project Manager (PM), Contractors (C), Environmental Assessment Practitioner (EAP) and Property Owners Association (POA). Further, landowners, interested and affected parties and the relevant environmental and project specialists are also important role players.

SECTION 3 – ENFORCEMENT, MONITORING AND AUDITING

3.1 PRE-CONSTRUCTION AND CONSTRUCTION PHASE

The proponent must appoint, at his own cost, an **ECO** and full time EO (as part of the construction team) who will oversee the implementation of the EMP.

Swartland Municipality, as well as DEADP (Department of Environmental Affairs and Development Planning) must be informed of the appointment of the **ECO** prior to construction activities. Please note that the responsibility of the particular ECO may end at the end of the construction period. In

the event that an ECO is appointed during the operational phase, it must be noted that this ECO may be different from the original ECO and the Department of Environmental Affairs and Development Planning (DEADP) as well as the Swartland Municipality must be notified of this appointment again.

The independent ECO is responsible for fortnightly audits on compliance to relevant environmental legislation, conditions of the Environmental Authorisation (EA), and the EMP for the project.

The ECO shall conduct fortnightly independent environmental audits. **Monthly Audit reports** are to verify the projects compliance with the EMP and conditions of the Environmental Authorisation (EA).

Before any construction activities commence, the ECO must compile, for the approval by the Department, an audit checklist based on the contents of this EMP and conditions of the Environmental Authorisation (EA). The ECO shall at the request of the Department forward audit reports to the Department and the Swartland Municipality at a frequency determined by the Department which shall be stipulated in the Environmental Authorisation (EA).

Evidence of the following as **key performance indicators**, must be included in the audit reports:

- Complaints received from landowners and actions taken.
- Environmental incidents, such as oil spills, concrete spills, etc. and actions taken (litigation excluded).
- Incidents leading to litigation and legal contraventions.
- Environmental damage that needs rehabilitation measures to be taken.

A copy of all ESO and EO monitoring reports, contractor method statements and pro forma documentation must be held by the ESO and/or the EO on site and be made available to the Department and or the ECO upon request.

3.2 OPERATIONAL PHASE

The ECO shall conduct, at a frequency as determined by the Department of Environmental Affairs and Development Planning (DEADP) and stipulated in the relevant Environmental Authorisation (EA) for the project, independent environmental audits. The audits are to verify the developments compliance with the operational EMP and conditions of the Environmental Authorisation (EA).

The ECO must compile, for the approval by the Department of Environmental Affairs and Development Planning (DEADP), an audit checklist based on the contents of this EMP and conditions of the Environmental Authorisation (EA). The ECO shall at the request of the Department of Environmental Affairs and Development Planning (DEADP) forward audit reports to the Department at a frequency determined by the Department which shall be stipulated in the Environmental Authorisation (EA).

The following **Key Performance Indicators** must be included in the audit reports:

- Complaints received from landowners and actions taken.
- Environmental incidents, such as oil spills, fires etc. and actions taken.
- Incidents possibly leading to litigation and legal contraventions.
- Environmental damage that needs rehabilitation measures to be taken.

The minutes of site meetings, to which the ECO will have unrestricted access to, shall be the official record of environmental activities, complaints and communications. These minutes will be circulated to the entire project team. A copy of the standard site meeting agenda is available on request.

3.3 FORMAL ENVIRONMENTAL COMMUNICATION CHANNELS

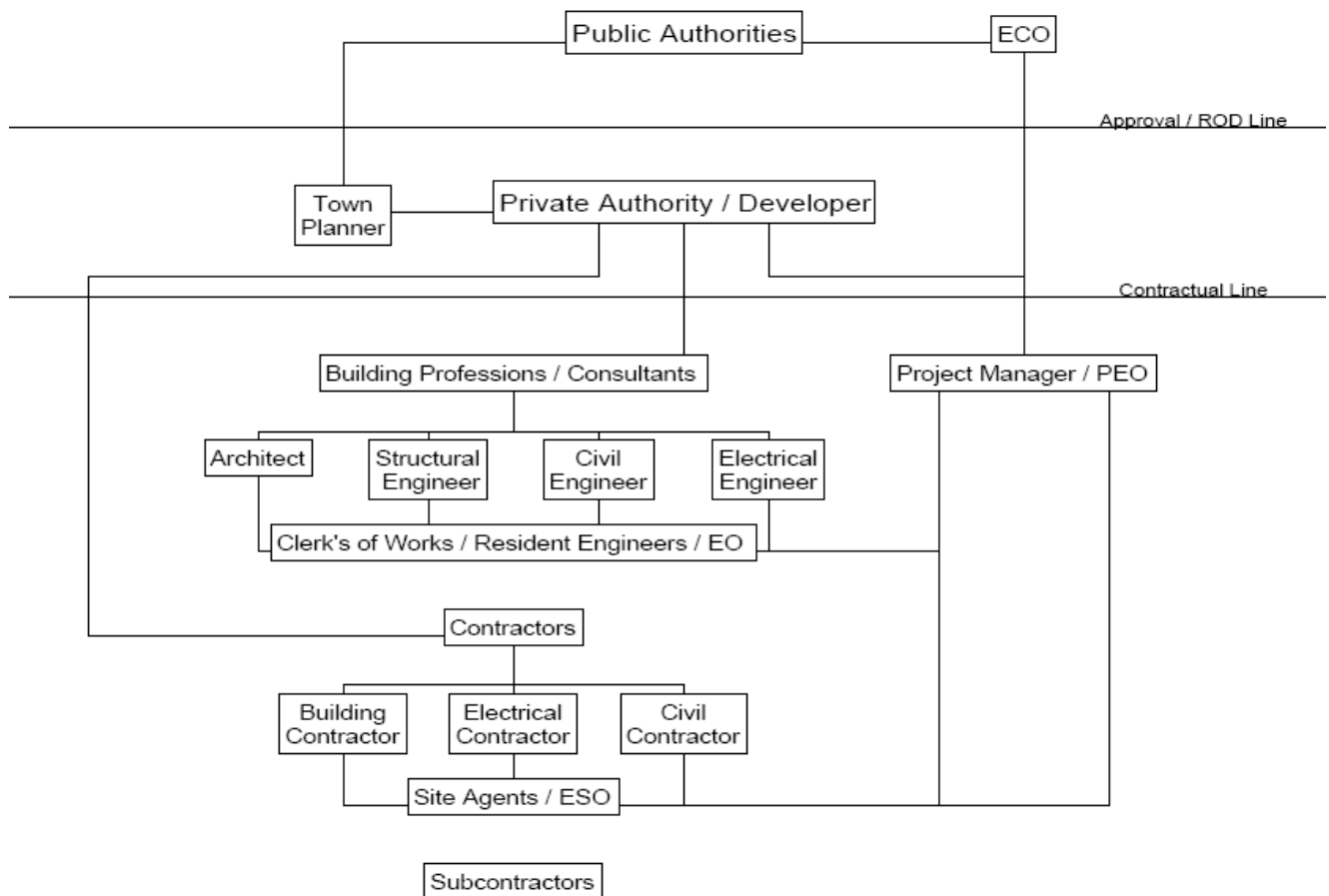


Figure 10: Reporting structure and role players involved in the implementation of the EMP.

Please note that due to the timeline of the development as well as the coming and leaving of consultants and contractors, as well as the many crossed channels of communication in the DEAD&DP EMP Guideline, it was decided by the project team to use the GACP-channels of communication whereby the Project Manager remains the central pivot between all the disciplines. All instructions and reports shall flow through the Project Manager (PM). In the environmental matters the PM becomes the Project Environmental Officer (PEO).

3.4 MEASUREMENT AND PAYMENT

It is understood that environmental requirements included in this EMP will entail costs over and above those of the civil requirements. These include provision for: mitigation and enhancement actions; training and environmental awareness requirements; monitoring; auditing; and corrective actions. The proponent shall recognise this and make provision for it in the tender. Costing for management action should be done with inputs and advice from appropriate technical members of the project team and relevant EAP who have knowledge of the management actions being recommended as well as practical experience in implementing similar measures and techniques.

A lump sum must be allocated for the management of Environmental Specifications where it is not possible to cost requirements of the EMP.

3.6 GENERAL GUIDELINES

Guidelines as per standardised construction documentation must be used.

3.7 AWARENESS (INDUCTION) TRAINING

3.7.1 Construction Phase

The EO or ESO, or ECO are responsible in ensuring everyone on site is given an environmental awareness induction session which not only clearly defines what the environment is and specifics detailing the local environment but outlines the requirements of the EMP as a management tool to protect the environment.

Refresher courses must be conducted as and when required. The EO or ESO must ensure daily toolbox talks include alerting the workforce to particular environmental concerns associated with the tasks for that day or the area/habitat in which they are working. Awareness posters and a handed out must be produced to create awareness throughout the site.

3.7.2 Operational Phase

The ECO is responsible for ensuring everyone involved in the operation of the development at ground level receives an environmental awareness induction which not only clearly defines what the environment is and specifics detailing the local environment but outlines the requirements of the EMP as a management tool to protect the environment.

Awareness posters and a handout must be produced to create awareness throughout the site.

3.8 SITE DOCUMENTATION

3.8.1 Construction Phase

The following is list of documentation that must be held on site and must be made available to the ECO and/or the Department of Environmental Affairs and Development Planning (DEADP) on request.

- Access negotiations and physical access plan
- Site daily diary /instruction book
- Records of all remediation / rehabilitation activities
- Copies of EO reports (management and monitoring)
- Environmental Management Programme (EMP)
- Complaints register

3.8.2 Operational Phase

The following is a list of documentation which must be held on sight and must be made available to the ECO and/or the Department of Environmental Affairs and Development Planning (DEADP) on request.

- Environmental monitoring reports (if required)
- Records of all remediation / rehabilitation activities (if required)
- Environmental Management Programme (EMP)
- Complaints register

3.8.3 Pro forma documentation

3.8.3.1 Prior to the commencement of construction activities

The following attached pro forma documentation is to be filled out and is binding to the EMP and project contract and includes, but not limited to, the following:

- Declaration of understanding by the Developer
- Declaration of understanding by the Contractor

3.8.3.2 During construction activities

The following attached pro forma documentation is to be filled out and maintained. These are binding to the EMP and project contract. They include, but are not limited to, the following:

- Environmental incidents
- Records of all remediation / rehabilitation activities

3.8.3.2 During the Operational Phase

The following attached pro forma documentation is to be filled out and is binding to the EMP and project contract and includes, but not limited to, the following:

- Declaration of understanding by the Proponent
- Environmental incidents

3.9 TOLERANCES AND NON-COMPLIANCE

The independent ECO is responsible for fortnightly audits on compliance to relevant environmental legislation, conditions of the Environmental Authorisation (EA), and the EMP for the project.

