PROPOSED NEWCASTLE SOLAR ENERGY FACILITY NEAR NEWCASTLE, KWAZULU-NATAL

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

Submitted as part of the draft Basic Assessment Report

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Prepared for:
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PROJECT DETAILS

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Client	:	Building Energy SpA

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DEFINITIONS AND TERMINOLOGY

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Archaeological material: Remains resulting from human activities which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

Cumulative impacts: The impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Endemic: An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

Environment: the surroundings within which humans exist and that are made up of:

i. The land, water and atmosphere of the earth;
ii. Micro-organisms, plant and animal life;

iii. Any part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental impact: An action or series of actions that have an effect on the environment.

Environmental impact assessment: Environmental Impact Assessment (EIA), as defined in the NEMA Basic Assessment Regulations and in relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental management programme: An operational plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its ongoing maintenance after implementation.

Fossil: Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000).

Indigenous: All biological organisms that occurred naturally within the study area prior to 1800

Indirect impacts: Indirect or induced changes that may occur as a result of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

Interested and affected party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local

communities, investors, work force, consumers, environmental interest groups and the general public.

Photovoltaic effect: Electricity can be generated using photovoltaic panels (semiconductors) which are comprised of individual photovoltaic cells that absorb solar energy to produce electricity. The absorbed solar radiation excites the electrons inside the cells and produces what is referred to as the Photovoltaic Effect.

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare".

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Significant impact: An impact that by its magnitude, duration, intensity, or probability of occurrence may have a notable effect on one or more aspects of the environment.

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PROJECT DETAILS *CHAPTER 1*

Building Energy SpA is proposing the development of a small-scale photovoltaic solar energy facility near Newcastle in the KwaZulu-Natal. The project is referred to as the proposed **Newcastle Solar Energy Facility**. The facility is proposed to be located on the Remainder of Erf 13661 and have a generating capacity of up to 5MW and a development footprint approximately 10ha in extent.

The purpose of the project is to generate electricity which will be fed-into the national electricity grid. The project will participate in the Department of Energy's Small Projects Renewable Energy Independent Power Producer Procurement Programme (REIPPP). The REIPPP Programme has been designed to contribute towards the South African government's renewable energy target of 17GW by 2030, and to stimulate the renewable industry in South Africa.

The solar energy facility will have a development footprint of ~10ha, within which the following typical infrastructure will be established:

» Arrays of photovoltaic (PV) panels with a capacity of up to 5MW.
» Mounting structures to be either rammed steel piles or piles with pre-manufactured concrete footing to support the PV panels.
» Cabling between the project components, to be lain underground.
» Inverters/Transformer enclosures.
» An on-site switching station.
» An overhead power line of approximately 2 000m to facilitate the connection between the solar energy facility and the existing Karbochem Plant Substation located to the west of the facility.
» Internal access roads and service road for the power line
» Fencing and workshop area for maintenance, storage and an on-site office.

Through the environmental assessment of impacts associated with the Newcastle Solar Energy Facility, both potentially positive and negative impacts were identified. All impacts were assessed to be of medium-low significance.

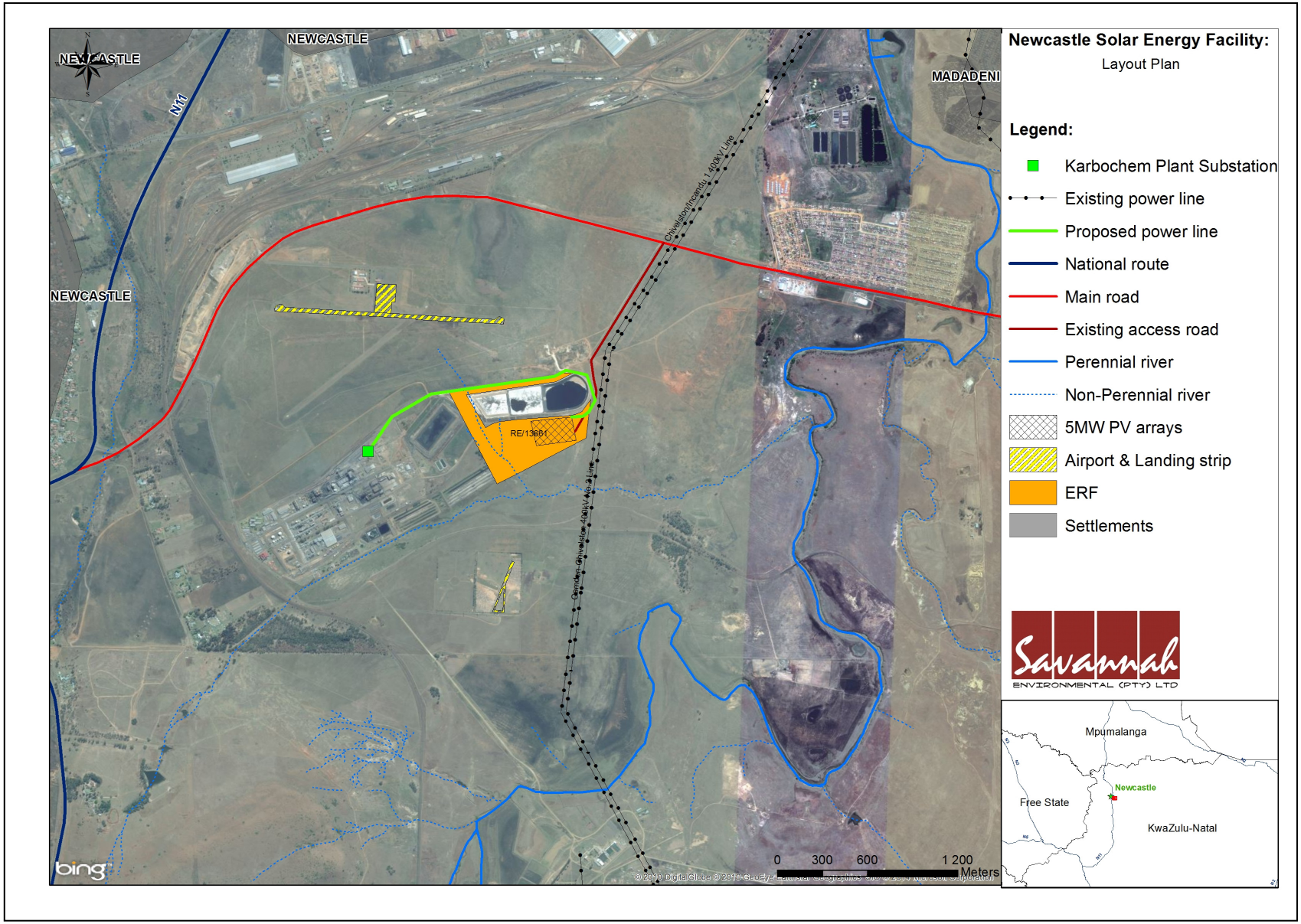

Figure 1.1: Locality map showing the development area for the proposed Newcastle Solar Energy Facility on the Remainder of Erf 13661

1.1. Activities and Components associated with the Construction Operation and Decommissioning Solar Energy Facility

Table 1.1: Activities associated with the construction of a PV facility

Main Activity/Project Component	Components of Activity	Details
	Planning	
Conduct technical surveys	» Geotechnical survey by geotechnical engineer. » Site survey and confirmation of the infrastructure micro-siting footprint.	» All surveys are to be undertaken prior to initiating construction.
	Construction	
Undertake site preparation	» Clearance of vegetation at the infrastructure footprints. » Where required, some levelling of the land may occur. » Excavation of trenches for underground cables.	» These activities will require the stripping of topsoil, which will need to be appropriately stockpiled for use in rehabilitation.
Construction of internal access roads	» Construct a 7 m wide gravel roads around the site.	» The proposed internal access roads will be comprised of gravel tracks or compacted rock-fill.
Construct infrastructure foundations	» Mounting structures will either be pile driven, screwed or pre-cast concrete footings	» Mounting structures will not involve the utilization of concrete, but would involve be pile driven, screwed
Transport of components and equipment to site	» Trucks will be used to transport all components to site: * The normal civil engineering construction equipment for the civil works (e.g. trucks, graders, compaction equipment, cement mixers, etc.).	» The equipment will be transported to the site using appropriate National and Provincial routes, and the dedicated access/haul road to the site itself.
Establishment of PV panels	» PV panels are transported in containers. » The steel structures will be assembled on site.	» The steel mounting structures, manufactured in South Africa, are custom made for the site. They are assembled on site.

Main Activity/Project Component	Components of Activity	Details
Connection of PV panels to the substation	» The PV panels will be connected to the on-site substation via underground cabling (where practical).	» The installation of these underground cables will require the excavation of trenches of approximately 400 mm – 1000 mm deep within which they can then be laid.
Connect substation to the grid	» The PV facility could possibly connect into the existing Karbochem Plant Substation.	» The electricity generated at the site will run through underground cables onto the onsite mini-substation
Undertake site rehabilitation	» Remove all construction equipment from the site. » Rehabilitation of temporarily disturbed areas where practical and reasonable.	» On full commissioning of the facility, any access points to the site which are not required during the operation phase will be closed and prepared for rehabilitation.
Operation		
Operation	» PV panels. » Associated infrastructure.	» The operational phase is proposed to run for a period of approximately 20 years. » During this time, full time security, maintenance, supervision, and monitoring teams will be required on site. » The PV facility will be operational during daylight hours only but not under circumstances of mechanical breakdown, or maintenance activities. » No energy storage mechanisms (i.e. batteries) which would allow for continued generation at night or on cloudy days are proposed. » An estimated 500 m^3 litters of water per annum would be required for cleaning of the panels and for offices and workshops and an estimated 1 300 m^3 of water would be required for the construction of the plant.
Maintenance & Security	» Maintenance during the life cycle of the facility	» The panels will be cleaned with water. It is

Main Activity/Project Component	Components of Activity	Details
	would include emergency repairs, routine panel maintenance, routine maintenance of medium voltage equipment and maintenance of the site.	estimated that this would be required twice annually. » 24 hour on-site security
	Decommissioning	
Site preparation	» Preparation of the site. » Mobilisation of decommissioning equipment.	» Depending on the economics of the development following the operational period, the plant will either be decommissioned or the operational phase will be extended. If it is deemed financially viable to continue, existing components may be disassembled and replaced with technology/ infrastructure available at that time. However, if the decision is made to decommission the facility the components of the facility will be disassembled and removed from the site.
Disassemble panels	» The panels will be disassembled and removed.	» The components of the plant will be disassembled and removed. Thereafter they will be reused and recycled (where possible) or disposed of in accordance with regulatory requirements. The site will be rehabilitated and can be returned to the agricultural or other land-use.

1.2 Findings of the Environmental Impact Assessment

Potential environmental impacts associated with Newcastle solar Energy Facility, as identified through the EIA BA include:

» Impacts on ecology (refer to Figure 1.2, project is located with 500m of wetland buffer)
» Impacts heritage and Paleontological Resources
» Impacts on the local soils, land capability and agricultural potential of the site.
» Visual impacts mainly due to the solar panels and partly due to other associated infrastructure (power line, access road .).
» Social and economic impacts.

» In terms of the **ecology** survey, the results based on the available information and the site investigations show that the proposed project would have **no impact** on any sensitive and / or important terrestrial and aquatic habitats. This is based on the current condition of the site.

» **Heritage:** During the survey for the proposed PV facility, access route and connection into the grid **no sites of heritage significance** were found in the development footprint. The impacts of the proposed development on heritage resources such as archaeological sites, built structures over 60 years old, sites of cultural significance associated with burial grounds and graves, graves of victims of conflict, and significant cultural landscapes or viewscapes are considered to be **low**.