The ECO shall conduct fortnightly independent environmental audits. **Monthly Audit reports** are to verify the projects compliance with the EMP and conditions of the Environmental Authorisation (EA).

Should the contractor show repeated non-compliance in terms of the audits, a range of fines may be issued to the contractor. These fines are included as part of the Construction EMP (Table 6).

The Engineer, in conjunction with the ECO, shall be the judge as to what constitutes a transgression in terms of this clause, subject to the General Conditions of Contract.

SECTION 4 - GENERIC CONSTRUCTION PHASE EMP - IMPLEMENTATION

4.1 PREAMBLE

The point of departure for the application of the proposed development of a solar power plant on Farm RE/154, Piketberg, Western Cape, EMP is to empower a pro-active rather than re-active approach to environmental performance by addressing potential problems before they occur. This will limit corrective measures needed during the construction phase of the project. Therefore, the purpose of this EMP is to provide management measures that must be implemented by The Le Roux Group and all contractors and sub-contractors alike to ensure that the potential impacts of the proposed development are minimised. It must also be ensured that the EMP is maintained and upheld as a dynamic document in order for the project team to add or improve on issues that might be considered left out or not relevant to the project. In such instances the Department of Environmental Affairs and Development Planning (DEADP) may authorise the ECO to make such changes.

The following tables form the core mitigation measures appropriate to the pre-construction and construction phase. The tables present, the objectives to be achieved and the management actions that needs to be implemented in order to mitigate the negative impacts and enhance the benefits of the project. Associated responsibilities, criteria/targets and timeframes are clearly specified.

The ‘**pre-construction**’ section of this generic EMP, refers to the period of time leading up to and prior to commencement of construction activities, and is included to ensure pro-active environmental management measures with the goal of identifying avoidable environmental damage at the outset and sustain optimal environmental performance throughout the construction phase.

Most impacts will occur during the construction phase and must be mitigated through the contingency plans identified in the pre-construction phase.

The bulk of environmental impacts will have immediate effect during the ‘construction’ phase (e.g. noise, dust, and water pollution). If the site is monitored on a continual basis during the construction phase, it is possible to identify these impacts as they occur. These impacts will then be mitigated through the measures outlined in this section, together with a commitment to sound environmental management from the project team.

The “construction” section refers to all construction and its operation-related activities that will occur within the approved area and access roads, until the project is completed. This “construction” section is divided into three functional areas, namely “materials”; “plant”; and “construction”. Each of these functional areas within the EMP contains specific generic mitigation requirements and requested contractor method statements stipulated where required.

Many potential environmental impacts will have immediate or long term effects during the ‘operational’ phase (e.g. noise, waste management, and water pollution). If the development is monitored on a continual basis during operations, it is possible to identify these impacts as they occur. These impacts will then be mitigated through the measures outlined in this section, together with a commitment to sound environmental management from the proponent and management team.

It must be noted that the responsible party for the majority of the mitigation measures is that of the Management body, unless otherwise stipulated. The names of the responsible parties must be made

available to Department of Environmental Affairs and Development Planning (DEADP) for record purposes.

The management body must ensure that a maintenance team is employed with the correct equipment and skill to maintain boardwalks, pathways, fences etc. The following tables will refer to the responsible party as “Management body: ‘to be announced’ and “maintenance crew”.

4.2 STRUCTURE AND CONTENTS OF THE TABLES

The table consists of seven parts as follows:

“Phase of development” - This row will identify either pre-construction (planning) or actual construction phase.

“Impact / issue” - This row will identify the issue being addressed, e.g. Materials, site demarcation, heritage, etc.

Mitigation Measure - This column will include all the necessary mitigation measures for each impact/issue’.

Management objectives - This column will indicate what the management objectives to be achieved for each mitigation measure are.

Measurable targets - This column will indicate what evidence is to be used as an indication to whether or not the ‘Management objectives’ have been implemented and hence achieved.

Responsible party - This column will provide information as to which role player, e.g. ECO, RE, etc. is responsible for the implementation and or management of each mitigation measure.

Frequency of action - These columns provide time guidelines for the ‘Responsible party’ by which he/she is to action or manage the required mitigation.

4.2.1 SPECIALIST RECOMMENDATIONS

4.2.1.1 Pre-Construction and Construction Phases

The last part of the table provides space for the EAP to add specialist recommendations that need to be addressed during the pre-construction and construction phases.

4.2.1.2 Operational Phase

Additional requirements may need to be added to the table pending conditions required in the Environmental Authorisation (EA). The last part of the table provides space for such conditions, which must be added before the “declaration of understanding” is signed by the proponent and ECO.

TABLE 1: PROPOSED DEVELOPMENT OF A 3,15 MW PV PLANT ON FARM RE/154, PIKETBERG, WESTERN CAPE, PRE-CONSTRUCTION (PLANNING) PHASE EMP.

Phase of development	PRE-CONSTRUCTION (PLANNING)				
Impact / issue	GENERAL				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION	
Visual Impact - Light output is to be confined within property boundaries through using specifically designed luminaries such as full cut-off luminaries to minimize upward spread of light near to and above the horizontal Figure 1 – A; - Spotlight luminaries to be tilted in order to direct the light to the intended spot, instead of allowing it to light areas outside its purpose (Figure – B Report); - Outdoor spot lights to be mounted on the appropriate pole height. Higher mounting heights allow lower main beam angles which can reduce glare (Figure 1– C). - Utilize control systems to reduce light levels during inactive periods or at predetermined times while maintaining sufficient lighting for safety and security (NEMA, 2000). Where vertical surfaces are illuminated, such as advertising signs or buildings façades, luminaries must light downwards. (Figure 1– E) - Strict adherence to the tree policy of the Swartland Municipality; Visual Assessment Mitigation measures: - Designate the former dam and riparian corridor as ‘no-go areas’ for site camp establishment,	- Unnecessary visually visible impacts are avoided. - Ensure exact implementation of EMP guidelines with regards to light and lighting.	- Contract records - Signed declaration pro forma’s	Project team	Design and implementation	

Phase of development	PRE-CONSTRUCTION (PLANNING)				
Impact / issue	GENERAL				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION	
materials storage, stockpiling, dumping, to avoid and prevent damage or intrusion to these areas. • Limit construction activity to within the hoarding areas, constructing on disturbed areas only to • minimize impact to visual amenity resources identified (e.g., tree clusters, windbreaks, etc.). • Ensure post-construction repair and rehabilitation of the site, towards improvement of disturbed, areas and areas degraded by the construction activity. • Implement a construction phase environmental management plan (CEMP) to ensure on-going management of environmental matters, including noise, dust, and erosion control.					

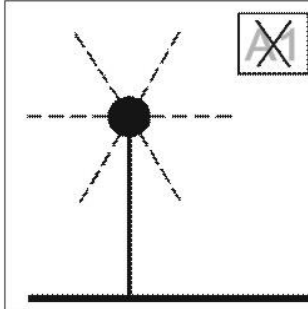
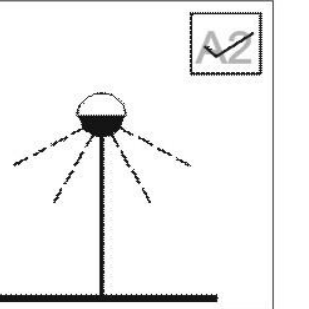
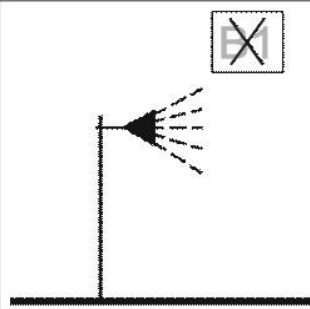
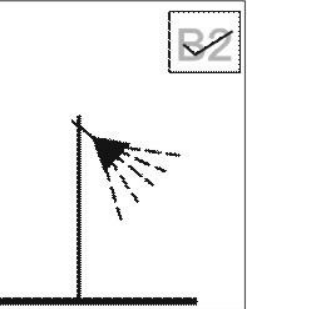
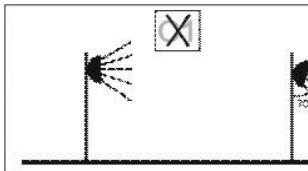
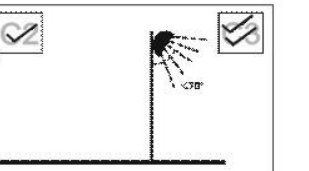
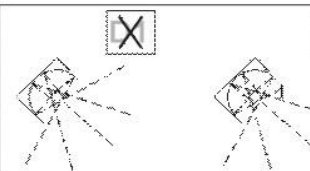
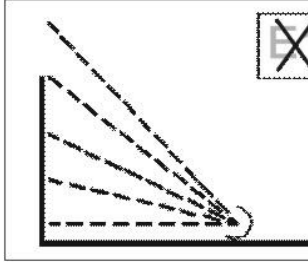
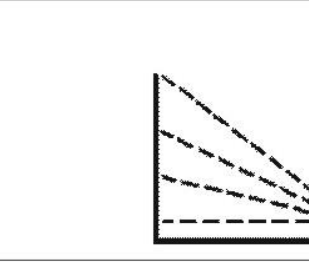
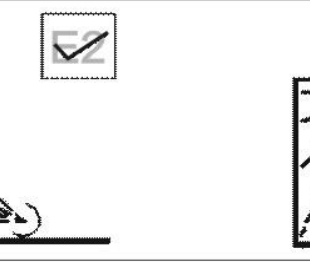
Phase of development	PRE-CONSTRUCTION (PLANNING)				
Impact / issue	GENERAL				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION	OF
         					

Figure 1: Guidelines for the reduction of obtrusive lighting (Source: ILE, 2005)

Figure 1: Guidelines for the reduction of obtrusive lighting (Source: ILE, 2005)

Phase of development	PRE-CONSTRUCTION (PLANNING)				
Impact / issue	GENERAL				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION	
Project contract and programme The EMP must be included as part of the tender documentation thereby making it part of the enquiry document to make the recommendations and constraints, as set out in this document, enforceable under the general conditions of contract. A copy of this EMP must be available on site. The Contractor shall ensure that all the personnel on site, sub-contractors, suppliers, etc. are familiar with and understand the specifications contained in the EMP.	- Contingencies for minimising negative impacts anticipated to occur during the construction phase - Ensure environmental awareness and formalise environmental responsibilities and implementation	- Contract records - Signed declaration pro forma's	Project team	-	
Appointments and duties of project team The contact details for the ECO, RE, EO, Contractor and ESO shall be completed on the attached pro forma and a copy kept on site. This document must be made available to the Department of Environmental Affairs and Development Planning (DEADP) on request. Before construction activities commence, role players must have a clear indication to their role in the implementation of this EMP. Subcontractor(s) contracts with the principle contractor must contain a clause to the effect that the disposal of all construction-generated refuse / waste to an officially approved dumping site is the responsibility of the subcontractor in question and that the subcontractors are bound to the management activities stipulated in this EMP.	Contingencies for minimising negative impacts anticipated to occur during the construction phase	- Contract records - Signed declaration pro forma's	Project team	-	