» The effects of the proposed construction operations to the geological strata underlying the project area will be restricted to the Early Permian Vryheid Formation; this geological unit is known to be fossiliferous. The probability of the project resulting in a negative impact on the **paleontological heritage** of the Vryheid Formation has been assessed as **moderate.** Implementation of recommended mitigation measures will minimise impacts.

» The proposed development is located outside the Newcastle urban area, within the industrial expansion zone. There are no residential or tourist attractions located adjacent to the property and therefore the anticipated impact on the area's **visual quality and sense of place** is expected to be of **low significance.**

» The overall positive and negative **social and socio-economic impact** is likely to be of a **medium to low significance** during both the construction and operational phases with the implementation of enhancement/mitigation measures. The proposed Newcastle Solar Energy Facility is unlikely to result in permanent damaging social impacts. From a social perspective it is concluded

that the project could be developed subject to the implementation of the recommended mitigation measures and management actions contained in the report.

» **Cumulative impacts**: the cumulative impacts on ecology, visual and social will be low considering the limited size of the proposed infrastructure as well the disturbed landscape in which it is being proposed

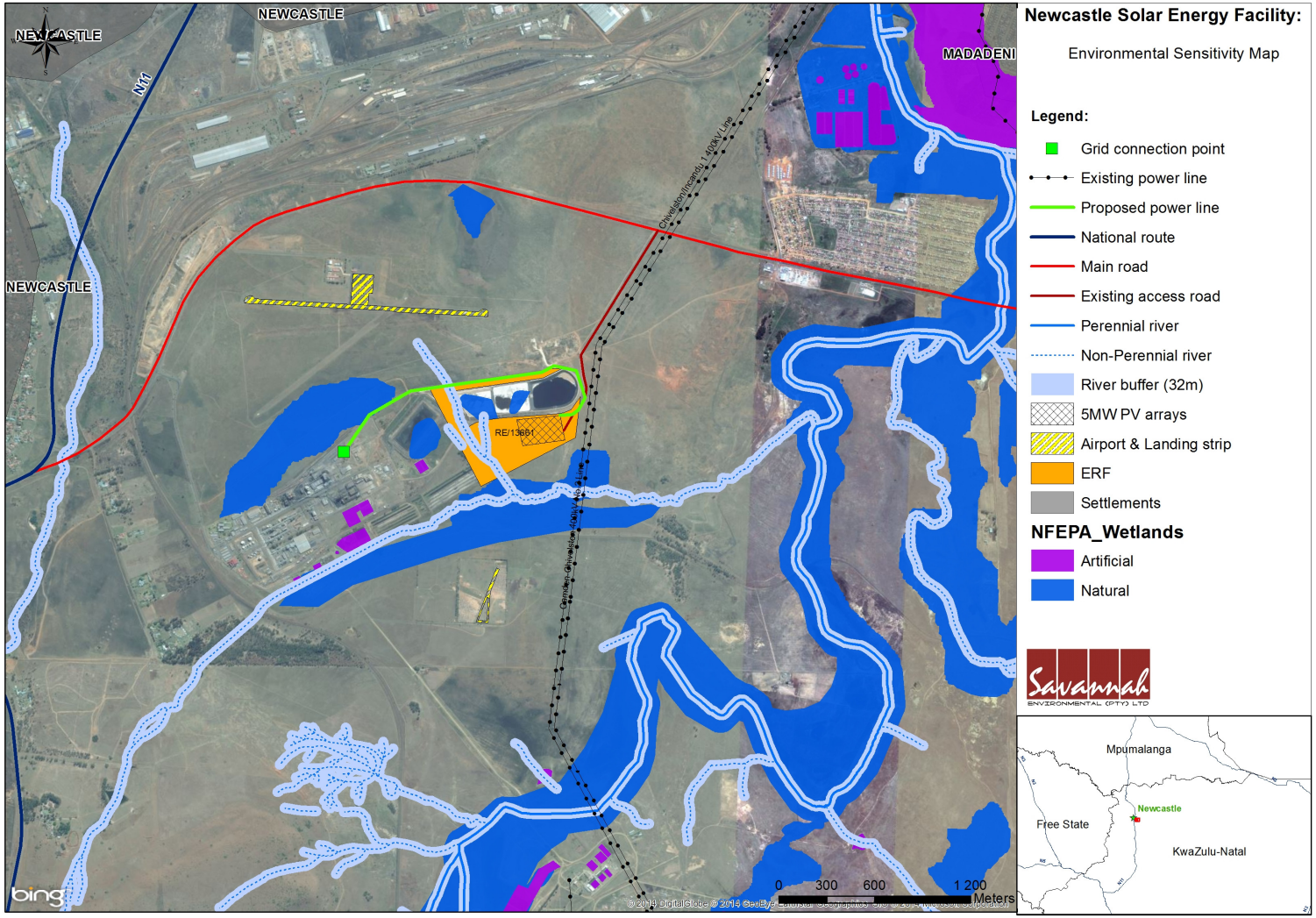

Figure 1.2: Environmental Sensitivity map for the proposed Newcastle solar energy facility

1.3. Benefits of the Proposed Project

Internationally there is increasing pressure on countries to increase their share of renewable energy generation due to concerns such as climate change and exploitation of resources. The South African Government has set a target for renewable energy of 17 GW all new installed generating capacity (new build) being derived from renewable energy forms, to be produced mainly from biomass, wind, solar and small-scale hydro.

Through pre-feasibility assessments and research, the viability of establishing a 5MW Solar energy facility in the KwaZulu-Natal has been established by **Building Energy SpA** The positive implications of establishing a solar energy facility on the demarcated sites within the KwaZulu-Natal include:

» The project would assist the South African government in reaching their set targets for renewable energy.
» The potential to harness and utilise good solar energy resources would be realised.
» The National electricity grid in the KwaZulu-Natal would benefit from the additional generated power.
» Promotion of clean, renewable energy in South Africa.
» Creation of local employment and business opportunities for the area.

The proposed development represents an investment in clean, renewable energy infrastructure, which, given the challenges created by climate change, represents a positive social benefit for society as a whole. The proposed project will not consume energy, but will instead provide a new source of clean, renewable electricity to the South African power grid. This generation of renewable power will aid in reducing the dependency on other power generation fuels and enhancing the reliability of the regional energy supply.

PURPOSE AND OBJECTIVES OF THE EMPR CHAPTER 2

An Environmental Management Programme (EMPr) is defined as "an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts associated with the planning, construction, operation and decommissioning of a project are avoided or mitigated, and that the positive benefits of the projects are enhanced."[1] The objective of this EMPr is to provide consistent information and guidance for implementing the management and monitoring measures established in the permitting process and help achieve environmental policy goals. The purpose of an EMPr is to ensure continuous improvement of environmental performance, reducing negative impacts and enhancing positive effects during the construction and operation of the facility. An effective EMPr is concerned with both the immediate outcome as well as the long-term impacts of the project.

The EMPr provides specific environmental guidance for the construction and operation phases of a project, and is intended to manage and mitigate construction and operation activities so that unnecessary or preventable environmental impacts do not result. These impacts range from those incurred during start up (i.e. site clearing and site establishment), during the construction activities themselves (i.e. erosion, noise, dust, and visual impacts), during site rehabilitation (i.e. soil stabilisation, re-vegetation), during operation and during decommissioning (i.e. similar to construction phase activities).

This Construction and Operational Environmental Management Plan (CEMP and OEMP) has been compiled for the proposed Newcastle Solar Energy Facility. This EMPr is applicable to all employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the project. The document will be adhered to, updated as relevant throughout the project life cycle.

This EMPr has been compiled in accordance with Section 33 of EIA Regulations and will be further developed in terms of specific requirements listed in any authorisations issued for the proposed project. The EMPr has been developed as a set of environmental specifications (i.e. principles of environmental management), which are appropriately contextualised to provide clear guidance in terms of the on-site implementation of these specifications (i.e. on-site contextualisation is provided through the inclusion of various monitoring and implementation tools).

[1] Provincial Government Northern Cape, Department of Environmental Affairs and Development Planning: *Guideline for Environmental Management Plans*. 2005

This EMPr has the following objectives:

» Outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction and rehabilitation, operation, and decommissioning phases of the project in order to manage and minimise the extent of potential environmental impacts associated with the facility.
» Ensure that all the phases of the project do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.
» Identify entities responsible for the implementation of the measures and outline functions and responsibilities.
» Propose mechanisms and frequency for monitoring compliance, and preventing long-term or permanent environmental degradation.
» Facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that was not considered in the Basic Assessment process.

The management and mitigation measures identified within the Environmental Basic Assessment (BA) process are systematically addressed in this EMPr, and ensure the minimisation of adverse environmental impacts to an acceptable level.

Building Energy SpA must ensure that the implementation of the project complies with the requirements of all environmental authorisations, permits, and obligations emanating from relevant environmental legislation. This obligation is partly met through the development and the implementation of this EMPr and through its integration into the contract documentation. Since this EMPr is part of the Basic Assessment process for the proposed Newcastle Solar Energy Facility, it is important that this document be read in conjunction with the final Basic Assessment Report compiled for this project. This will contextualise the EMPr and enable a thorough understanding of its role and purpose in the integrated environmental management process. Should there be a conflict of interpretation between this EMPr and the environmental authorisation, the stipulations in the environmental authorisation shall prevail over that of the EMPr, unless otherwise agreed by the authorities in writing. Similarly, any provisions in legislation overrule any provisions or interpretations within this EMPr.

This EMPr shall be binding on all the parties involved in the construction and operational phases of the project, and shall be enforceable at all levels of contract and operational management within the project. The document must be adhered to, updated as relevant throughout the project life cycle.

STRUCTURE OF THIS EMPR CHAPTER 3

The first two chapters provide background to the EMPr and the proposed project, while the chapters which follow consider the following:

» Key legislation applicable to the development;
» Planning and design activities;
» Construction activities;
» Operation activities; and
» Decommissioning activities.

These chapters set out the procedures necessary for Newcastle Solar Energy Facility, as the project developer, to minimise environmental impacts and achieve environmental compliance. For each of the phases of implementation, an over-arching environmental **goal** is stated. In order to meet this goal, a number of **objectives** are listed. The EMPr has been structured in table format in order to show the links between the goals for each phase and their associated objectives, activities/risk sources, mitigation actions, monitoring requirements and performance indicators. A specific EMPr table has been established for each environmental objective. The information provided within the EMPr table for each objective is illustrated below:

OBJECTIVE: Description of the objective, which is necessary to meet the overall goals; which take into account the findings of the Basic Assessment specialist studies

Project Component/s	» List of project components affecting the objective.
Potential Impact	» Description of potential environmental impact if objective is not met.
Activity/Risk Source	» Description of activities which could affect achieving objective.
Mitigation: Target/Objective	» Description of the target and/or desired outcomes of mitigation.

Mitigation: Action/Control	Responsibility	Timeframe
List specific action(s) required to meet the mitigation target/objective described above.	Who is responsible for the measures?	Periods for implementation.

Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the EMPr.
Monitoring	Mechanisms for monitoring compliance; the key monitoring actions required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods, and reporting.

The objectives and EMPr tables are required to be reviewed and possibly modified whenever changes, such as the following, occur:

» Planned activities change (i.e. in terms of the components and/or layout of the facility);
» Modification to or addition to environmental objectives and targets;
» Relevant legal or other requirements are changed or introduced; and
» Significant progress has been made on achieving an objective or target such that it should be re-examined to determine if it is still relevant, should be modified, etc.