Phase of development	PRE-CONSTRUCTION (PLANNING)				
Impact / issue	GENERAL				
MITIGATION MEASURE		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Site demarcation and development The surveys for the overall project area and construction footprint as approved in the Environmental Authorisation (EA) must be complete and clearly demarcated before the contractors set up their crew camps or begin construction. All relevant ‘general’ and ‘specific’ conditions contained in the Environmental Authorisation (EA) must be included in the space provided below and included as part of this EMP when the “<i>declaration of understanding</i>” is signed by The Le Roux Group, the Engineer and the Contractor. The EO and ECO must be on site in order to make sure the correct areas are fully demarcated.		Contingencies for minimising negative impacts anticipated to occur during the construction phase	- Demarcated area’s - Filled in section of this document	EAP specialist, Engineer, contractor	As and when required
Emergencies, non-compliance and communication The contractor must provide method statements on the protocols to be followed, and contingencies to be put in place for the following, before construction may begin: - Emergency spills procedures for the contamination of soils from spills and fire - Handling & storage of oils and chemicals - Cement and concrete batching, which includes the storage, washing & disposal of cement, packaging, tools and plant. - Diesel tanks and refuelling procedures - Crew camps and construction lay down areas		Contingencies for minimising negative impacts anticipated to occur during the construction phase	Method statements	Contractor, Engineer	As and when required

Phase of development	PRE-CONSTRUCTION (PLANNING)				
Impact / issue	GENERAL				
MITIGATION MEASURE		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Workshop maintenance and cleaning of plant Communication in emergencies must follow the suggested lines of communication as stipulated.					
Fauna All <i>possible</i> sensitive faunal species present on the site must be rescued and relocated to another suitable location prior to the commencement of construction activities.		To protect possible faunal species on the site from being exterminated.	Should sensitive species be present on the site, the correct re-establishment of these species	Faunal Specialist or appropriately qualified person	Before construction commences

Table 2: ADDITIONAL CONDITIONS FOR THE PROPOSED DEVELOPMENT OF A 3,15 MW PV PLANT ON FARM RE/154, PIKETBERG, WESTERN CAPE, EMP

Phase of development	PLANNING	EA reference number	16/3/3/1/F5/2028/23		
Impact / issue	EA Conditions				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION	
Visual mitigation measures proposed by the visual specialist should be implemented to keep the proposed development's impact low on the Swartland Cultural Environment. The Visual Impact Assessment mitigation measures: - Keep sufficient distance from the existing Broodkraal farm workers village so to allow for a landscape buffer / interface along the edge. Consider productive use of space between panels. - New screen planting, using clusters of indigenous trees (or 'naturalized' introduced / exotic species now considered part of the cultural landscape) should be integrated into the layout to further obscure and filter views of the proposed solar panels from the viewpoints and views from the farm works village immediately adjacent, taking cues from established landscape patterns within the contextual landscape. - With respect to the utility components and service infrastructure (ancillary building, etc), muted colours and 'earth tones' are more subtle and are more	Minimise visual intrusion	Detailed designs before construction commence	Developer	Before construction commences	

easily absorbed (visually) than bright or highly reflective surfaces. Suitable colours include grey, olive green, ochre, brown, etc. – refer to on-site geology, soil, and vegetation types for reference. Rough/textured surfaces are preferable to shiny/highly reflective surfaces in terms of visual absorption (minimise reflection / glare). • The detailing of internal access roadways and service yards associated with the development should reflect a green infrastructure approach, which alludes to the rural character of the context of the site as a cultural landscape, incorporating where possible earth-swales for storm-water run-off rather than heavily engineered concrete channels and drains. Where practical, existing roadways should be utilized. • Roadways should not be over-scaled and should include new tree planting where possible; concrete kerbs and channels should be avoided. With respect to the new accessways and roadways, these should respond to historical patterns and existing alignments in scale and placement, avoiding excessive earthworks / cut and fill or vegetation removal. • Storm-water management through ‘soft’ engineering of the site, incorporating the principles of sustainable drainage and water sensitive design, will be environmentally advantageous and further mitigate the visual impact of driveways, service yards				
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and other hardened surfaces (this to be ensured through meaningful engagement between freshwater ecology and storm-water engineering). • Screening, planting, and wetland features may be incorporated in a manner sensitive to natural landform, avoiding overly 'engineered' geometries. Distant views towards the mountains should be maintained, and planting should retain an agricultural quality. Indigenous vegetation ought to be integrated as a biodiversity corridor, especially within the riparian corridor/drainage channel. • With respect to site boundaries, apart from gateway thresholds, solid masonry boundary walls should be minimized; and no galvanized steel palisade fencing should be allowed. Visually transparent fencing (e.g., welded mesh Clearvu or similar), is preferable, especially if integrated into generous planting beds to properly 'disappear' into the landscape, noting that dark grey or black fencing is more visually recessive than green. • Avoid light pollution by reducing lighting to the minimum necessary. Lighting is to be carefully controlled and well-integrated into the design proposal and coordinate with signage. Light sources must be shielded to reduce light spillage. Shielded down-lights to be used where required from security on open areas.				
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Table 3: PROPOSED DEVELOPMENT OF A 3,15 MW PV PLANT ON FARM RE/154, PIKETBERG, WESTERN CAPE, CONSTRUCTION PHASE EMP (Materials)

Phase of development	CONSTRUCTION			
Impact / issue	Materials			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Handling				
Stockpiles All stockpiled material must be easily accessible on site without any environmental damage of the surrounding properties. All temporarily stockpiled material must be stockpiled in such a way that the spread of materials are minimised. In the case of strong wind and/or rain all stockpile material must be covered with a tarpaulin in order to prevent erosion. The stockpiles may only be placed within the demarcated areas the location of which must be approved by the RE, EO or ECO. Stockpiles are to be stabilised if signs of erosion are visible. Soils from different horizons must be stockpiled such that topsoil stockpiles do not get contaminated by sub-soil material. Topsoil stockpiles must be monitored for invasive exotic vegetation growth. Contractors must remediate as and when required in consultation with the EO, RE and ECO. No plant, workforce or any construction related activities may be allowed onto the topsoil stockpiles. Topsoil stockpiles must be clearly demarcated as no-go areas. Stockpiles must not be higher than 2m to avoid compaction thereby maintaining the soil integrity and chemical composition. No stockpiles or construction of any hard infrastructure may occur near watercourses; and	• Minimise scarring of the soil surface and land features • Minimise disturbance and loss of soil • Minimise construction footprint • Maintain the integrity of topsoil's for landscaping and rehabilitation • Containment of invasive plant growth by means of topsoil monitoring. • Minimise contamination of storm water run-off	• No visible erosion scars once construction is completed • The footprint has not exceeded the agreed site in terms of EA etc. • Minimal invasive weed and grass growth • No signs of sedimentation and erosion	Contractor	Daily

Phase of development	CONSTRUCTION			
Impact / issue	Materials			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
All stockpiles should not exceed 2m in height and should be covered with a suitable geotextile such as hessian sheeting to prevent excessive dust generation.				
Oil and chemicals The contractor must provide method statements for the “handling & storage of oils and chemicals”, “fire”, and “emergency spills procedures These substances must be confined to specific and secured areas within the contractor’s camp, and in a way that does not pose a danger of pollution even during times of high rainfall. These areas must be imperviously bunded with adequate containment (at least 1.1 times the volume of the fuel) for potential spills or leaks. Drip trays (minimum of 10cm deep) must be placed under all machinery and vehicles. The surface area of the drip trays will be dependent on the vehicle and must be large enough to catch any hydrocarbons that may leak from the vehicle while standing. The depth of the drip tray must be determined considering the total amount / volume of oil in the vehicle. The drip tray must be able to contain the volume of oil in the vehicle. Any spills larger than 100ℓ should be reported to all local authorities. Spill kits must be available on site and in all vehicles that transport hydrocarbons for dispensing to other vehicles on the construction site. Spill kits must be made up of material/product	• Prevention of pollution of the environment • Minimise chances of transgression of the acts controlling pollution	• No pollution of the environment and especially the river • No litigation due to transgression of pollution control acts • No complaints from I & AP’s • Method statements	Contractor	Daily

Phase of development	CONSTRUCTION				
Impact / issue	Materials				
MITIGATION MEASURE		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
that is in line with environmental best practice (sunsorb is a recommended product that is environmentally friendly). All spilled hazardous substances must be contained in impermeable containers for removal to a General & Hazardous Waste Landfill site, (this includes contaminated soils, and drenched spill kit material).					
Cement It is suggested that ready-mix cement be used as far as possible to minimize the possible impact on the surrounding environment. Cement batching areas must be located in consultation with the RE, EO or ECO to ensure residues are contained and that the proposed location does not fall within sensitive areas such as drainage lines, storm water channels, etc. The contractors must provide and maintain a method statement for “cement and concrete batching” which includes the storage, washing & disposal of cement, packaging, tools and plant. The mixing of concrete shall only be done at selected sites on mortar boards or similar structures to contain run-off into natural vegetation, soils, and streams leading to the river. Cleaning of cement mixing and handling equipment shall be done using proper cleaning trays. All empty containers must be stored in a dedicated area and later removed from the site for appropriate disposal at a Licensed Landfill site. All empty cement bags are to be picked up		- Minimise the possibility of cement residue entering into the surrounding environment - Minimise pollution of soil, surface and ground water resources	- No evidence of contaminated soil on the construction site - No evidence of contaminated water resources - Method statement	Contractor	Monitored daily

Phase of development	CONSTRUCTION				
Impact / issue	Materials				
MITIGATION MEASURE		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
immediately to ensure that cement dust is not blown away. Cement dust is poisonous and will be detrimental to the environment and especially to the river. Any spillage that may occur must be investigated and immediate remedial action shall be taken. The visible remains of concrete, either solid, or from washings, shall be physically removed immediately and disposed of as waste to a Licensed Landfill site. Washing of the remains into the ground is unacceptable. Surface water control measures Concrete and cement related mortars can be toxic to aquatic life. Proper handling and disposal should minimize or eliminate discharges into watercourses. High alkalinity associated with cement, which can dramatically affect and contaminate both soil and ground water. The following recommendations must be adhered to: Proper handling and disposal should minimise or eliminate discharge into watercourses. High alkalinity associated with cement, which can dramatically affect and contaminate both soil and ground water. The following recommendations must be adhered to: Fresh concrete and cement mortar should not be mixed near waterbodies. Mixing of cement may be done within the construction camp, may not be mixed on bare soil, and must be					

Phase of development	CONSTRUCTION				
Impact / issue	Materials				
MITIGATION MEASURE		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
within a lined, bound or banded portable mixer. Consideration must be taken to use ready mix concrete; No mixed concrete shall be deposited directly onto the ground. A batter board or other suitable platform/mixing tray is to be provided onto which any mixed concrete can be deposited whilst it awaits placing; Cement bags must be disposed of in the demarcated hazardous waste receptacles and the used bags must be suitably disposed of; and Spilled or excess concrete must be disposed of at a suitable landfill site.					
DANGEROUS AND TOXIC MATERIALS Provision of storage facilities Materials such as fuel, oil, paint, herbicide and insecticides must be sealed and stored in bermed areas or under lock and key, as appropriate, in well-ventilated areas. Storage facilities should be banded, roofed, secure, rain, wind and tamper proof. Storage areas shall display the required safety signs depicting “no smoking”, “No Naked lights” and “Danger” containers shall be clearly marked to indicate contents as well as safety requirements. Sufficient care must be taken when handling these materials to prevent pollution. Training on the handling of dangerous and		• Prevention of pollution of soil, surface and ground water resources in the immediate and surrounding environments • Minimise chances of transgression of the acts controlling pollution	• No visible signs of pollution • No litigation due to transgression of pollution control acts	Contractor	Monitor daily

Phase of development	CONSTRUCTION				
Impact / issue	Materials				
MITIGATION MEASURE		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
toxic materials must be conducted for all staff prior to the commencement of construction. In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water and Sanitation (DWS) must be informed immediately. Empty containers shall be removed to a General & Hazardous Waste Landfill site. Material Safety Data Sheets (MSDS) must be prepared for all hazardous substances on site and supplied by the supplier where relevant. MSDS's must be updated as required.					
Bulk storage of fuels and oils The contractors must provide and maintain a method statement for “Diesel tanks and refuelling procedures”. Bulk fuel storage tanks on the site shall be on an impervious surface that is bunded and able to contain at least 110% of the volume of the tanks. A Flammable Liquid License must be obtained for diesel volumes greater than 200 litres. As no application was lodged for this activity, it should be noted that Environmental Authorisation is required for the storage of Diesel and/or Petrol with volumes greater than 30 000 litres. Bulk fuel storage tanks shall be located in a portion of the construction camp where they do not pose a high risk in terms		• Prevention of pollution of soil, surface and ground water resources in the immediate and surrounding environments • Minimise chances of transgression of the acts controlling pollution	• No visible signs of pollution • No litigation due to transgression of pollution control acts • Method statement	Contractor	Once off, as required

Phase of development	CONSTRUCTION				
Impact / issue	Materials				
MITIGATION MEASURE		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
of water pollution (i.e. they must be located far away from any watercourses found.) Bulk fuel storage tanks shall be placed so that they are out of the way of traffic, so that the risk of the tanks being ruptured or damaged by vehicles is minimised. Bulk fuel storage should be covered during the rainy season.					
Use of dangerous and toxic materials The contractor shall keep the necessary materials and equipment on site to deal with spills/ fire of the materials present should they occur. The contractor shall set up a procedure for dealing with spills/ fire, which will include notifying the ECO and the relevant authorities prior to commencing with construction. These procedures must be developed in consultation and approval by the appointed EO. All staff should receive some form of fire training. Fire buckets and hoses shall be in good working order and easily accessible on site. A record must be kept of all spills and the corrective action taken.		• Prevention of pollution of soil, surface and ground water resources in the immediate and surrounding environments • Minimise chances of transgression of the acts controlling pollution	• No pollution of the environment • No litigation due to transgression of pollution control acts	Contractor	As required

Table 4: PROPOSED DEVELOPMENT OF A 3,15 MW PV PLANT ON FARM RE/154, PIKETBERG, WESTERN CAPE, CONSTRUCTION PHASE EMP (Plant)

Phase of development	CONSTRUCTION			
Impact / issue	PLANT			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Eating areas and camp followers The contractors must provide and maintain a method statement for "Crew camps and construction lay down areas". The Contractor shall, in conjunction with the EO, designate the restricted eating area for eating during normal working hours. Two refuse bins with lids must be provided and cleaned on a daily basis. The bins are to be secure, wind, weather and scavenger proof. Designated areas for smoking must be provided. No fires are to be lit outside of a facility designed to contain fires. The adequacy and positioning of these structures must be determined in consultation with the EO and ECO. No animals, domestic or otherwise are allowed on the premises. The feeding, or leaving of food, for stray or other animals in the area is strictly prohibited. Camp followers/informal traders must not be allowed to congregate on pavements or outside the construction site. However, at the contractors discretion facilities can be made available within the designated eating area. Litter (even if originating outside the camp) and concrete bags etc. must be picked up and put into suitably closed bins.	- Control potential influx of vermin and flies - Neat work place and hygienic environment - Minimise negative social impacts to local businesses and residences.	- No visual sign of vermin and flies - No complaints from I & AP's	Contractor, EO	Once off, monitor daily

Phase of development	CONSTRUCTION			
Impact / issue	PLANT			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Toilets and ablution facilities The contractor will be responsible for providing all sanitary arrangements for his and the sub-contractors team. A minimum of one chemical toilet shall be provided per 15 persons. Sanitary arrangements shall be to the satisfaction of the ECO and the local authority. The contractor shall keep the toilets in a clean, neat and hygienic condition. The contractor shall supply toilet paper at all toilets at all times. Toilet paper dispensers shall be provided in all toilets. Toilets provided by the contractor must be easily accessible and a maximum of 150m from the works area to ensure they are utilised. All toilets will be located within the contractor's camp. Should toilets be needed elsewhere, their location must first be approved by the RE, EO or ECO. The contractor (who must use reputable toilet-servicing company) shall be responsible for the cleaning, maintenance and servicing of the toilets. The contractor (using reputable toilet-servicing company) shall ensure that all toilets are cleaned and emptied before the builders' or other public holidays. Toilets out on site must be secured to the ground and have a sufficient locking mechanism operational at all times. The natural surrounding area may NOT be used for any ablution activities. FINES will be payable should any person be caught.	• Ensure proper sanitation is achieved which will encourage the workforce to utilise toilets provided and not the surrounding habitat • Minimise potential of diseases on site • Minimise potential to pollute soils, water resources and natural habitats	• Workforce use toilets provided • No complaints received from I & AP's as well as members of the workforce • No visible or measurable signs of pollution of the environment (soils, ground and surface water)	Contractor, RE or EO	As and when required

Phase of development	CONSTRUCTION			
Impact / issue	PLANT			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Waste management Please refer to the waste minimization plan herewith attached. All wastes are to be removed from the site and disposed of at a registered facility. All fuel and oil is to be stored with adequate spill protection. The intentional disposal of any substance into the environment must be strictly prohibited, while accidental spillage must be prevented, contained and reported immediately. Suitable handling and disposal protocols must be clearly explained, and sign boarded. A policy of reduce, reuse, recycle must be implemented.	• Sustainable management of waste by recycling • To keep the site neat and tidy • Minimise litigation and complaints by I&AP's • Reduce visual impact • Control potential influx of vermin and flies thereby minimising the potential of diseases on site and the surrounding environment. • Minimise potential to pollute soils, water resources and natural habitats	• Disposal of rubble and refuse in an appropriate manner with no rubble and refuse lying on site • Site is neat and tidy • No complaints from surrounding industries and businesses • Sufficient containers available on site • No visible or measurable signs of pollution of the environment (soils, ground and surface water)	Contractor, EO	Daily

DUST It is imperative that method statements regarding dust control be supplied to the ECO by the contractor prior to the commencement of any construction activities. Dust management and dust suppression during the construction phase is deemed very important. The method statement must provide information on the proposed source of water to be utilised and the details of the licenses acquired for such usage. Potable water cannot (as far as possible) be used as a means of dust suppression, alternative measures must be sourced. The use of 'grey' water must be investigated as an alternative. The contractor will be responsible to source this water and obtain the required approvals. Water extraction from the storm water channel will not be allowed. The construction camp shall be watered during dry and windy conditions to control dust fallout. Dust production must be controlled by regular watering of roads and works area, should the need arise. (NB: Concrete dust is toxic and damages soil properties. Therefore watering to prevent dust spread must not be done where concrete dust has fallen or it will infiltrate into the soil. Concrete bags must not be allowed to blow around the site and spread cement dust. This cement dust will be detrimental to the environment.) At the end of construction, the site camp must be fully rehabilitated by removing the temporary surface, ripping the area to loosen the soil and the area must be re-vegetated with locally indigenous vegetation only, according to the landscape development plan for the project.	• Reduce dust fall out • Reduce visual impact • Minimise loss of valuable soil material	• No visible signs of dust • No complaints from interested and Affected parties • No incidences reported to ECO • No visible evidence of dust contamination on the surrounding environment • Method statement • Baseline targets not exceeded during regular monitoring of dust counts	RE, Contractor, EO	Monitored daily
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Workshop equipment, maintenance and storage The contractors must provide and maintain a method statement for “workshop maintenance and cleaning of plant”. All maintenance and washing of vehicles and equipment shall be done off-site as far as possible. During servicing of vehicles or equipment, a suitable drip tray shall be used to prevent spills onto the soil. Leaking equipment shall be repaired immediately or be removed from site to facilitate repair. Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and remediate to the satisfaction of the EO or RE. Cleaning and remediation must be done with products that are in line with best environmental practice i.e. Sunsborb. The Contractor shall be in possession of an emergency spill kit that must be complete and available at all times on site. The Contractor must ensure that senior and the other relevant members of the workforce are trained in dealing with spills by using emergency spill kits. All spills of hazardous substances must be reported to the ESO, EO, RE or ECO. The contractor must comply with the regulations of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) as well as specific specifications set forth by the health and safety agent.	• Prevent pollution of the environment • Minimise chance of transgression of the acts controlling pollution • Disposal of hazardous substances to a General & Hazardous Waste Landfill site.	• No pollution of the environment • No litigation due to transgression of pollution control acts • Method statement	RE, Contractor, EO	Monitor daily
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Phase of development	CONSTRUCTION			
Impact / issue	PLANT			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Noise All construction vehicles must be in a good working order to reduce possible noise pollution. Work hours during the construction phase shall be strictly enforced unless permission is given (07H00 – 18H00). Permission shall not be granted without consultation with the local industries and businesses by the EO. No work to be done on Sundays or public holidays. Noise reduction is essential and Contractors shall endeavour to limit unnecessary noise, especially loud talking, shouting or whistling, radios, sirens or hooters, motor revving, etc. The use of silent compressors is a specific requirement. All machinery to be muffled where possible. Noisy activities shall take place only during working hours. The EO must inform the residents of houses and businesses adjacent to the development in writing 24 hours prior to any planned activities that will be unusually noisy or any other activities that could reasonably have an impact on the adjacent sites. These activities could include, but are not limited to use of pneumatic jack-hammers and compressors etc. No noise louder than 70dB from the ambient noise level. Machinery and equipment on site must be maintained so as to avoid any unnecessary noises.	• Maintain noise levels below “disturbing” as defined in the National Noise Regulations • Minimise the nuisance factor of the development	• No complaints from surrounding landowners or I&APs	Contractor, EO	As and when required