3.1. Project Team

This draft EMPr was compiled by:

	Name	**Company**
EMPr Compilers:	Sheila Muniongo Karen Jodas	Savannah Environmental Savannah Environmental
Specialists:	Brian Colloty	Scherman Colloty & Associates
	Johann Lanz	Johann Lanz Soil Scientist
	Jaco van der Walt	Heritage Contracts and Archaeological Consulting
	Barry Millsteed	BM Geological Services
	Candice Hunter	Savannah Environmental

The Savannah Environmental team have extensive knowledge and experience in EIAs and environmental management, having been involved in Basic Assessment processes & EIAs over the past fifteen years. The team have managed and drafted EMPs for other power generation projects throughout South Africa, including numerous wind and solar energy facilities.

KEY LEGISLATION APPLICABLE TO THE DEVELOPMENT CHAPTER 4

The following legislation and guidelines have informed the scope and content of this EMPr Report:

- National Environmental Management Act (Act No 107 of 1998).
- EIA Regulations, published under Chapter 5 of the NEMA (GNR R545, GNR 546 in Government Gazette 33306 of 18 June 2010).
- Guidelines published in terms of the NEMA Basic Assessment Regulations, in particular:
  - Companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010 (Draft Guideline; DEA, 2010).
  - Public Participation in the Basic Assessment Process (DEA, 2010).
  - Integrated Environmental Management Information Series (published by DEA).
- International guidelines, including the Equator Principles.

Several other Acts, standards, or guidelines have also informed the project process and the scope of issues addressed and assessed in the Basic Assessment Report. A review of legislative requirements applicable to the proposed project is provided in Table 4.1.

Table 4.1: Relevant legislative and permitting requirements applicable to the establishment of the proposed Newcastle Solar Energy Facility

Legislation	***Applicable Requirements***	***Relevant Authority***	***Compliance Requirements***
	National Legislation		
National Environmental Management Act (Act No 107 of 1998)	The Environmental Assessment Regulations have been promulgated in terms of Chapter 5 of the Act. Listed activities which may not commence without an environmental authorisation are identified within these Regulations. In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. In terms of GN R543, R544, R545 and R546 of 18 June 2010, a Basic Assessment Process is required to be undertaken for the proposed project.	Department of Environmental Affairs – competent authority KwaZulu-Natal Department Agriculture, Environmental Affairs and Rural Development (DAEA)	The listed activities triggered by the proposed solar energy facility have been identified and assessed in the Basic Assessment Process being undertaken. This Basic Assessment Report will be submitted to the competent and commenting authority in support of the application for authorisation.
National Environmental Management Act (Act No 107 of 1998)	In terms of the Duty of Care Provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, stopped or minimised. In terms of NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.	Department of Environmental Affairs KwaZulu-Natal Department Agriculture, Environmental Affairs and Rural Development (DAEA)	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section has found application during the Basic Assessment Process through the consideration of potential impacts (cumulative, direct, and indirect). It will continue to apply throughout the life cycle of the project.
Environment Conservation	National Noise Control Regulations (GN R154 dated 10 January	Department of	Noise impacts are expected

Legislation	***Applicable Requirements***	***Relevant Authority***	***Compliance Requirements***
Act (Act No 73 of 1989)	1992)	Environmental Affairs KwaZulu-Natal Department Agriculture, Environmental Affairs and Rural Development (DAEA) Newcastle Local Municipality	to be associated with the construction phase of the project and are not likely to present a significant intrusion to the local community. On-site activities should be limited to 6:00am - 6:00pm, Weekdays (excluding public holidays) and 6:00am - 1:00pm, on Saturdays. Should activities need to be undertaken outside of these times, the surrounding communities will need to be notified.
National Water Act (Act No 36 of 1998)	Water uses under S21 of the Act must be licensed, unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation (and then registration of the water use is required). Consumptive water uses may include the taking of water from a water resource - Sections 21a and b. Non-consumptive water uses may include impeding or diverting of flow in a water course - Section 21c; and altering of bed, banks or characteristics of a watercourse - Section 21i.	Department of Water Affairs Provincial Department of Water Affairs	The water required for this project will be sourced from Newcastle Local Municipality. No License would be required from DWA for the taking of water. Should any water resources be impacted through construction, the relevant license would be

Legislation	***Applicable Requirements***	***Relevant Authority***	***Compliance Requirements***
			required to be applied for.
Minerals and Petroleum Resources Development Act (Act No 28 of 2002)	A mining permit or mining right may be required where a mineral in question is to be mined (e.g. materials from a borrow pit) in accordance with the provisions of the Act. Requirements for Environmental Management Programmes and Environmental Management Plans are set out in S39 of the Act. S53 Department of Mineral Resources: Approval from the Department of Mineral Resources (DMR) may be required to use land surface contrary to the objects of the Act in terms of section 53 of the Mineral and Petroleum Resources Development Act, (Act No 28 of 2002): In terms of the Act approval from the Minister of Mineral Resources is required to ensure that proposed activities do not sterilise a mineral resources that might occur on site.	Department of Mineral Resources	As no borrow pits are expected to be required for the construction of the facility, no mining permit or right is required to be obtained. A Section 53 application to be submitted the DMR Regional office.
Minerals and Petroleum Resources Development Act (Act No 28 of 2002)	A reconnaissance permission, prospecting right, mining right, mining permit, retention permit, technical corporation permit, reconnaissance permit, exploration right and production right work programme; mining work programme, environmental management programme, and environmental management plan may not be amended or varied (including by extension of the area covered by it or by the addition of minerals or a share or shares or seams, mineralised bodies, or strata, which are not at the time the subject thereof) without the written consent of the Minister.	Department of Mineral resources	DMR were consulted with regard to the proposed facility and due process is underway to obtain permission
National Environmental Management: Air Quality Act (Act No 39 of 2004)	» S18, S19 and S20 of the Act allow certain areas to be declared and managed as "priority areas" » Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards » The Act provides that an air quality officer may require any	Department of Environmental Affairs	While no permitting or licensing requirements arise from this legislation, this Act will find application during the construction

Legislation	***Applicable Requirements***	***Relevant Authority***	***Compliance Requirements***
	person to submit an atmospheric impact report if there is reasonable suspicion that the person has failed to comply with the Act. » Dust control regulations promulgated in November 2013 may require the implementation of a dust management plan.		phase of the project. The Air Emissions Authority (AEL) may require the compilation of a dust management plan.
National Heritage Resources Act (Act No 25 of 1999)	» Stipulates assessment criteria and categories of heritage resources according to their significance (S7). » Provides for the protection of all archaeological and paleontological sites, and meteorites (S35). » Provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority (S36). » Lists activities which require developers any person who intends to undertake to notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development (S38). » Requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction (S44).	South African Heritage Resources Agency	A notification letter was submitted to SARHA informing them about the project and request for comments. This Basic Assessment Report together with the heritage study undertaken will also be submitted to SAHRA for review. A permit may be required should any heritage sites be impacted on by the proposed development.
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	» Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53) » A list of threatened and protected species has been published in terms of S 56(1) - Government Gazette 29657. » Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (Lists of critically endangered, vulnerable and protected species) and GN R 152 (Threatened or Protected Species Regulations).	Department of Environmental Affairs	Permits are not likely to be required for the project due to the transformed nature of the site, none of the Species of Conservation Concern (Threatened and / or Protected) were observed on site.

Legislation	***Applicable Requirements***	***Relevant Authority***	***Compliance Requirements***
	» Provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GN 1002), 9 December 2011). » This Act also regulates alien and invader species. » Under this Act, a permit would be required for any activity which is of a nature that may negatively impact on the survival of a listed protected species.		In addition, a weed control and management plan must be implemented.
Conservation of Agricultural Resources Act (Act No 43 of 1983)	» Prohibition of the spreading of weeds (S5) » Classification of categories of weeds & invader plants (Regulation 15 of GN R1048) & restrictions in terms of where these species may occur. » Requirement & methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048).	Department of Agriculture	This Act will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies must be developed and implemented. In addition, a weed control and management plan must be implemented.
National Forests Act (Act No. 84 of 1998)	According to this act, the Minister has declared a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that 'no person may cut, damage, disturb, destroy or	National Department of Forestry	They are no protected trees on site

Legislation	***Applicable Requirements***	***Relevant Authority***	***Compliance Requirements***
	remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister'.		
National Veld and Forest Fire Act (Act 101 of 1998)	In terms of S12 the applicant must ensure that the firebreak is wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material. In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.	Department of Agriculture, Forestry and Fisheries (DAFF)	While no permitting or licensing requirements arise from this legislation, this act will find application during the construction and operational phase of the project.
Hazardous Substances Act (Act No 15 of 1973)	This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance Group IV: any electronic product; and Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.	Department of Health	It is necessary to identify and list all the Group I, II, III, and IV hazardous substances that may be on the site and in what operational context they are used, stored or handled. If applicable, a license is required to be obtained from the Department of Health.

Legislation	***Applicable Requirements***	***Relevant Authority***	***Compliance Requirements***
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by – » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. In terms of the Regulations published in terms of this Act (GN 921), A Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities. Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » The containers in which any waste is stored, are intact and not corroded or in » any other way rendered unlit for the safe storage of waste; » Adequate measures are taken to prevent accidental spillage or leaking; » The waste cannot be blown away; » Nuisances such as odour, visual impacts and breeding of vectors do not arise; and » Pollution of the environment and harm to health are prevented.	National Department of Water and Environmental Affairs Provincial Department of Environmental Affairs (general waste)	As no waste disposal site is to be associated with the proposed project, no permit is required in this regard. Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of the Act. The volumes of waste to be generated and stored on the site during construction and operation of the facility will not require a waste license (provided these remain below the prescribed thresholds).
National Road Traffic Act (Act No 93 of 1996)	» The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline	» South African National Roads Agency Limited	An abnormal load/vehicle permit may be required to transport the various

Legislation	***Applicable Requirements***	***Relevant Authority***	***Compliance Requirements***
	the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. » Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. » The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.	(national roads) » Provincial Department of Transport	components to site for construction. These include route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads.
Provincial Legislation and Plans			
Kwazulu-Natal Nature Conservation Management Act, Act No. 9 of 1997	This Act provides the institutional structure for nature conservation in Kwazulu-Natal; to establish control and monitoring body and mechanics, and to provide for matters incidental thereto.	KwaZulu-Natal Department Agriculture, Environmental Affairs and Rural Development (DAEA)	No permitting or licensing requirements.
KwaZulu-Natal Provincial Spatial Development Framework (Draft 2) (2011)	Provides a spatial interpretation of the Provincial Growth and Development Strategy to guide future land use and development	KwaZulu-Natal Department Agriculture, Environmental Affairs and Rural Development (DAEA)	No permitting or licensing requirements.
KwaZulu-Natal Provincial Growth and Development	Provides a framework for integrated and sustainable growth and economic development for the Province and its people over the next	KwaZulu-Natal Department	No permitting or licensing requirements.

Legislation	***Applicable Requirements***	***Relevant Authority***	***Compliance Requirements***
Strategy 2012-2030 (2012)	ten years. It addresses the formulation of a common vision, goals and objectives of what should be achieved and how the provincial government and its social partners should achieve its objectives	Agriculture, Environmental Affairs and Rural Development (DAEA)	
KwaZulu-Natal Biodiversity Conservation Assessment Plan (2010)	» inform the development of the Provincial Biodiversity Sector plans, bioregional plans, and also be used to inform Spatial Development Frameworks (SDFs), Environmental Management » Frameworks (EMFs), Strategic Environmental Assessments (SEAs) and in the Environmental Impact Assessment (EIA) process in the province.	KwaZulu-Natal Department Agriculture, Environmental Affairs and Rural Development (DAEA)	No permitting or licensing requirements.
	Local Government		
Newcastle Local Municipality IDP (2012-2017) Amajuba District Municipality (2014-2015)	» Ensure the provision of services to communities in a sustainable manner » Promote safe and healthy environment	Local Authorities	No permitting or licensing requirements.