Table 5: PROPOSED DEVELOPMENT OF A 3,15 MW PV PLANT ON FARM RE/154, PIKETBERG, WESTERN CAPE, CONSTRUCTION PHASE EMP (Construction)

Phase of development	CONSTRUCTION			
Impact / issue	CONSTRUCTION			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Crew camps Accommodation for members of the workforce will not be permitted on site unless authorisation has been given in terms of the Environmental Authorisation issued for the site. If accommodation is to be provided for workers, details need to be provided as to the location and facilities to be provided for the workers. Dedicated wash areas must be situated away from surface water sources. The contractor's camp shall be monitored for dust fallout and dust suppression applied as required. This may include the laying of gravel, the use of grey water can be considered as an option if the required permits have been acquired. The contractor's camp, offices and storage facilities shall be located within the site boundaries. If this is not feasible an alternative should be designated in consultation with the ECO. The contractor shall provide labourers to clean up the contractor's camp and construction site on a daily basis. These areas shall then be inspected by the contractor or his/her ESO to ensure compliance with this requirement. The contractor shall be responsible for cleaning the contractor's camp and construction site of all structures, equipment, residual litter and building materials at the end of the construction period and, the topsoil restored in areas where landscaping is to take place.	• Minimise water pollution • Minimise dust fallout • Minimise unwarranted environmental damage outside the footprint • Maintain a clean and healthy working environment • Minimise visual impact to surrounding environment	• No signs of water or soil pollution • No complaints from surrounding landowners or I&APs • No visible signs of litter • Method statements	Contractor, EO, ESO	Monitor daily

Fires The contractors must provide and maintain a method statement for “fires”, clearly indicating where and for what fires will be utilised plus details on the fuel to be utilised in creating the fire. Fire training and equipment to be nearby to put fires out. No wood is to be collected from private or surrounding property. Fires must be within designated areas and must be in small scale. Absolutely no burning of waste is permitted. Fires will only be allowed in facilities especially constructed for this purpose within fenced Contractor’s camps. Wood and/or charcoal are the only fuels permitted to be used for fires. The contractor must provide sufficient wood (fuel) for this purpose. Fires in the designated areas must be small in scale so as to prevent excessive smoke being released into the atmosphere. Heavy smoke may not be released into the air. No felling of trees or wood collection is allowed from private or public property. The Contractor shall ensure that there is appropriate fire-fighting equipment available on site at all times.	• Minimise risk of veldt fires • Minimise destruction of natural fauna and flora • Maintain safety on site	• No veldt fires started by the contractor’s workforce • No claims from landowners for damages due to veldt fires • Method statement	Contractor, EO, ESO	Monitor daily
Erosion and sedimentation To reduce the loss of material by erosion, the contractor shall ensure that disturbance on site is kept to a minimum. The disturbance especially includes the movement of heavy vehicles. The contractor shall be responsible for rehabilitating all eroded areas in such a way that the erosion potential is minimised after construction has been completed. These areas are to be filled with mulch or funnels constructed to route the water.	• Minimise erosion damage • Minimise scarring of the soil surface and land features • Minimise disturbance and loss of topsoil	• No erosion scars • No loss of topsoil • No interference with the natural flow of water • No visible erosion scars once	Contractor, EO, ESO	As and when required

All disturbed areas that will not be landscaped within the construction phase, must be mulched to encourage vegetation re-growth. Mulch used must be free from alien seed. These areas must be cordoned off so that vehicles or construction personnel cannot gain access to these areas. In the case of strong wind and/or rain all stockpile material must be covered with a tarpaulin in order to prevent erosion.	• Re-growth of disturbed areas.	construction is completed • The footprint has not exceeded the agreed boundaries • All damaged areas successfully rehabilitated		
Fauna <u>All activities on site must comply with:</u> The regulations of the Animal Protection Act, 1962 (Act No. 71 of 1962); and Marine Living Resources Act, 1998 (Act No. 18 of 1998). All construction workers must be informed that the intentional killing of any animal is not permitted as faunal species are a benefit to society. All on site staff should be informed about sensitive aquatic species, sensitive estuarine habitats, and the responsible disposal of construction waste. Any lighting to be implemented within the study area should be designed in such a way so as to avoid light emission into the freshwater habitat as well as the non-indigenous woodland habitat. Lighting may affect movement of more cryptic and nocturnal mammal species that may avoid lit areas. Disturbance of the area upstream and downstream of construction site must be avoided.	• Minimise disturbance to animals • Minimise interruption of breeding patterns of birds • Minimise destruction of habitat	• No complaints from Nature Conservation • No litigation concerning applicable animal protection acts • No measurable or visible signs of habitat destruction	RE, Contractor, EO, ESO	Monitor daily

As many large trees within the study area should be retained in order to provide roosting for larger bird species and habitat for arboreal faunal species.				
Flora Locally indigenous plants must be used in the landscaping of the site. Plants that are proclaimed as problem plants or noxious weeds must be excluded from the landscaping plan and these must be removed immediately, should they occur on site. No plants/trees may be destroyed prior to notify the ECO about the plan. The ECO is to approve all plants to be removed. The contractor must rehabilitate the construction camp and any other disturbed areas once construction activities have terminated. Compacted areas will be ripped and mulched in order to ensure recovery of the natural vegetation cover. Once construction is complete, rehabilitation of un-built areas must be undertaken in order to restore the aesthetic & ecological value of the area. It is recommended that a qualified landscape architect, qualified botanist, aquatic specialist and the ECO be consulted with regard to the most appropriate rehabilitation vegetation and structures, where agricultural land uses are not proposed. Active re-vegetation must take place with locally indigenous vegetation under the supervision of the ECO. No open fires shall be allowed on site under any circumstances, fires will only be permitted in adequate facility within the crew camp, Forest Act, 1984 (Act No. 122 of 1984).	• Encourage natural habitat fauna • Minimise scarring of the soil surface and land features • Minimise disturbance and loss of topsoil • Minimise risk of veldt fires • Minimise risk of fauna and flora destruction	• No exotic plants used for landscaping • No visible erosion scars once construction is completed • The footprint has not exceeded the agreed boundaries • All damaged areas successfully rehabilitated • No veldt fires started by contractors work force • No claims from landowners for damages due to veldt fires.	Contractor, EO, ESO, Landscape Architect	As and when required

Heritage In terms of the National Heritage Act, 1999 (Act No. 25 of 1999), should any archaeological artefacts be exposed during construction activities, work on the area where the artefacts were found shall cease immediately and the ECO as well as the Local Council shall be notified within 24 hours. Upon receipt of such notification, the ECO will arrange for the excavation to be examined by an Archaeologist. Under no circumstances shall archaeological artefacts be removed, destroyed or interfered with. Any archaeological sites exposed during demolition or construction activities must not be disturbed prior to authorisation by the Heritage Western Cape and/or the South African Heritage Resources Agency on the appropriate provincial heritage resource agency. No building older than 60 years may be demolished or altered without prior approval by Heritage Western Cape. No graveyard or grave may be altered or impacted upon during the construction or operational phase of the development.	• Limit the destruction of the country's heritage resources • The preservation and appropriate management of new archaeological finds should these be discovered during construction.	• No destruction of or damage to known archaeological sites	Contractor, EO, RE, ESO	Monitor Daily
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No-go / sensitive areas Topsoil stockpiles are to be demarcated with danger tape and seen as no-go areas. All construction activities must remain within the boundaries of the development area, as demarcated at the start of the construction phase. There must be no vehicular access to the drainage lines outside the development area thus reducing the infringement of the development on natural habitat. The construction footprint must be kept to a minimum by constructing boundaries and demarcated areas not to be disturbed. These No-go areas must be demarcated with fencing / warning tape and signs before any construction activities commence. These areas and the type of fencing/demarcation must be approved by the relevant specialist involved in the EIA process. The EO and ECO must be on site in order to make sure the correct areas are fully demarcated. Visual Assessment Mitigation measures: • Designate the former dam and riparian corridor as 'no-go areas' for site camp establishment, materials storage, stockpiling, dumping, to avoid and prevent damage or intrusion to these areas. • Limit construction activity to within the hoarding areas, constructing on disturbed areas only to • minimize impact to visual amenity resources identified (e.g., tree clusters, windbreaks, etc.). • Ensure post-construction repair and rehabilitation of the site, towards improvement of disturbed, • areas and areas degraded by the construction activity. • Implement a construction phase environmental management plan (CEMP) to ensure on-going	• Minimise the potential for the spread of the construction footprint. • Reduce loss of fauna and flora habitat. • Minimise the potential for loss of protected and or endangered fauna and flora species.	• No sign of movement through "no go" areas. • Containment of footprint	RE, Contractor, ESO, EO	Monitor daily
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management of environmental matters, including noise, dust, and erosion control. Refer to Figure 4.				
Access route/haul roads Existing roads and services must be utilised thus reducing the infringement of the development on natural habitat. If new access roads have to be constructed the road should follow existing roads for as far as possible in order to minimize the area of disturbance. Any authorised clearing for access roads must be done under the supervision of the ECO. Access roads for earthmoving-equipment must be clearly designated and be positioned as close as possible to the proposed development site. No driving off from the marked roads is permitted and designated parking areas must be identified and demarcated with applicable signage. Neither the site nor its access roads must be allowed to be utilised for recreational activities, this includes but is not limited to quad bikes, 4x4's and dirt bikes. Security personnel	• Minimise loss of topsoil and enhancement of erosion • Minimise fauna and flora displacement by destruction of natural habitats	• No erosion on access roads after completion of construction • No loss of topsoil due to runoff water on access roads	Contractor, RE or EO	As required, monitor daily

ensure that this is enforced. No unauthorised access is permitted.				
Crime, safety and security No site staff, other than security personnel and skeleton staff shall be housed on site unless otherwise stipulated in the Environmental authorisation. Security personnel and skeleton staff shall be supplied with adequate protective clothing, ablution facilities, water and refuse collection facilities. A boundary fence will serve to prevent public access to the site, for public safety and security reasons. The access to the site must be controlled so as to restrict unauthorised personnel from entering the site. The workers on site must retain some means of identification. The ESO and the contractor are responsible for ensuring that only authorised personnel are on site at all times. The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and the National Building Regulations. Site specific conditions and regulations as set forth by the health and safety agent should also be adhered to. The contractor shall ensure that all emergency procedures are in place prior to commencing work. Emergency procedures shall include (but not be limited to) fire, spills, contamination of the ground, accidents to employees, use of hazardous substances and materials, etc. The contractor shall ensure that lists of all emergency telephone numbers / contact persons are kept up to date and that all numbers and names are posted at relevant locations throughout the construction site. The nearest emergency service provider must be identified during all phases of the project as well as its capacity and the magnitude of accidents it will be able to handle. The contact details of this emergency centre, as well as the police and ambulance services must be available at prominent locations	• Reduce the risk of potential incidences • Minimise the potential impact on the environment • Reduce the risk of possibly fatal incidents occurring on site.	• No incidences reported	RE, Contractor, ESO, EO	Monitor daily

around the construction site and the construction crew camps.				
Visual impact Shade cloth must be utilised to conceal and minimise the visual impact of contractor camps, lay down and storage areas. Landscaping must enhance the aesthetic appeal of the development. The buildings that are to be erected must be aesthetically pleasing and blend into the area as far as possible. Rubble and litter must be removed every two weeks or more often as the need arises and be disposed of at a registered landfill site as designated by the Swartland, Solid Waste removal department. The possible visual impact can further be mitigated by means of trees around the site in line with the Landscaping Masterplan and Design Guidelines prepared. Mitigation measures as proposed in the planning phase should be adhered to. Visual Impact Assessment mitigation measures: • Keep sufficient distance from the existing Broodkraal farm workers village so to allow for a landscape buffer / interface along the edge. Consider productive use of space between panels. • New screen planting, using clusters of indigenous trees (or 'naturalized' introduced / exotic species now considered part of the cultural landscape) should be integrated into the layout to further	• Minimise visual impact	• No complaints from I & AP's	Contractor, landscape contractor, ESO	Monitor daily

obscure and filter views of the proposed solar panels from the viewpoints and views from the farm works village immediately adjacent, taking cues from established landscape patterns within the contextual landscape. • With respect to the utility components and service infrastructure (ancillary building, etc), muted colours and 'earth tones' are more subtle and are more easily absorbed (visually) than bright or highly reflective surfaces. Suitable colours include grey, olive green, ochre, brown, etc. – refer to on-site geology, soil, and vegetation types for reference. Rough/textured surfaces are preferable to shiny/highly reflective surfaces in terms of visual absorption (minimise reflection / glare). • The detailing of internal access roadways and service yards associated with the development should reflect a green infrastructure approach, which alludes to the rural character of the context of the site as a cultural landscape, incorporating where possible earth-swales for storm-water run-off rather than heavily engineered concrete channels and drains. Where practical, existing roadways should be utilized. • Roadways should not be over-scaled and should include new tree planting where possible; concrete kerbs and channels should be avoided. With respect to the new accessways and roadways, these should respond to historical patterns and existing alignments in scale and placement, avoiding				
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excessive earthworks / cut and fill or vegetation removal. • Storm-water management through 'soft' engineering of the site, incorporating the principles of sustainable drainage and water sensitive design, will be environmentally advantageous and further mitigate the visual impact of driveways, service yards and other hardened surfaces (this to be ensured through meaningful engagement between freshwater ecology and storm-water engineering). • Screening, planting, and wetland features may be incorporated in a manner sensitive to natural landform, avoiding overly 'engineered' geometries. Distant views towards the mountains should be maintained, and planting should retain an agricultural quality. Indigenous vegetation ought to be integrated as a biodiversity corridor, especially within the riparian corridor/drainage channel. • With respect to site boundaries, apart from gateway thresholds, solid masonry boundary walls should be minimized; and no galvanized steel palisade fencing should be allowed. Visually transparent fencing (e.g., welded mesh Clearvu or similar), is preferable, especially if integrated into generous planting beds to properly 'disappear' into the landscape, noting that dark grey or black fencing is more visually recessive than green. • Avoid light pollution by reducing lighting to the minimum necessary. Lighting is to be carefully				
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controlled and well-integrated into the design proposal and coordinate with signage. Light sources must be shielded to reduce light spillage. Shielded down-lights to be used where required from security on open areas.				
Hydrology Increased run-off during construction must be managed using berm and other suitable structures as required to ensure flow velocities are reduced; this must be done in consultation with the Resident engineer as well as the ECO. The Contractor shall take reasonable measures to control the erosive effects of storm water runoff. Storm water, wherever possible, should be allowed to soak into the land in the area on which the water fell. In the event of pollution caused as a result of construction activities, the contractor, according to section 20 of the National Water Act, 1998 (Act No. 36 of 1998) shall be responsible for all costs incurred by organisations called to assist in pollution control and/or to clean up polluted areas and water courses. The contractor shall ensure that excessive quantities of sand, silt and silt-laden water do not enter the non-perennial watercourse found on site. No wastewater may run freely into the surrounding area. Freshwater Verification mitigation measures: Suitable dust management practices must be implemented for the duration of construction; Sediment control devices (such as geotextile sediment traps) should be installed downgradient of	• Minimise pollution of soil, surface and ground water resources in the immediate and surrounding environments • Minimise impeding the natural flow of water • Minimise the impact on natural water flow dynamics • Minimise scarring of the soil surface and land features	• No visible signs of pollution • No signs of siltation of water courses • No visible erosion scarring once construction is completed • Minimum loss of topsoil •	RE, Contractor, EO	As and when required, monitor daily

the construction works, to avoid excess sediment entering the receiving freshwater features; Proliferation of alien vegetation as a result of the construction and operation related disturbances must be monitored and controlled; Construction and maintenance vehicles must make use of existing access roads as far as possible and no indiscriminate vehicular movement within the identified features may be permitted; It is highly recommended that the ground cover under the solar panels be vegetated with indigenous terrestrial graminoid species, maintained and not be left as gravel or bare ground to assist with stormwater management and prevent erosion at the base of the panels (Cook and McCuen, 2013). Alternatively, a buffer strip must be placed after the most downgradient row of panels. The buffer strip length must be sufficient to return the runoff characteristics with the panels to those of runoff experienced before the gravel and panels were installed (Cook and McCuen, 2013); and General good housekeeping practices must be implemented during all phases of the proposed solar development, to ensure limited direct and cumulative impacts to the receiving freshwater environment.				
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Soil Topsoil must be stripped from all areas that are to be utilized during the construction period and where permanent structures and access is required. These areas will include comprising the permanent works, pipeline trenches, stockpiles, access roads, construction camps and lay down areas. Topsoil must be deemed to be the top layer of soil containing organic material, nutrients and plant grass seed. For this reason it is an extremely valuable resource for the rehabilitation and vegetation of disturbed areas. At the beginning of the construction phase, topsoil removed for vegetation clearance must be stripped to a minimum depth of 300 mm and stockpiled on the demarcated topsoil stockpile areas. All topsoil must be removed and stockpiled on the site. However, the use of topsoil for rehabilitation contaminated by the seed of alien vegetation must not be permitted unless a programme to germinate the seed and eradicate the seedlings is drawn up and approved, or some other mitigatory feature is found. This must be approved by the ECO. Single handling is recommended. Stock piles must not be higher than 2m to avoid compaction. Dust suppression is necessary for stockpiles older than a month – with either water or a biodegradable chemical binding agent. Backfill will require contouring to ensure that it blends in with the surrounding environment.	• Minimise scaring of the soil surface and land features • Minimise disturbance and loss of soil • Minimise construction footprint • Maintain the integrity of topsoil's for future landscaping and rehabilitation • Containment of invasive plant growth	• No visible erosion scars once construction is completed • The footprint has not exceeded the agreed site in terms of EA etc. • Minimal invasive weed growth • No signs of sedimentation and erosion • Method statement	Contractor	Daily
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Phase of development	CONSTRUCTION		
Impact / issue	TOLERANCES		
MITIGATION MEASURE		RESPONSIBLE PARTY	FREQUENCY OF ACTION
Fines Fines for the activities detailed below, will be imposed by the Engineer on the Contractor and/or his Sub-contractors. a) Any employees, vehicles, plant, or thing related to the Contractor's operations operating within the designated boundaries of a "no-go" area. <u>R 5 000</u> b) Any vehicle driving in excess of designated speed limits. <u>R 500</u> c) Persistent and un-repaired oil leaks from machinery. <u>R 2 000</u> d) Persistent failure to monitor and empty drip trays timeously. <u>R 1 000</u> e) The use of inappropriate methods for refuelling. <u>R 1 000</u> f) Litter on site associated with construction activities. <u>R 5 000</u> g) Deliberate lighting of illegal fires on site. <u>R 2 000</u> h) Any employee eating meals on site, outside of the defined eating area. <u>R 500</u> i) Employees not making use of the site ablution facilities. <u>R 2 000</u> j) Failure to implement specified noise controls <u>R 1 000</u> k) Failure to empty waste bins on a regular basis. <u>R 1 000</u> l) Inadequate dust control. <u>R 1 000</u> m) Any act, that in the reasonable opinion of the Engineer, constitutes a deliberate contravention of the requirements of these Specifications. <u>R2 000</u> n) Any water abstraction activities from the river <u>R5 000</u> For each subsequent similar offence the fine shall be doubled in value to a maximum value of <u>R 40 000.</u> The Engineer, in conjunction with the ECO shall be the judge as to what constitutes a transgression in terms of this clause, subject to the General Conditions of Contract.		Engineer	Monitor daily

Table 6: PROPOSED DEVELOPMENT OF A 3,15 MW PV PLANT ON FARM RE/154, PIKETBERG, WESTERN CAPE, OPERATIONAL PHASE EMP (General)