MANAGEMENT PROGRAMME: PLANNING AND DESIGN CHAPTER 5

Overall Goal: undertake the planning and design phase in a way that:

» Ensures that the design of the facility responds to the identified environmental constraints and opportunities.
» Ensures that adequate regard has been taken of any landowner and community concerns and that these are appropriately addressed through design and planning (where appropriate).
» Ensures that the best environmental options are selected for the linear components, including the access roads and power line alignments.
» Enables the solar energy facility construction activities to be undertaken without significant disruption to other land uses and activities in the area.

In order to meet this goal, the following objectives have been identified, together with necessary actions and monitoring requirements.

5.1 Objectives

OBJECTIVE PD 1: Ensure the facility design responds to identified environmental constraints and opportunities

In order to minimise impacts associated with the construction and operation of the facility, the following is required to be undertaken during the final design phase:

» Geotechnical survey – this will investigate flood potential, foundation conditions, potential for excavations, and the availability of natural construction materials. This study will serve to inform the type of foundations required to be constructed (i.e. for the substation), and the extent of earthworks and compaction required in the establishment of the internal access roads.
» A storm-water management plan – this will detail how storm-water runoff (i.e. over engineered hard surfaces) can be managed to reduce velocities and volumes of water that could lead to erosion and potential sedimentation of drainage systems.

The implementation of the EMPr will minimise and/or mitigate impacts on the environment.

Project Component/s	» PV panels. » Substation. » Access roads. » Power line.
Potential Impact	» Impact on the functioning and quality of the diversion channels (cut off drains) and seepage from the various dams
Activities/Risk Sources	» Positioning of all the facilities components.
Mitigation: Target/Objective	» The design of the facility responds to the identified environmental constraints and opportunities. » Site sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts.

Mitigation: Action/Control	Responsibility	Timeframe
Undertake a detailed geotechnical survey prior to the commencement of construction.	Geotechnical specialist	Design
The diversion channels (cut off drains) and seepage from the various dams and treatment works at Karbochem have also influence the hydrological environment, resulting in increased and or diverted run-off into the wetlands areas below the site.	Engineering design consultant and Building Energy SpA and EPC	Design review
Consider and incorporate design level mitigation measures recommended by the specialists as detailed within the Basic Assessment Report and relevant appendices.	Engineering design consultant, solar component supplier, and Building Energy SpA and EPC	Design review
External access point and internal access road to be carefully planned to maximise road user safety.	Building Energy SpA Design engineer/ EPC Contractor and EPC	Design
Compile a comprehensive erosion and storm water management plan for hard surfaces as part of the final design of the project (refer to **Appendix C** for principles to be considered). This must include appropriate means for the handling of storm water within the site, e.g. separate clean and dirty water streams around the plant, install stilling basins to capture large volumes of run-off, trapping sediments, and reduce flow velocities (i.e. water used when washing the panels).	Building Energy SpA design engineer and contractor and EPC	Design
Use bird-friendly power line towers and conductor designs.	Building Energy SpA and EPC	Design
In designing the facility, use should be made of existing road infrastructure as far as possible. Where	Building Energy SpA/ Design	Design phase

Mitigation: Action/Control	Responsibility	Timeframe
no road infrastructure exists, new roads should be placed within existing disturbed areas or management measures must be implemented to ensure minimum damage is caused to natural habitats.	engineer and EPC	
Roads must be designed so that changes to surface water runoff are avoided or minimised and erosion is not initiated.	Building Energy SpA/ Design engineer and EPC	Design phase
The facility should be designed in such a manner to allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water.	Building Energy SpA/ Design engineer and EPC	Design phase
Submit a final layout to the DEA prior to the commencement of construction	Building Energy SpA and EPC	Pre-construction
A traffic management plan must be prepared for site access roads to ensure no hazards result from increased traffic and that traffic flow is not adversely affected.	Building Energy SpA and EPC	Pre-Construction
Minimise the footprint of the PV facility and the associated infrastructure as far as possible.	Contractor and Building Energy SpA and EPC	Pre-construction

Performance Indicator	» The design meets the objectives and does not degrade the environment. » Design and layouts respond to the mitigation measures and recommendations in the Basic Assessment Report.
Monitoring	» Review of the final layout by the Project Manager and the Environmental Control Officer (ECO) prior to the commencement of construction.

OBJECTIVE PD2: Ensure the selection of the best environmental option for the alignment of the power line and access roads

» ***Access Road*** – An existing gravel access road via the Karbochem plant (between 1-1.4km) on the eastern side of the site will be utilised
» ***Power line and associated access/service road*** – The proposed power line will be ~2 000m in length, connecting to the existing Karbochem Plant Substation.

Project	» Power line.

Component/s	» Access roads.
Potential Impact	» Route that degrades the environment unnecessarily, particularly with respect to visual aesthetics, loss of indigenous flora, and erosion.
Activities/Risk Sources	» Alignment of power line within corridor. » Alignment of access roads.
Mitigation: Target/Objective	» To ensure selection of best environmental option for alignment of linear infrastructure. » Environmental sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts.

Mitigation: Action/Control	Responsibility	Timeframe
Locate power line and access roads within disturbed corridors, as far as possible.	Building Energy SpA and EPC	Prior to submission of the final construction layout plan
Consider design level mitigation measures recommended by the specialists as detailed within the Basic Assessment report and relevant appendices.	Building Energy SpA and EPC	Design
Plan any new access roads according to contour lines to minimise cutting and filling operations.	Building Energy SpA and EPC	Design
The terms of this EMPr and the Environmental Authorisation (once issued) must be included in all tender documentation and Contractors contracts	Building Energy SpA and EPC	Tender process

Performance Indicator	» Power line and road alignments meet environmental objectives. » Selected linear alignments that minimise any negative environmental impacts and maximise any benefits.
Monitoring	» Ensure that the design implemented meets the objectives and mitigation measures in the Basic Assessment Report through review of the design by the Project Manager, and the ECO prior to the commencement of construction.

OBJECTIVE PD3: Minimise storm water runoff (guideline for storm water management plan)

Management of storm water will be required during the construction phase of the facility. A detailed storm water management plan is required to be compiled as

part of the final design to ensure compliance with applicable regulations and to prevent off-site migration of contaminated storm water or increased soil erosion. The section below provides a guideline for the management of storm water on site and will need to be supplemented with the relevant method statements during the construction phase of the facility.

Project Component/s	» Storm water management components. » Any hard engineered surfaces (i.e. access roads).
Potential Impact	» Poor storm water management and alteration of the hydrological regime (i.e. project is located within 500m of a wetland boundary).
Activities/Risk Sources	» Construction of the facility (i.e. placement of hard engineered surfaces).
Mitigation: Target/Objective	» Appropriate management of storm water to minimise impacts on the environment.

Mitigation: Action/Control	Responsibility	Timeframe
A Method Statement for the management of storm water which also considers the recommendations below is to be submitted to the ECO for review prior to commencement of construction activities.	Building Energy SpA and EPC	Pre-construction
Reduce the potential increase in surface flow velocities and the resultant impact on the localised drainage system as a result of increased sedimentation through the implementation of appropriate erosion management measures.	Building Energy SpA and EPC	Planning and design
Appropriately plan hard-engineered bank erosion protection structures.	Building Energy SpA and EPC	Planning and design
Ensure suitable handling of storm water within the site (i.e. separate clean and dirty water streams around the plant and install stilling basins to capture large volumes of run-off, trapping sediments and reduce flow velocities) through appropriate design of the facility.	Building Energy SpA and EPC	Construction and operation
Design measures for storm water management need to allow for surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows.	Building Energy SpA and EPC	Planning and design

Performance Indicator	» Appropriate storm water management measures included within the facility design. » Sound water quality and quantity management during construction and operation.
Monitoring	» Devise a suitable surface water quality monitoring plan for implementation during construction and operation.

OBJECTIVE PD4: Protection of avifauna

Given the proximity of the PV facility to the Karbochem Substation and the short length of the line, the risk to avifauna is not considered to be of high significance however the following mitigation measures must be noted.

Project Component/s	» Power line.
Potential Impact	» Collision and electrocution events with the overhead power line.
Activities/Risk Sources	» Operation of the power line without mitigation measures. .
Mitigation: Target/Objective	» Maintain a low number of collision, and electrocution events. » Ensure bird-friendly tower designs are implemented to minimise the risk of electrocutions.

Mitigation: Action/Control	Responsibility	Timeframe
Ensure bird-friendly tower designs are implemented to minimise the risk of electrocutions.	Building Energy SpA and EPC	Design and Construction
Notes of electrocution and collision events must be sent to a qualified Ornithologist for the recommendation of further mitigation measures if necessary.	ECO and avifauna specialist and EPC	Operation

Performance Indicator	» Minimal collision, or electrocution events.
Monitoring	» Observation of electrocution or collision events with the power line. » Monitor power line servitudes for mortalities.

OBJECTIVE PD5: To ensure effective communication mechanisms

On-going communication with affected and surrounding landowners is important to maintain during the construction and operational phases of the solar energy facility. Any issues and concerns raised should be addressed as far as possible in as short a timeframe as possible.

Project	» Solar energy facility and associated infrastructure

component/s	
Potential Impact	» Impacts on affected and surrounding landowners and land uses
Activity/risk source	» Activities associated with solar energy facility construction » Activities associated with solar energy facility operation
Mitigation: Target/Objective	» Effective communication with affected and surrounding landowners » Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible

Mitigation: Action/control	Responsibility	Timeframe
Compile and implement a grievance mechanism procedure for the public (as outlined in **Appendix A**) to be implemented during both the construction and operational phases of the facility. This procedure should include details of the contact person who will be receiving issues raised by interested and affected parties, and the process that will be followed to address issues.	Building Energy SpA and EPC	Pre-construction (construction procedure) Pre-operation (operation procedure)
Develop and implement a grievance mechanism for the construction, operational and closure phases of the project for all employees, contractors, subcontractors and site personnel. This procedure should be in line with the South African Labour Law.	Building Energy SpA/ Contractor and EPC	Pre-construction (construction procedure) Pre-operation (operation procedure)
Liaison with landowners is to be undertaken prior to the commencement of construction in order to provide sufficient time for them to plan agricultural activities.	Building Energy SpA/ Contractor and EPC	Pre-construction

Performance Indicator	» Effective communication procedures in place.
Monitoring	» An incident reporting system should be used to record non-conformances to the EMPr.

MANAGEMENT PROGRAMME: CONSTRUCTION *CHAPTER 6*

Overall Goal: Undertake the construction phase in a way that:

» Ensures that construction activities are appropriately managed in respect of environmental aspects and impacts.

» Enables construction activities to be undertaken without significant disruption to other land uses and activities in the area, in particular concerning noise impacts, farming practices, traffic and road use, and effects on local residents.
» Minimises the impact on any remaining indigenous natural vegetation and habitats of ecological value (i.e. project is located with 500 m wetland buffer).
» Minimises impacts on fauna using the site.
» Minimises the impact on heritage site should they be uncovered.

6.1 Institutional Arrangements: Roles and Responsibilities for the Construction Phase

As the proponent, Building Energy SpA must ensure that the implementation of the facility complies with the requirements of all environmental authorisations and permits, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development of the EMPr, and the implementation of the EMPr through its integration into the contract documentation. Building Energy SpA will retain various key roles and responsibilities during the construction of the facility.