Phase of development	OPERATIONAL				
Impact / issue	General				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION	
Waste management Please refer to the waste Minimization Plan Herewith attached.	• Sustainable management of waste by recycling • To keep the development neat and tidy • Minimise litigation and complaints by I&AP's • Reduce visual impact • Control potential influx of vermin and flies thereby minimising the potential of diseases at the site and the surrounding environment	• Disposal of refuse in an appropriate manner with no refuse polluting the development • Development is neat and tidy • No complaints from surrounding industries and businesses • Sufficient containers available on site • No visible or measurable signs of pollution of the environment (soils, ground and surface water)	Property Owners association and ECO	6 Monthly	

Phase of development	OPERATIONAL			
Impact / issue	General			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Storm water Management Storm water, wherever possible, must be allowed to soak into the land in the area on which the water has been discharged. The storm water system and the discharge points must be inspected and damaged areas must be repaired if required. Discharge points should further be inspected for blockages of any kind; these must be removed timeously to ensure the efficient operation of the storm water management system. No waste or refuse must be allowed to access the storm water infrastructure. In the event that silt runoff occurs off the development site, the cause of this must be investigated and suitable mitigation measures employed. This may include the vegetation of bare areas, installing flow diversion channels in consultation with an engineer, installing velocity reducing structures etc. For all maintenance undertaken reference must be made to recommendations in the engineer's reports and or the approved storm water management plan. All maintenance activities must be monitored to ensure that no environmental damage occurs. All damage must be mitigated immediately. As a mitigation measure, it is proposed to maintain the narrow corridor of existing vegetation adjacent to the tributary to the wesat of the site to act as a buffer against potential runoff.	• Minimise pollution of soil, surface and ground water resources • Minimise the potential loss of topsoil • Minimise the potential of flooding of the development, or its neighbouring properties	• No evidence of pollution at the discharge points • No evidence of silt build-up at the discharge points • No complaints from I & AP's	Property Owners association and ECO	As and when required Monitor seasonally

Phase of development	OPERATIONAL				
Impact / issue	General				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION	OF
Additionally, mitigation measures of the Freshwater Specialist should be implemented during the operational phase as indicated in the EMPr. As extracted from the Freshwater Mitigation Measures in the freshwater study: • Suitable dust management practices must be implemented for the duration of construction; • Sediment control devices (such as geotextile sediment traps) should be installed downgradient of the construction works, to avoid excess sediment entering the receiving freshwater features; • Proliferation of alien vegetation as a result of the construction and operation related disturbances must be monitored and controlled; • Construction and maintenance vehicles must make use of existing access roads as far as possible and no indiscriminate vehicular movement within the identified features may be permitted; • It is highly recommended that the ground cover under the solar panels be vegetated with indigenous terrestrial graminoid species, maintained and not be left as gravel or bare ground to assist with stormwater management and prevent					

Phase of development	OPERATIONAL				
Impact / issue	General				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION	
erosion at the base of the panels (Cook and McCuen, 2013). Alternatively, a buffer strip must be placed after the most downgradient row of panels. The buffer strip length must be sufficient to return the runoff characteristics with the panels to those of runoff experienced before the gravel and panels were installed (Cook and McCuen, 2013); and General good housekeeping practices must be implemented during all phases of the proposed solar development, to ensure limited direct and cumulative impacts to the receiving freshwater environment.					
Dust Surface dust should be minimized during the operational phase of the development in order to prevent the dust from being blown to adjacent properties. The proposed development should be landscaped with indigenous plant species. Water extraction from the non perennial storm water channel on site will not be allowed.	No dust blown from the development to adjacent properties.	No complaints from I&AP's			

Phase of development	OPERATIONAL			
Impact / issue	General			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Atmospheric pollution Air pollution All forms of dust/air pollution must be managed in terms of the Atmospheric Pollution Prevention Act, 1965 (Act No. 45 of 1965), this includes the control of noxious and offensive gases, smoke, dust and vehicular emissions Under no circumstances may heavy smoke be released into the air. Light pollution ▪ Light output is to be confined within property boundaries through using specifically designed luminaries such as full cut-off luminaries to minimise upward spread of light near to and above the horizontal Figure 1 A; ▪ Spotlight luminaries to be tilted in order to direct the light to the intended spot, instead of allowing it to light areas outside its purpose Figure 1 B ▪ Outdoor spot lights to be mounted on the appropriate pole height. Higher mounting heights allow lower main beam angles which can reduce glare (Figure 1– C). Noise pollution Noise levels shall be kept within acceptable limits, these are determined in terms of the relevant local by laws. Operation activities will remain within normal working hours (07:00am – 18:00pm).	• Reduce visual impact • Minimise chances of transgression of the acts controlling pollution	• No visible signs of pollution • No litigation due to transgression of pollution control acts • No complaints from surrounding residents and businesses	Property Owners association and ECO	Monitor daily

Phase of development	OPERATIONAL			
Impact / issue	General			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Safety and Security Boundary wall must be regularly inspected and maintained to prevent any damage. All fencing on site must be managed in terms of the Fence Act No. 31 of 1963 All maintenance and repair work must be done in accordance with National Building Regulations and Standards Act 103 of 1977 Maintenance work must not be the cause of environmental damage. Any environmental damage caused must be investigated and mitigated immediately. An emergency plan (including fire management) must be developed and implemented; the relevant authority must approve this plan. Ensure that all fire extinguishers are replaced on or before their expiry dates. Ensure that pump devices are in good working order.	• Reduce the risk of potential incidences • Minimise litigation and complaints by I&AP's	• No complaints from surrounding residents and businesses	Property Owners association and ECO	As and when required
Traffic management All traffic management must be done in accordance with the National Road Traffic Act No. 93 of 1996	• Minimise chances of transgression of the acts controlling traffic • Minimise traffic backlog	• No litigation due to transgression of traffic control acts • No complaints from surrounding industries and businesses	Property Owners association and ECO	Monitored continually

Phase of development	OPERATIONAL			
Impact / issue	General			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Landscape maintenance All alien invasive plant species must be monitored and removed for disposal at a registered organic waste transfer facility.	- Minimise chances of transgression of the acts - Reduce visual impact	- No litigation due to transgression of relevant acts - No complaints from surrounding residents and businesses	Property Owners association and ECO	As and when required Monitor seasonally
Visual Statement Mitigation Measures: a) Maintain the dam and riparian corridor as 'no-go areas' for any further development, and ensure that any activities or events held within these areas 'tread-lightly', b) planning and management to respond positively to visual/heritage considerations and design indicators, towards an appropriate fit and seamless integration into the landscape context. c) architectural measures (form / scale / massing / materials / textures) to ensure visually recessive structures and to combat the cumulative effect of the aggregation of buildings and services d) landscape measures (screen planting / village green open space / view corridors) to anchor and settle the new buildings into the site and to 'dissolve' and 'diffuse' hard edges	Unnecessary visually visible impacts are avoided.	No complains or non-compliances	ECO	As and when required

Table 7: PROPOSED DEVELOPMENT OF A 3,15 MW PV PLANT ON FARM RE/154, PIKETBERG, WESTERN CAPE, OPERATIONAL PHASE EMP (EA conditions)

Phase of development	OPERATIONAL	GNEC-Guillaume Nel	16/3/3/1/F5/2028/23		
Impact / issue	EA Conditions				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION	
Mitigations proposed by the Visual Impact Assessment should be implemented. Starting page 53 of this document. Mitigation measures proposed by the Freshwater Verification report should be implemented. Starting page 56 of this document.	•	•			
	•	•			

**PROPOSED DEVELOPMENT OF A 3,15 MW PV PLANT ON FARM
RE/154, PIKETBERG, WESTERN CAPE.**

DEADP Ref: 16/3/3/1/F5/25/2010/23

**WASTE, WATER USE AND ELECTRICITY CONSUMPTION MINIMIZATION MANAGMENT
PLAN**

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04 November 2023

REFERENCES

DEA&DP, 2003. A Waste Minimization Guideline Document for Environmental Impact Assessments (2003) by Common Ground in association with deVilliers Brownlie Associates.

National Environmental Management Act 107 of 1998 (NEMA)

Stellendale Village DRAFT Green Building Guidelines by Steadfast Greening, 2008

SUB SECTION 1 - INTRODUCTION

1.1 INTRODUCTION

The Le Roux Group (Broodkraal Landgoed (Pty) Ltd), will use this Planning, Construction and Operational Phase Environmental Management Programme (EMP) as a tool in managing the impacts of the application for the proposed solar power plant after environmental approval from the Department of Environmental Affairs and Development Planning (DEADP) in terms of the Environmental Impact Assessment Regulations – National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), which replaced the regulations under the, Environment Conservation Act, 1989 (Act No. 73 of 1989) and has been effective as of 3 July 2006.

This document is based on the Waste Minimization Guideline Document on the DEA&DP website (by Common Ground in association with de Villiers Brownlie Associates) and the Stellendale Village DRAFT Green Building Guidelines by Steadfast Greening.

The regulation of activities that have a significant impact on the environment as well as the protection of the environment itself, have improved significantly in the last decade and a half with the promulgation of the Constitution, and general environmental legislation, such as the National Environmental Management Act (NEMA) and the National Water Act. One of the main impacts of human activities on the environment is that of waste disposal (Common Ground & deVilliers Brownlie Associates, 2003).

Waste may be in solid, liquid or gaseous form. It may be benign, toxic, or hazardous. The management of hazardous waste, with associated negative impacts on the environment, is generally covered by legislation. The longer term, cumulative impacts of relatively benign waste disposal is poorly addressed by our laws (DEA&DP Waste Minimization Guideline, 2003).

“Waste” in this document is primarily interpreted as solid waste. Waste minimization per se is not specifically legislated in South Africa at present. Similarly, there are no legal instruments that can be used to enforce reduction in wastage of electricity and water although the National Water Act No 36 of 1998 prohibits wastage of water without specifying what wastage means and how this section will be enforced. However, there are a number of laws and overarching policies that are aimed at sustainable development and sound environmental management, and which are relevant to waste and wastage minimisation.

Wastage is defined in the Oxford Dictionary as “expend or employ to no purpose or for inadequate result, use extravagantly or ineffectually, squander”. Part of the obligation to protect the environment would be to limit wastage of resources. Thus limiting wastage of

water would fall within this obligation. So too would be limiting the wastage of electricity that results in pollution at the site of electricity generation (Common Ground & deVilliers Brownlie Associates, 2003).

SUB SECTION 2 - WASTE REDUCTION

2.1 BACKGROUND TO WASTE REDUCTION

A key element of environmentally friendly buildings is to promote awareness and change behaviour around all aspects of waste management.