OBJECTIVE C1: Establish clear reporting, communication, and responsibilities in relation to overall implementation of the EMPr

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Project Manager; Site Manager; Safety, Health and Environment Representative; Environmental Control Officer (ECO) and Contractor for the construction phase of this project are as detailed below.

Project Manager will:

» Ensure all specifications and legal constraints specifically with regards to the environment are highlighted to the Contractor(s) so that they are aware of these.
» Ensure that Building Energy SpA and its Contractor(s) are made aware of all stipulations within the EMPr.
» Ensure that the EMPr is correctly implemented throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes.
» Be fully conversed with the Basic Assessment for the project, the EMPr, the conditions of the Environmental Authorisation (once issued), and all relevant environmental legislation.

Site Manager (Building Energy SpA on-site Representative) will:

» Be fully knowledgeable with the contents of the Basic Assessment and risk management.
» Be fully knowledgeable with the contents and conditions of the Environmental Authorisation (once issued).
» Be fully knowledgeable with the contents of the EMPr.
» Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with these.
» Have overall responsibility of the EMPr and its implementation.
» Conduct audits to ensure compliance to the EMPr.
» Ensure there is communication with the Project Manager, the ECO, and relevant discipline engineers on matters concerning the environment.
» Ensure that no actions are taken which will harm or may indirectly cause harm to the environment, and take steps to prevent pollution on the site.
» Confine activities to the demarcated construction site.

An independent **Environmental Control Officer** (ECO) must be appointed by Building Energy SpA prior to the commencement of any authorised activities. The ECO will be responsible for monitoring, reviewing and verifying compliance by the Contractor with the environmental specifications of the EMPr and the conditions of the Environmental Authorisation. Accordingly, the ECO will:

» Be fully knowledgeable with the contents with the EIA.
» Be fully knowledgeable with the contents with the conditions of the Environmental Authorisation (once issued).
» Be fully knowledgeable with the contents with the EMPr.
» Be fully knowledgeable with the contents with all relevant environmental legislation, and ensure compliance with them.
» Ensure that the contents of this document are communicated to the Contractor site staff and that the Site Manager and Contractor are constantly made aware of the contents through discussion.
» Ensure that the compliance of the EMPr is monitored through regular and comprehensive inspection of the site and surrounding areas.
» Ensure that if the EMPr conditions or specifications are not followed then appropriate measures are undertaken to address this.
» Monitoring and verification must be implemented to ensure that environmental impacts are kept to a minimum, as far as possible.
» Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements.
» Ensure that activities on site comply with all relevant environmental legislation.

» Ensure that appropriate measures are undertaken to address any non-compliances recorded.
» Ensure that a removal is ordered of any person(s) and/or equipment responsible for any contravention of the specifications of the EMPr.
» Ensure that the compilation of progress reports for submission to the Project Manager, with input from the Site Manager, takes place on a regular basis, including a final post-construction audit.
» Ensure that there is communication with the Site Manager regarding the monitoring of the site.
» Ensure that any non-compliance or remedial measures that need to be applied are reported.
» Independently report to DEA in terms of compliance with the specifications of the EMPr and conditions of the Environmental Authorisation (once issued).
» Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.

As a general mitigation strategy, the Environmental Control Officer (ECO) should be present for the site preparation and initial clearing activities to ensure the correct demarcation of no-go areas, facilitate environmental induction with construction staff and supervise any flora relocation and faunal rescue activities that may need to take place during the site clearing (i.e. during site establishment, and excavation of foundations). Thereafter weekly site compliance inspections would probably be sufficient, provided that compliance with the requirements of the Environmental Authorisation, EMPr and environmental legislation is maintained. In the absence of the ECO there should be a designated environmental officer present to deal with any environmental issues that may arise such as fuel or oil spills. The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site handed over for operation.

Contractors and Service Providers: It is important that contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The contractor's obligations in this regard include the following:

» Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment.
» A copy of the EMPr must be easily accessible to all on-site staff members.

» Employees must be familiar with the requirements of this EMPr and the environmental specifications as they apply to the construction of the proposed facility.
» Prior to commencing any site works, all employees and sub-contractors must have attended an environmental awareness training course which must provide staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
» Staff will be informed of environmental issues as deemed necessary by the ECO.

All contractors (including sub-contractors and staff) and service providers are ultimately responsible for:

» Ensuring adherence to the environmental management specifications.
» Ensuring that Method Statements are submitted to the Site Manager (and ECO) for approval before any work is undertaken.
» Any lack of adherence to the above will be considered as non-compliance to the specifications of the EMPr.
» Ensuring that any instructions issued by the Site Manager on the advice of the ECO are adhered to.
» Ensuring that a report is tabled at each site meeting, which will document all incidents that have occurred during the period before the site meeting.
» Ensuring that a register is kept in the site office, which lists all transgressions issued by the ECO.
» Ensuring that a register of all public complaints is maintained.
» Ensuring that all employees, including those of sub-contractors receive training before the commencement of construction in order that they can constructively contribute towards the successful implementation of the EMPr (i.e. ensure their staff are appropriately trained as to the environmental obligations).

Contractor's Safety, Health and Environment Representative: The Contractor's Safety, Health and Environment (SHE) Representative, employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this EMPr, and for the compilation of regular Monitoring Reports. In addition, the SHE must act as liaison and advisor on all environmental and related issues and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.

The Contractor's SHE Representative should:
» Be well versed in environmental matters.
» Understand the relevant environmental legislation and processes.

» Understand the hierarchy of Environmental Compliance Reporting, and the implications of Non-Compliance.
» Know the background of the project and understand the implementation programme.
» Be able to resolve conflicts and make recommendations on site in terms of the requirements of this Specification.
» Keep accurate and detailed records of all EMPr-related activities on site.

6.2 Objectives

In order to meet the overall goal for construction, the following objectives, actions, and monitoring requirements have been identified.

OBJECTIVE C2: Minimise impacts related to inappropriate site establishment

The movement of workers on site and layout of the construction camp needs to be well management in order to reduce the environmental impacts.

Project Component/s	» Area infrastructure (i.e. PV panels, and substation). » Linear infrastructure (i.e. power line, and access roads).
Potential Impact	» Hazards to landowners and public. » Loss of threatened plant species
Activities/Risk Sources	» Open excavations (foundations and cable trenches). » Movement of construction vehicles in the area and on-site.
Mitigation: Target/Objective	» To secure the site against unauthorised entry. » To protect members of the public/landowners/residents.

Mitigation: Action/Control	Responsibility	Timeframe
Secure site, working areas and excavations in an appropriate manner, as agreed with the ECO.	Contractor and EPC	Site establishment, and duration of construction
Contractors and construction workers must be adequately informed of any no-go areas identified on the site and in the surrounding areas.	Building Energy SpA and EPC	Construction
Adequate measures must be implemented to prevent unauthorised access to the working area and the internal access/haul routes.	Contractor and EPC	Site establishment, and duration of construction
Fence and secure contractor's equipment camp.	Contractor and EPC	Site establishment

Mitigation: Action/Control	Responsibility	Timeframe
The construction camp used to house equipment should be located in a disturbed area and must be screened off as far as practical during the entire construction phase.	Contractor and EPC	Erection: during site establishment Maintenance: for duration of Contract
Establish and maintain appropriately bunded areas for storage of hazardous materials (i.e. fuel to be required during construction).	Contractor and EPC	Site establishment
All unattended open excavations shall be adequately demarcated and/or fenced.	Contractor and EPC	Site establishment, and duration of construction
Establish and maintain the necessary ablution facilities with chemical toilets and provide adequate sanitation facilities and ablutions for construction workers (1 toilet per every 15 workers) at appropriate locations on site.	Contractor and EPC	Site establishment, and duration of construction
Ablution or sanitation facilities should not be located within 100 m from a 1:100 year flood line (if any) including drainage lines.	Contractor and EPC	Site establishment, and duration of construction
Supply adequate waste collection bins at site where construction is being undertaken. Separate bins should be provided for general and hazardous waste. As far as possible, provision should be made for separation of waste for recycling.	Contractor and EPC	Site establishment, and duration of construction
The Contractor must take all reasonable measures to ensure the safety of the public in the surrounding area. Where the public could be exposed to danger by any of the works or site activities, the contractor must, as appropriate, provide suitable flagmen, barriers and/or warning signs in English, Afrikaans and any other relevant local languages, all to the approval of the Site Manager.	Contractor and EPC	Site establishment, and duration of construction

Performance Indicator	» Site is secure and there is no unauthorised entry. » No members of the public/ landowners injured as a result of construction activities. » Appropriate and adequate waste management and sanitation facilities provided at construction site.
Monitoring	» An incident reporting system will be used to record non-conformances to the EMPr. » ECO to monitor all construction areas on a continuous basis until all construction is completed. Non-conformances will be

	immediately reported to the site manager.

OBJECTIVE C3: Appropriate management of the construction site and construction workers

The construction phase of the PV facility is expected to extend over a period of 8-12 months and create approximately 80 employment opportunities. Ideally low skilled and semi-skilled positions will be filled by locals living in and around the study area (from towns such as Newcastle). This will however be dependent on the skills availability in the area.

Project Component/s	» Area and linear infrastructure.
Potential Impact	» Damage to and/or loss of topsoil (i.e. pollution, compaction etc.). » Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities. » Pollution/contamination of the environment.
Activities/Risk Sources	» Vegetation clearing and levelling of equipment storage area/s. » Access to and from the equipment storage area/s. » Ablution facilities. » Contractors not aware of the requirements of the EMPr, leading to unnecessary impacts on the surrounding environment.
Mitigation: Target/Objective	» Limit equipment storage within demarcated designated areas. » Ensure adequate sanitation facilities and waste management practices. » Ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment.

Mitigation: Action/Control	Responsibility	Timeframe
The siting of the construction equipment camp/s must take cognisance of any sensitive areas identified by the Basic Assessment studies by staying outside the 500m wetland area as far as possible. The location of this construction equipment camp/s shall be approved by the project ECO.	Contractor and EPC	Pre-construction
As far as possible, minimise vegetation clearing and levelling for equipment storage areas.	Contractor and EPC	Site establishment, and during construction
Rehabilitate all disturbed areas at the construction equipment camp to pre-construction conditions as soon as construction is complete within an area.	Contractor and EPC	Duration of Contract

Mitigation: Action/Control	Responsibility	Timeframe
Ensure waste removal facilities are maintained and emptied on a regular basis.	Contractor and EPC	Site establishment, and duration of construction
Ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm. This can be achieved through the provision of appropriate environmental awareness training to all personnel. Records of all training undertaken must be kept.	Contractor and EPC	Duration of construction
Contractors must use chemical toilets/ablution facilities situated at designated areas of the site; no ablution activities will be permitted outside the designated areas. These facilities must be regularly serviced by appropriate contractors. A minimum of one toilet shall be provided per 15 persons at each working area such as the Contractor's camp.	Contractor and sub-contractor/s and EPC	Duration of contract
Cooking and eating of meals must take place in a designated area. No fires are allowed on site. No firewood or kindling may be gathered from the site or surrounds.	Contractor and sub-contractor/s and EPC	Duration of contract
All litter must be deposited in a clearly marked, closed, weather and animal-proof disposal bin in the construction area. Particular attention needs to be paid to food waste.	Contractor and sub-contractor/s and EPC	Duration of contract
No one other than the ECO or personnel authorised by the ECO may disturb flora or fauna outside of the demarcated construction area/s.	Contractor and sub-contractor/s and EPC	Duration of contract
Fire fighting equipment and training must be provided before the construction phase commences.	Contractor and sub-contractor/s and EPC	Duration of contract
Draft and implement a Code of conduct for construction workers.	Contractor and sub-contractor/s and EPC	Pre-construction
Contractors must ensure that all workers are informed at the outset of the construction phase of the conditions contained in the Code of Conduct.	Contractor and sub-contractor/s and EPC	Construction
On completion of the construction phase, all construction workers must leave the site within one	Contractor and sub-	Construction

Mitigation: Action/Control	Responsibility	Timeframe
week of their contract ending.	contractor/s and EPC	
Develop and implement a grievance mechanism for the construction, operational and closure phases of the project for all employees, contractors, subcontractors and site personnel. This procedure should be in line with the South African Labour Law.	Building Energy SpA/ Contractor and EPC	Pre-construction

Performance Indicator	» The construction camps have avoided sensitive areas, as approved by the ECO. » Ablution and waste removal facilities are in a good working order and do not pollute the environment due to mismanagement. » All areas are rehabilitated promptly after construction in an area is complete. » Excess vegetation clearing and levelling is not reported by the ECO. » No complaints regarding contractor behaviour or habits. » Appropriate training of all staff is undertaken prior to them commencing work on the construction site. » Code of Conduct drafted before commencement of construction phase.
Monitoring	» Regular audits of the construction camps and areas of construction on site by the ECO. » Proof of disposal of sewage at an appropriate wastewater treatment works. » An incident reporting system should be used to record non-conformances to the EMPr. » Observation and supervision of Contractor practices throughout construction phase by the ECO. » Complaints will be investigated and, if appropriate, acted upon. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE C4: Maximise local employment and business opportunities associated with the construction phase

Although limited, employment opportunities could be created during the construction phase (i.e. approximately 80), specifically for semi-skilled and unskilled workers.

Project Component/s	» Construction and establishment activities associated with the establishment of the PV facility, including infrastructure etc.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business should be maximised.
Activities/Risk Sources	» The employment of outside contractors to undertake the work and who make use of their own labour will reduce the employment and business opportunities for locals. Employment of local labour will maximise local employment opportunities.
Mitigation: Target/Objective	» Building Energy SpA, in discussions with the Newcastle Local Municipality, should aim to employ the majority of the low-skilled workers from the local area. This should also be made a requirement for all contractors. » Building Energy SpA should also develop a database of local BEE service providers

Mitigation: Action/Control	Responsibility	Timeframe
Attempt to employ a majority of the low-skilled workers from the local area.	Contractors and EPC	Duration of construction
Where required, implement appropriate training and skills development programmes prior to the initiation of the construction phase to ensure that local employment target is met.	Building Energy SpA and EPC	Programmes to be initiated prior to the initiation of the construction phase
Skills audit to be undertaken to determine training and skills development requirements.	Building Energy SpA and EPC	Pre-construction
Develop a database of local BEE service providers and ensure that they are informed of tenders and job opportunities.	Building Energy SpA and EPC	Pre-construction
Identify potential opportunities for local businesses.	Building Energy SpA and EPC	

Performance Indicator	» Employment and business policy document that sets out local employment and targets completed before construction phase commences; » Majority of semi- and unskilled labour locally sourced. » Database of potential local BEE services providers in place before construction phase commences. » Skills audit to determine need for training and skills development programme undertaken prior to commencement of construction phase.
Monitoring	» Building Energy SpA and or appointed ECO must monitor indicators listed above to ensure that they have been met for

	the construction phase.

OBJECTIVE C5: Minimise impacts related to traffic management and transportation of equipment and materials to site (Traffic Management and Transportation Plan)

The construction phase of the project will be the most significant in terms of generating traffic impacts; resulting from the transport of equipment and materials and construction crews to the site and the return of the vehicles after delivery of materials. Potential impacts associated with transportation and access relate to works within the site boundary and external works outside the site boundary.

The components for the proposed facility will be transported to site by road. An existing gravel access road will be utilised to access the site. The existing gravel road is connected to the N11.

The section below provides a guideline for the Traffic Management and Transportation Plan on site and will need to be supplemented with the relevant final transport plan devised by the EPC partner during the final design phase of the facility.

Project Component/s	» Delivery of any component required within the construction phase.
Potential Impact	» Impact of heavy construction vehicles on road surfaces, and possible increased risk in accidents involving people and animals. » Traffic congestion, particularly on narrow roads or on road passes where overtaking is not permitted. » Deterioration of road pavement conditions (both surfaced and gravel road) due to high traffic volumes and abnormal loads.
Activities/Risk Sources	» Construction vehicle movement. » Speeding on local roads. » Degradation of local road conditions. » Site preparation and earthworks. » Foundations or plant equipment installation. » Transportation of ready-mix concrete from off-site batching plant to the site. » Mobile construction equipment movement on-site. » Power line and substation construction activities.
Mitigation: Target/Objective	» Minimise impact of traffic associated with the construction of the facility on local traffic volume, existing infrastructure, property owners, animals, and road users.

	» To minimise potential for negative interaction between pedestrians or other road users and traffic associated with the facility construction » To ensure all vehicles are roadworthy and all materials/ equipment are transported appropriately and within any imposed permit/licence conditions

Mitigation: Action/Control	Responsibility	Timeframe
The contractor's plans, procedures and schedules regarding the construction activities should be communicated with affected parties prior to the commencement of construction activities on site.	Contractor and EPC	Pre-construction
Source general construction material and goods locally where available to limit transportation over long distances.	Contractor and EPC	Pre-construction and construction
Appropriate dust suppression techniques must be implemented to minimise dust from gravel roads.	Contractor and EPC	Construction
Construction vehicles and those transporting materials and goods should be inspected by the contractor or a sub-contractor to ensure that these are in good working order and not overloaded.	Contractor and EPC	Construction
Strict vehicle safety standards should be implemented and monitored.	Contractor and EPC	Construction
All relevant permits for abnormal loads must be applied for from the relevant authority.	Contractor (or appointed transportation contractor) and EPC	Pre-construction
A designated access to the proposed site must be created to ensure safe entry and exit.	Contractor and EPC	Pre-construction
No deviation from approved transportation routes must be allowed, unless roads are closed for whatever reason outside the control of the contractor.	Contractor and EPC	Duration of contract
Appropriate road management strategies must be implemented on external and internal roads with all employees and contractors required to abide by standard road and safety procedures.	Contractor (or appointed transportation contractor) and EPC	Pre-construction
Any traffic delays because of construction traffic must be co-ordinated with the appropriate authorities.	Contractor and EPC	Duration of contract
The movement of all vehicles within the site must be on designated roadways.	Contractor and EPC	Duration of contract
Signage must be established and maintained at appropriate points warning of turning traffic and the	Contractor and EPC	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
construction site (all signage to be in accordance with prescribed standards).		
Appropriate maintenance of all vehicles of the contractor must be ensured.	Contractor and EPC	Duration of contract
All vehicles of the contractor travelling on public roads must adhere to the specified speed limits and all drivers must be in possession of an appropriate valid driver's license.	Contractor and EPC	Duration of contract
Keep new hard road surfaces as narrow as possible.	Contractor and EPC	Duration of contract
Signs must be placed along construction roads within the site to identify speed limits, travel restrictions and other standard traffic control information.	Contractor and EPC	Duration of contract

Performance Indicator	» Vehicles keeping to the speed limits. » Vehicles are in good working order and safety standards are implemented. » Local residents and road users are aware of vehicle movements and schedules. » No construction traffic related accidents are experienced. » Local road conditions and road surfaces are up to standard. » Complaints of residents are not received (e.g. concerning the speeding of heavy vehicles).
Monitoring	» Developer and or appointed ECO must monitor indicators listed above to ensure that they have been implemented.

OBJECTIVE C6: To avoid and or minimise soil degradation and erosion (Erosion management Plan) and potential impact on current and future farming activities during the construction phase

Although the land is classified as Class 3 capability, there is minimal dryland cultivation in the vicinity of the site which suggests that suitability for dryland crops is low. The agricultural capability of the site itself, over and above any climate limitations, is limited by the shallow soils which are probably partly a result of land disturbance discussed above, and as a result the site is not suitable for cultivation. There is no current or historic cultivation on the site and there is no agricultural infrastructure on the site.

The land type of the site and surrounding area is Bb54. The soils of this land type are dominated by plinthic loamy sands of variable depth. The field investigation showed that the site comprises shallow soils of the Dresden soil form, which has a hardpan, cemented plinthic horizon in the subsoil, some excavation and levelling has been done on the site in the past and may be the

reason for the shallow soils. In some parts the plinthic subsoil is exposed right at the surface with no covering of topsoil.

Project component/s	» Construction phase activities associated with the establishment of the PV facility and associated infrastructure.
Potential Impact	» The footprint of the solar energy facility and associated infrastructure will result in a loss of land that will impact on farming activities on the site.
Activities/risk sources	» The footprint occupied by the solar energy facility and associated infrastructure.
Mitigation: Target/Objective	» To minimise the loss of land taken up by the PV facility and associated infrastructure and to enable farming activities to continue where possible, specifically grazing.

Mitigation: Action/control	Responsibility	Timeframe
Rehabilitate disturbed areas to pre-construction condition on completion of the construction phase.	Contractors and EPC	Construction

Performance Indicator	» Footprint of PV facility included in the Construction Phase EMPr (see Figure 1.1)
Monitoring	» ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE C7: To avoid and or minimise the potential impacts of safety, noise and dust and damage to roads caused by construction vehicles during the construction phase

During the construction phase, limited gaseous or particulate emissions are anticipated from exhaust emissions from construction vehicles and equipment on-site, as well as vehicle entrained dust from the movement of vehicles on the main and internal access roads.

Project Component/s	» Construction and establishment activities associated with the establishment of the PV facility, including infrastructure etc.
Potential Impact	» Heavy vehicles can generate noise and dust impacts. Movement of heavy vehicles can also damage roads.
Activities/Risk Sources	» The movement of heavy vehicles and their activities on the site can result in noise and dust impacts and damage roads.
Mitigation: Target/Objective	» To avoid and or minimise the potential noise and dust impacts associated with heavy vehicles, and minimise damage to roads.

Mitigation: Action/Control	Responsibility	Timeframe
Implement appropriate dust suppression measures for gravel roads and ensure that vehicles used to transport building materials are fitted with tarpaulins or covers.	Contractors and EPC	Duration of Construction
Ensure that all vehicles are road-worthy; drivers are qualified and are made aware of the potential noise, dust and safety issues.	Contractors and EPC	Duration of Construction
Ensure that drivers adhere to speed limits. Vehicles should be fitted with recorders to record when vehicles exceed the speed limit.	Contractors and EPC	Duration of Construction
Ensure that damage to roads attributable to the construction activities is repaired before completion of construction phase.	Contractors and EPC	Duration of Construction

Performance Indicator	» Dust suppression measures implemented for all areas that require such measures during the construction phase. » Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed. » Road worthy certificates in place for all construction vehicles at outset of construction phase and up-dated on a monthly basis.
Monitoring	» Building Energy SpA and/or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE C8: Minimisation of development footprint

In order to minimise impacts on flora, fauna, and ecological processes, the development footprint should be limited to the smallest area possible.

Terrestrial habitats: The study area is located approximately 6km outside of the Newcastle CBD, and is characterised by grasslands which according to the Mucina and Rutherford (2006) Vegmap, is located within the KwaZulu-Natal Highland Thornveld vegetation type, Mucina and Rutherford (2006) listed this vegetation type as Least Concern.