Waste minimisation can therefore be assessed as a component of waste management that aims to reduce the amount of waste, which has to be disposed of. In this regard waste minimisation is aimed at tackling the causes and sources of waste rather than just trying to address and mitigate the symptoms (e.g. through treatment). Waste management can be depicted as a hierarchy, as shown in Figure 1 below. In the hierarchy, source reduction options are considered as a priority, followed by re-use and recycling options. Treatment options are considered only when acceptable waste minimisation techniques have been investigated. As a “last resort” disposal should be considered.

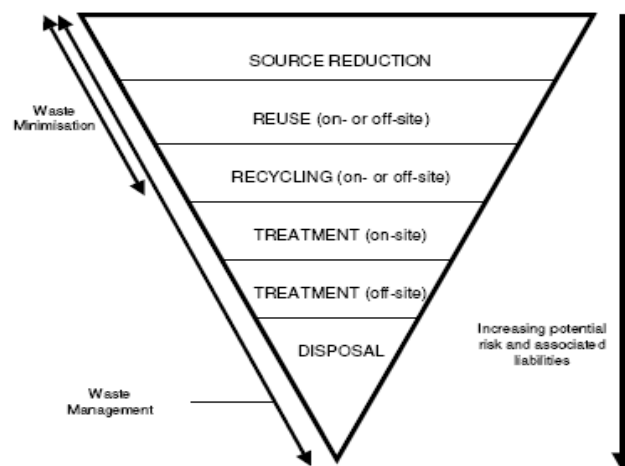


Figure 1 Waste Management Hierarchy (Common Ground & deVilliers Brownlie Associates, 2003).

Waste Management, therefore, involves interventions to minimize waste generation in the planning, operation, management and maintenance of the built environment, and includes waste prevention, waste reduction, waste re-use, and recycling.

A further aspect is minimizing the environmental and health impacts by reducing toxicity, and ensuring environmentally sound treatment and disposal of remaining waste. The

ultimate is however to promote a zero waste concept where all the related materials can be used again over the longer term with life-cycle assessments, cradle to cradle.

Zero Waste is a goal, a process, a way of thinking that is different to the way we think about products and processes. Not only is Zero Waste about recycling and avoiding waste going to landfill, it also changes production and distribution systems to prevent waste from being manufactured in the first place. It is a way of changing how materials flow through society in such a way that, as in nature, they flow in a closed loop – resulting in efficient use of material and other resources, such as energy and water (Steadfast Greening, 2008).

Zero Waste therefore aims to:

- Prevent rather than manage waste.
- Turn resource that would normally be thrown away into economic value instead of loss.
- Support sustainable development.
- Follows natural processes where everything is recycled.
- Promote the efficient flow of energy and materials.

It is thus essential to ensure that waste avoidance is built into the process at a design phase, referring to the construction and maintenance of the building. This will be done through selection of the appropriate building materials and managing the construction process in a responsible manner.

Opportunities for the separation of waste at source must also be built into the design of the building to encourage people to recycle their waste.

2.2 BENEFITS OF WASTE REDUCTION

The benefits of waste reduction as described in the DEA&DP Waste Minimization Guideline (Common Ground & deVilliers Brownlie Associates, 2003) include the following benefits.

2.2.1 Financial benefits

- Reduced transportation costs for waste materials (less transportation because of less material wasted). This includes transportation to and from the site and disposal.
- Reduced disposal costs of waste materials (disposal costs are likely to rise significantly in the near future)
- Reduced purchase quantity and price of raw materials by waste minimisation.
- Reduced purchase price of new materials when considering reuse and recycling (depending on materials).

- Increased returns can be achieved by selling waste materials to be reused.

2.2.2 Environmental benefits

Some of the environmental benefits are:

- Reduced quantity of waste generated.
- Efficient use of waste generated.
- Minimised amounts of waste disposed of at landfills, which therefore extend the lifespan of landfills.
- Reduced environmental effects as a result of disposal, e.g. noise, pollution.
- Reduced transportation of waste to be disposed of (hence less noise, vehicle emission pollution, and energy used).

2.2.3 Social benefits

- Increased site safety.
- Increased work efficiency.
- Enhanced company image.
- Job creation through recycling initiatives.

2.3 GENERATED WASTE

2.3.1 Examples of waste generated during construction:

- Waste wood from cutting structural elements, broken structural elements and damaged elements from incorrect storage
- Damaged or off-cut steel components
- Off-cut electrical wiring and cabling
- Broken or off-cut tiles
- Packaging
- Off-cut and broken bricks
- Surplus material from cut and fill activities
- Spoil from cut and fill activities
- Off-cut, or broken conduit and plumbing
- Off-cut or damaged insulation elements
- Surplus paint and paint containers
- Broken or redundant plant and equipment
- Surplus concrete, cement and grouting
- General waste

SUB SECTION 3 - WASTE MINIMIZATION PLAN

3.1 WASTE MINIMIZATION DURING CONSTRUCTION

Issue	Minimization Plan
General Considerations	
Standardization of dimensions	The developer will for as far as it is economically feasible design the buildings to maximise the use of standard dimensions in order to minimize the amount of cutting waste during construction. •
Material Selection	The developer will, for as far as it is economically feasible select: • materials for least waste generation during preparation and use during construction • materials used in the construction which are durable in order to minimise maintenance or replacement • standard materials to increase re-use/ recycling potential • materials which are sourced locally
Pre-Fabrication	The developer will, for as far as it is economically feasible make use of pre-fabricated components in order to minimise waste on site and permit re-use by the manufacturers of any waste generated during construction of the units.
Hazardous Substances	The developer will, for as far as it is economically feasible make use of non-hazardous substances to replace hazardous substances such as replacing asbestos with fibre glass etc.
Maintenance	The developer will, for as far as it is economically feasible design the structure of buildings in such as way that it minimizes but facilitates maintenance, in order to prolong the lifespan of the structure and reduce the amount of waste resulting from demolition. The developer will, for as far as it is economically feasible design the structure of buildings in such a way that maintenance does not require the use of hazardous or toxic substances. This will ensure that minimal waste will be un-recyclable due to contamination.

Ordering	The developer will strive to order materials “just-in-time” to avoid deterioration/ breakage during storage The developer will strive to (as far as reasonably possible) order materials only from suppliers which will take back any unused/ off-spec or broken materials favoured. The developer will strive to (as far as reasonably and economically possible) order materials in bulk to reduce packaging but without over-ordering resulting in waste generation. Suppliers which take back the packaging will be favoured by the developer.
Load and unloading of materials	The construction site staff will be trained to load and unload materials correctly to avoid breakage and wastage.
Storing of materials	Care will be taken to ensure that materials are stored appropriately according to supplier specifications to reduce the risk of damage or deterioration.
The use of temporary structures	The developer will attempt to keep temporary structures on site to a minimum. Where unavoidable the temporary structures used on this site, will be re-used on other sites.
General	The contractors must provide and maintain a method statement for “solid waste management”. The method statement must provide information on the proposed licensed facility to be utilised and details of proposed record keeping for auditing purposes. For the disposal of clean building rubble, a General & Hazardous Waste Landfill can be utilized • Waste shall be separated into recyclable and non-recyclable waste, and shall be separated as follows: Hazardous waste: including (but not limited to) old oil, paint,etc, • General waste: including (but not limited to) construction rubble, • Reusable construction material. Recyclable waste shall preferably be deposited in separate bins. The contractor is advised that “Collect-a-Can” collect tins, including paint tins, chemical tins, etc. and “Consol” collect glass for recycling. Any illegal dumping of waste will not be tolerated. Proof of legal dumping must be able to be produced on request. Bins must be clearly marked for ease of management. All refuse bins must have a lid secured so that animals cannot gain access. Under no circumstances may any waste be burnt.

	Dry vegetation removed during the execution of this project must be taken to a garden waste facility or be disposed of at an appropriately licensed facility, but not be disposed of on adjacent land. All waste must be managed in accordance with the Minimum Requirements for waste disposal by landfill 2nd ed 1998. The minimum requirements for easy access by waste disposal service trucks will be met in order for vehicles to effectively access the waste. All waste must be disposed of at a registered site. It is the management bodies' responsibility to ensure that the contracted party responsible for waste disposal disposes of the waste at the correct facility. This facility refers to a <i>General & Hazardous Waste Landfill site</i> as referred to by the Swarland Municipality Solid Waste Management Department. These landfill sites are permitted by Department Environmental Affairs and Development Planning with operating numbers in place.
	The use of building materials which result in least amount of waste generated (e.g. pre-fabrication as opposed to on-site construction/fabrication) will be favoured by the developer as far as economically feasible. Materials will be re-used on site wherever possible. Off-cuts and equipment will be re-used on other jobs wherever possible.

SUB SECTION 4 – WATER USE AND MANAGEMENT PLAN

4.1- WATER USE MINIMIZATION AND MANAGEMENT DURING CONSTRUCTION AND OPERATION

CONSTRUCTION PHASE	
Issue	Management Plan
General Considerations	
DUST SUPPRESSION	Potable water cannot (as far as possible) be used as a means of dust suppression, alternative measures must be sourced. The use of 'grey' water must be investigated as an alternative. The contractor will be responsible to source this water and obtain the required approvals.
ABLUTIONS	The developer will reuse as much of the water from wash basins on site as possible.
CONCRETE AND CEMENT PREPARATION	The developer/contractor will order concrete and cement from supplier for as far as possible. The mixing area should contain any liquids to prevent contamination of soil and storm water
GENERAL CLEANSING OPERATIONS	All hoses will be fitted with trigger gun spray nozzles to limit wastage. Wherever possible biodegradable and non-toxic detergents, soaps and degreasers will be used. Regular Maintenance of equipment will be conducted in order to prevent wastage.

ANNEXURE 1 DECLARATION OF UNDERSTANDING BY THE DEVELOPER

I, _____

Representing _____

Declare that I have read and understood the contents of the Environmental Management Programme for:

Contract _____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness2: _____

ANNEXURE 2 DECLARATION OF UNDERSTANDING BY THE ENGINEER

I, _____

Representing _____

Declare that I have read and understood the contents of the Environmental Management Programme for:

Contract _____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness2: _____

ANNEXURE 3 DECLARATION OF UNDERSTANDING BY THE CONTRACTOR

I, _____

Representing _____

Declare that I have read and understood the contents of the Environmental Management Programme for:

Contract _____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness2: _____

ANNEXURE 4 INCIDENT AND ENVIRONMENTAL LOG

ENVIRONMENTAL INCIDENT LOG				
Date	Env. Condition	Comments <i>(Include any possible explanations for current condition and possible responsible parties. Include photographs, records etc. if available)</i>	Corrective Action Taken <i>(Give details and attach documentation as far as possible)</i>	<u>Signature</u>