Aquatic environment: The proposed development will avoid any of these areas and their ecological buffers (50m), however the facility and a portion of the access road (if upgraded) is located within 500m of a wetland boundary, thus the overall scores for all the systems within the site could have been higher, but scores were reduced due to the presence of a high number of dams, erosion, sedimentation and grazing within the area. The diversion channels (cut off drains) and seepage from the various dams and treatment works at Karbochem

have also influence the hydrological environment, resulting in increased and or diverted run-off into the wetlands areas below the site. This has impacted on the functioning and quality of these systems. None of these species were observed during the site visit

Project Component/s	All constructional activities that disturb the soil below surface, such as levelling, excavations etc.
Potential Impact	Lack of topsoil, resulting in significant decrease in soil fertility.
Activity/Risk Source	All constructional activities that disturb the soil below surface, such as levelling, excavations etc.
Mitigation: Target/Objective	Ensure effective topsoil covering on all disturbed areas.

Mitigation: Action/Control	Responsibility	Timeframe
If an activity will mechanically disturb below surface in any way, then the upper 10-30 cm of topsoil (depending on the specific topsoil depth at the site of disturbance) should first be stripped from the entire disturbed surface and stockpiled separately for re-use during rehabilitation.	Construction managers	Duration of the construction phase
Topsoil stockpiles must be conserved against losses through erosion by establishing vegetation cover on them.	Construction managers / Environmental manager	Duration of the construction phase
Dispose of all subsurface spoils from excavations where they will not impact on agricultural land (for example on road surfaces or within a waste disposal facility) or where they can be effectively covered with topsoil and rehabilitated.	Construction managers / Environmental manager	Duration of the construction phase
The stockpiled topsoil must be evenly spread over the entire disturbed surface following the completion of construction in an area.	Construction managers / Environmental manager	During rehabilitation after construction / operation.
Ensure that rehabilitation plan is followed so that bare areas are not exposed for prolonged periods with likely erosion impacts.	Contractor	Construction
Monitor the site for erosion problems and identify areas where additional intervention such as additional revegetation or erosion control such as silt traps may be necessary	Contractor	Construction
Monitor disturbed areas for the presence and establishment of alien species , alien species present should be cleared on a regular basis	Contractor	Construction
Monitor disturbed areas for the presence and	Contractor/ECO	Construction

Mitigation: Action/Control	Responsibility	Timeframe
establishment of alien species such as (Guava, *Psidium guajava*) » Alien species present should be cleared on a regular basis		

Performance Indicator	That no disturbed areas are left without an effective covering of topsoil, and potential for re-vegetation, after rehabilitation.
Monitoring	Establish an effective record keeping system for each area where soil is disturbed for constructional purposes. These records should be included in environmental performance reports, and should include all the records below.

OBJECTIVE C9: Minimise the establishment and spread of alien invasive plants (Invasive Plant Management Plan) and manage indigenous invasive plants

On-going alien and invasive plant monitoring and removal should be undertaken on all areas of natural vegetation within the project lease area on an annual basis. The section below provides a guideline for the Invasive Plant Management Plan and should be implemented together with consideration of the principles contained in the Department of Water Affairs: Working for Water Programme (refer to **Appendix B**).

Project Component/s	» Any infrastructure or activity that will result in disturbance.
Potential Impact	» Invasion of disturbed areas by declared weeds or invasive alien species.
Activities/Risk Sources	» Construction,
Mitigation: Target/Objective	» There is a target of no alien plants within the project control area during the construction and operation phases, and no additional thickening of indigenous invasive shrubs.

Mitigation: Action/Control	Responsibility	Timeframe
Avoid creating conditions in which alien plants may become established: » Keep disturbance of indigenous vegetation to a minimum. » Rehabilitate disturbed areas as quickly as possible. » Do not import soil from areas with alien plants. » Remove all alien plants from areas adjacent to or on frequently traversed access routes to prevent	Contractor and EPC	Construction and operation

Mitigation: Action/Control	Responsibility	Timeframe
dispersal of regenerative material onto site		
Establish an on-going monitoring programme to detect and quantify any alien species that may become established and identify the problem species (as per Conservation of Agricultural Resources Act and Biodiversity Act).	Contractor and EPC	Construction and operation
Immediately control any alien plants that become established using registered control methods.	Contractor and EPC	Construction
DWA approved methodology should be employed for all invasive clearing operations	Contractor and EPC	Construction

Performance Indicator	For each invasive or alien species: number of plants and aerial cover of plants within project area and immediate surroundings is significantly reduced and alien species are absent from site.
Monitoring	On-going monitoring of area by ECO during construction.

OBJECTIVE C10: Limit direct faunal impacts

Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna. Sensitive and shy fauna would move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed. Some mammals or reptiles would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present.

The plant and animal species observed were mostly associated with the vegetated areas near the roads and intact grassland areas adjacent to the site. However no sensitive species, habitats or community types were observed directly within the proposed site, or road and transmission line alignments..

Project Component/s	» Operation of heavy machinery on site, construction activities and human presence
Potential Impact	» Loss of individuals of affected species due to operation of construction machinery as well as poaching and hunting risk from personnel.
Activity/Risk Source	» Habitat transformation & earth-moving during construction; presence of construction and operation personnel.
Mitigation: Target/Objective	» Low faunal impact, during construction and operation

Mitigation: Action/Control	Responsibility	Timeframe
Environmental induction for all staff » All staff at the site should undergo regular environmental induction training	Contractors	Construction & Operation
EPC contractor to monitor and enforce ban on hunting, collecting etc. of all plants and animals or their products.	ECO	Construction
Speed limits to apply to all construction vehicles to reduce likelihood of collisions with fauna. » 20-30km/h is the recommended maximum for all vehicles at the site	Contractors	Construction
Dust suppression during construction.	Contractors	Construction

Performance Indicator	» Low mortality of fauna due to construction machinery and activities » No poaching etc of fauna by construction personnel during construction » Removal to safety of fauna encountered during construction
Monitoring	» Monitoring for compliance during the construction phase

OBJECTIVE C11: Minimising the impact on archaeological sites

The main cause of impacts to archaeological sites is physical disturbance of the material itself and its context. The heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. This means that even though, for example a deep excavation may expose archaeological artefacts, the artefacts are relatively meaningless once removed from the area in which they were found. Large-scale excavations for foundations will damage archaeological sites, as will road construction activities.

During the survey for the proposed PV facility, access route and connection into the grid **no sites of heritage significance** were found in the development footprint.

The project area is completely underlain by potentially fossiliferous sedimentary rocks of the Early Permian Vryheid Formation. The fossils known to be present within the formation elsewhere in South Africa are known to contain highly scientifically and culturally significant fossils, particularly the plant macrofossils of the *Glossopteris* flora.

Project	» Solar Array

Component/s	» Roads » Power line » Substation » Construction equipment camps
Potential Impact	» Destruction of archaeological sites » Impacts on palaeontology
Activity/Risk Source	» Solar array foundations, power lines and roads
Mitigation: Target/Objective	» Minimise impacts on archaeological and paleontological sites

Mitigation: Action/control	Responsibility	Timeframe
It is recommended that the project area should be inspected by a palaeontologist prior to the commencement of the project to assess the paleontological potential of the site and to enable informed recommendations to be made should damage mitigation or avoidance protocols need to be outlined.	Palaeontologist	Prior to construction
Should archaeological sites or graves be exposed during construction work, work in the area must be stopped and the find must immediately be reported to a suitably qualified heritage practitioner such that an investigation and evaluation of the finds can be made.	Contractor, ECO and EPC	Duration of construction

Performance Indicator	» No destruction of archaeological sites » No impacts on graves
Monitoring	» Monitoring during construction to ensure no sites are unearthed and impacted on

OBJECTIVE C12: Minimisation of visual impacts associated with the construction of the solar energy facility

During the construction phase heavy vehicles, components, equipment and construction crews will frequent the area and may cause, at the very least, a cumulative visual nuisance to landowners and residents in the area as well as road users. The proposed development is located in the urban edge of Newcastle, within the industrial expansion zone of the Newcastle Local Municipality. The adjacent landowner is the Newcastle Local Municipality.

The anticipated visual issues is minimal as the project is located in the industrial zone. The Karbochem Rubber Plant and Lanxess Chrome Chemicals Plant located

next to the site, they are transmission lines on the east side of the site and the vacant mine are infrastructural and disrupting elements that currently affect visual resources in that area. There are no residential or tourist attractions located adjacent to the property and therefore the anticipated impact on the areas visual quality and sense of place is expected to be of very low significance for the construction phase.

Project Component/s	» Construction site, various buildings, a generator, a substation, a power line, a fence and internal access roads.
Potential Impact	Visual impact of general construction activities and associated impacts.
Activity/Risk Source	» Location of the installation »
Mitigation: Target/Objective	» Incorporating measures during the design stage to ensure sustainability, and reduction in the impacts on natural processes » Ensure that at the design stage functions and processes with low scoring impacts are preferred

Mitigation: Action/Control	Responsibility	Timeframe
Adopt responsible construction practices aimed at containing the construction activities to specifically demarcated areas	Contractors and EPC	Construction
Vegetation screening established where required.	Building Energy SpA/ operator and EPC	Constructiion
Limit access to the construction site to existing access roads.	Contractors and EPC	Construction
Rehabilitate all disturbed areas to acceptable visual standards as soon as possible after construction is complete in an area.	Contractors and EPC	Construction
Maintain the general appearance of the facility in an aesthetically pleasing way.	Building Energy SpA/ operator and EPC	Operation

Performance Indicator	Suggested mitigation measure are put into place
Monitoring	Construction Phase Monitoring: an Environmental Control Officer to monitor the specified visual management actions.

OBJECTIVE C13: Appropriate handling and management of waste

The main wastes expected to be generated by the construction of the solar energy facility will include general construction waste, hazardous waste (i.e. fuel), and liquid waste (including grey water and sewage). The volumes of waste

expected to be generated will not trigger the requirement for a waste management license. Wastes must however be managed effectively in order to ensure minimal impacts on the environment.

In order to manage the wastes effectively, guidelines for the assessment, classification, and management of wastes, along with industry principles for minimising construction wastes must be implemented. A guideline for integrated management of construction waste is included as **Appendix D** of this EMPr.

Project Component/s	» PV panels. » Power line. » Ancillary buildings. » Access roads.
Potential Impact	» Inefficient use of resources resulting in excessive waste generation. » Litter or contamination of the site or water through poor waste management practices.
Activity/Risk Source	» Packaging. » Other construction wastes. » Hydrocarbon use and storage. » Spoil material from excavation, earthworks, and site preparation.
Mitigation: Target/Objective	» To comply with waste management legislation. » To minimise production of waste. » To ensure appropriate waste storage and disposal. » To avoid environmental harm from waste disposal. » A waste manifests should be developed for the ablutions showing proof of disposal of sewage at appropriate water treatment works.

Mitigation: Action/Control	Responsibility	Timeframe
Construction method and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities.	Contractor	Duration of contract
Construction contractors must provide specific detailed waste management plans to deal with all waste streams.	Contractor	Duration of contract
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap), and contaminated waste as required. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control.	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Where practically possible, construction and general wastes on-site must be reused or recycled. Bins and skips must be available on-site for collection, separation, and storage of waste streams (such as wood, metals, general refuse etc.).	Contractor	Duration of contract
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Contractor	Duration of contract
Uncontaminated waste must be removed at least weekly for disposal; other wastes will be removed for recycling/ disposal at an appropriate frequency.	Contractor	Duration of contract
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Contractor	Duration of contract
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area.	Contractor	Duration of contract
Waste must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal.	Contractor	Duration of contract
Documentation (waste manifest) must be maintained detailing the quantity, nature, and fate of any regulated waste. Waste disposal records must be available for review at any time.	Contractor	Duration of contract
Regularly serviced chemical toilets facilities must be used to ensure appropriate control of sewage.	Contractor	Duration of contract
Upon the completion of construction, the area must be cleared of potentially polluting materials.	Contractor	Completion of construction
Dispose of all solid waste collected at an appropriately registered waste disposal site. Waste disposal shall be in accordance with all relevant legislation and under no circumstances may waste be burnt on site.	Contractor	Duration of construction
Where a registered waste site is not available close to the construction site, provide a method statement with regard to waste management.	Contractor	Duration of construction

Performance Indicator	» No complaints received regarding waste on site or indiscriminate dumping. » Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests for all waste streams.
Monitoring	» Observation and supervision of waste management practices throughout construction phase.

	» Waste collection will be monitored on a regular basis. » Waste documentation completed. » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE C14: Appropriate handling and storage of chemicals, hazardous substances

The construction phase will involve the storage and handling of a variety of chemicals including adhesives, abrasives, oils and lubricants, paints and solvents.

Project Component/s	» Storage and handling of chemicals, hazardous substances.
Potential Impact	» Release of contaminated water from contact with spilled chemicals. » Generation of contaminated wastes from used chemical containers.
Activity/Risk Source	» Vehicles associated with site preparation and earthworks. » Construction activities of area and linear infrastructure. » Hydrocarbon use and storage.
Mitigation: Target/Objective	» To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons. » To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons.

Mitigation: Action/Control	Responsibility	Timeframe
Vehicles and equipment must be serviced regularly and maintained in a good running condition. Vehicles must be fitted with spill skills. Storage of contaminants must be limited to low quantities and done under strict industry standards. There must be strict control over the safe usage of vehicles and equipment to minimise vehicle accidents and damage to vehicles by rocks and boulders which may cause spillages. Contingency plans must be in place to deal with spillages. The solar arrays should only be cleaned with water and soaps and detergents should not be allowed.	Contractor and EPC	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Develop and implement an emergency preparedness plan during the construction phase.	Contractor and EPC	Pre-construction and implement for duration of Contract
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	Contractor	Duration of contract
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures.	Contractor	Duration of contract
In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents.	Contractor	Duration of contract
Spilled cement must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	Contractor	Duration of contract
Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	Contractor	Duration of contract
Routine servicing and maintenance of vehicles must not to take place on-site (except for emergencies). If repairs of vehicles must take place, an appropriate drip tray must be used to contain any fuel or oils.	Contractor	Duration of contract
All stored fuels to be maintained within a bund and on a sealed surface. The bunded area must be provided with a tap-off system through which spillages and leakages that might occur will be removed without any spillage outside the bunded area.	Contractor	Duration of contract
Fuel storage areas must be inspected regularly to ensure bund stability, integrity, and function.	Contractor	Duration of contract
Construction machinery must be stored in an appropriately sealed area.	Contractor	Duration of contract
Oily water from bunds at the substations must be removed from site by licensed contractors.	Contractor	Duration of contract
The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files.	Contractor	Duration of contract
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
attached to such permits and approvals will be compiled with.		
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations	Contractor	Duration of contract
The sediment control and water quality structures used on-site must be monitored and maintained in an operational state at all times.	Contractor	Duration of contract
Upon the completion of construction, the area must be cleared of potentially polluting materials.	Contractor	Completion of construction

Performance Indicator	» No chemical spills outside of designated storage areas. » No unattended water or soil contamination by spills. » No complaints received regarding waste on site or indiscriminate dumping.
Monitoring	» Implement an effective monitoring system to detect any leakage or spillage of all hazardous substances. » Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase. » A complaints register must be maintained, in which any complaints from the community will be logged. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE C15: To avoid and or minimise the potential risk of increased veld fires during the construction phase

The increased presence of people on the site could increase the risk of veld fires, particularly in the dry season.

Project Component/s	» Construction and establishment activities associated with the establishment of PV facility, including infrastructure etc.
Potential Impact	» Veld fires can pose a personal safety risk to local farmers and communities, and their homes, crops, livestock and farm infrastructure, such as gates and fences.
Activities/Risk Sources	» The presence of construction workers and their activities on the site can increase the risk of veld fires.
Mitigation: Target/Objective	» To avoid and or minimise the potential risk of veld fires on local communities and their livelihoods.

Mitigation: Action/Control	Responsibility	Timeframe
Ensure that open fires on the site for cooking or heating are not allowed.	Contractors	Duration of construction
Provide adequate fire fighting equipment onsite.	Contractors	Duration of construction
Provide fire-fighting training to selected construction staff.	Contractors	Duration of construction
Compensate farmers / community members at full market related replacement cost for any losses, such as livestock, damage to infrastructure etc. attributable to the construction activities.	Contractors	Duration of construction
Join local Fire Protection Agency (if established).	Building Energy SpA	Pre-construction

Performance Indicator	» Fire fighting equipment and training provided at outset of the construction phase. » Proven compensation claims settled within 1 month of claim
Monitoring	» Building Energy SpA and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

6.3 Detailing Method Statements

OBJECTIVE C16: Ensure all construction activities are undertaken with the appropriate level of environmental awareness to minimise environmental risk

The environmental specifications are required to be underpinned by a series of Method Statements, within which the Contractors and Service Providers are required to outline how any identified environmental risks will practically be mitigated and managed for the duration of the contract, and how specifications within this EMPr will be met. That is, the Contractor will be required to describe how specified requirements will be achieved through the submission of written Method Statements to the Site Manager and ECO.

A Method Statement is defined as "a written submission by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plant, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Site Manager is able to assess whether the Contractor's proposal is in accordance with the Specifications and/or

will produce results in accordance with the Specifications". The Method Statement must cover applicable details with regard to:

» Responsible person/s;
» Construction procedures;
» Materials and equipment to be used;
» Getting the equipment to and from site;
» How the equipment/material will be moved while on-site;
» How and where material will be stored;
» The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
» Timing and location of activities;
» Compliance/non-compliance with the Specifications; and
» Any other information deemed necessary by the Site Manager.

Very specific areas to be addressed in method statements before, during and post construction include:

» Site Establishment plan (which explains all activities from induction training to offloading, construction sequence for site establishment and the different amenities and to be established etc. Including a site camp plan indicating all of these).
» Preparation of the site (i.e. clearing vegetation, compacting soils and removing existing infrastructure and waste).
» Soil management/stockpiling and erosion control.
» Excavations and backfilling procedure and processes.
» Stipulate norms and standards for water supply and usage (i.e.: comply strictly to licence and legislation requirements and restrictions as applicable).
» Stipulate the storm water management procedures recommended in the storm water management plan.
» Ablution facilities (placement, maintenance, management and servicing).
» Solid Waste Management:
    * Description of the waste storage facilities (on site and accumulative).
    * Placement of waste stored (on site and accumulative).
    * Management and collection of waste process.
    * Recycle, re-use and removal process and procedure.
» Liquid waste management:
    * The design, establish, maintain and operate suitable procedures for pollution control facilities necessary to prevent discharge of water containing polluting matter or visible suspended materials into rivers, streams or existing drainage systems.
    * Stipulate grey water (i.e. water from basins, showers, baths, kitchen sinks etc.) that needs to be disposed of, link into an existing facilities

where possible. Where no facilities are available, grey water runoff must be controlled to ensure there is no seepage into wetlands or natural watercourses.

» Dust and noise pollution:
  * Describe necessary measures to ensure that noise from construction activities is maintained within lawfully acceptable levels (construction activities generating output levels of 85 dB(A) near human settlement, are to be confined to working hours (06h00 - 18h00) Mondays to Fridays).
  * Procedure to control dust at all times on the site, access roads, borrow pits and spoil sites (dust control shall be sufficient so as not to have significant impacts in terms of the biophysical and social environments). These impacts include visual pollution, decreased safety due to reduced visibility, negative effects on human health and the ecology due to dust particle accumulation.
» Hazardous substance storage (ensure compliance with all national, regional and local legislation with regard to the storage of oils, fuels, lubricants, solvents, wood treatments, bitumen, cement, pesticides and any other harmful and hazardous substances and materials. South African National Standards apply).
  * List of all potentially hazardous substances to be used.
  * Appropriate handling, storage and disposal procedures.
  * Prevention plan of accidental contamination of soil at storage and handling areas.
  * All storage areas, (i.e.: for harmful substances appropriately bunded with a suitable collection point for accidental spills must be implemented and drip trays underneath dispensing mechanisms including leaking engines/machinery).
» Fire prevention and management measures on site.
» Fauna and flora protection process on and off site (i.e.: removal to reintroduction or replanting, if necessary).
» Rehabilitation and re-vegetation process.
» Traffic management.
» Incident and accident reporting protocol.
» General administration (and stipulating that all documentation and licences must be on site at all times).
» Designate access road and the protocol on while roads are in use.
» Requirements of gate control protocols.

Where relevant, these Method Statements must be prepared and submitted to Building Energy SpA Construction Manager, Project Manager and the ECO. The Contractor may not commence the activity covered by the Method Statement until it has been approved by the Building Energy SpA Construction Manager or

Project Manager, except in the case of emergency activities and then only with the consent of the Site Manager. Approval of the Method Statement will not absolve the Contractor from their obligations or responsibilities in terms of their contract. Failure to submit a method statement may result in suspension of the activity concerned until such time as a method statement has been submitted and approved.

The ECO should monitor the construction activities to ensure that these are undertaken in accordance with the approved Method Statement.

6.4 Awareness and Competence: Construction Phase of the Solar Energy Facility

OBJECTIVE C17: To ensure all construction personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm

To achieve effective environmental management, it is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The Contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts.

The Contractors obligations in this regard include the following:

» Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment.
» Ensuring that a copy of the EMPr is readily available on-site, and that all site staff are aware of the location and have access to the document.
» Employees will be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the facility.
» Employees must undergo training for the operation and maintenance activities associated with a PV plant and have a basic knowledge of the potential environmental impacts that could occur and how they can be minimised and mitigated.
» Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training course.

» The course should be sufficient to provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
» Awareness of any other environmental matters, which are deemed necessary by the ECO.
» Ensuring that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations throughout the site.
» Ensure that construction workers have received basic training in environmental management, including the storage and handling of hazardous substances, minimisation of disturbance to sensitive areas, management of waste, and prevention of water pollution.
» Records must be kept of those that have completed the relevant training.
» Training should be done either in a written or verbal format but must be appropriate for the receiving audience.
» Refresher sessions must be held to ensure the contractor staff are aware of their environmental obligations as practically possible.

Therefore, prior to the commencement of construction activities on site and before any person commences with work on site thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present onsite, clearly describing their obligations towards environmental controls and methodologies in terms of this EMPr. This training and awareness will be achieved in the following ways:

6.4.1 Environmental Awareness Training

Environmental Awareness Training must take the form of an on-site talk and demonstration by the ECO before the commencement of site establishment and construction on site. The education/awareness programme should be aimed at all levels of management and construction workers within the contractor team. A record of attendance of this training must be maintained by the ECO on site.

6.4.2 Induction Training

Environmental induction training must be presented to all persons who are to work on the site – be it for short or long durations; Contractor's or Engineer's staff; administrative or site staff; sub-contractors or visitors to site.

This induction training should include discussing the developer's environmental policy and values, the function of the EMPr and Contract Specifications and the importance and reasons for compliance to these. The induction training must highlight overall do's and don'ts on site and clarify the repercussions of not

complying with these. The non-conformance reporting system must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the SHE Officer on site.

6.4.3 Toolbox Talks

Toolbox talks should be held on a scheduled and regular basis (at least twice a month) where foremen, environmental and safety representatives of different components of the Works and sub-consultants hold talks relating to environmental practices and safety awareness on site. These talks should also include discussions on possible common incidents occurring on site and the prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

6.5 Monitoring Programme: Construction Phase

OBJECTIVE C18: To monitor the performance of the control strategies employed against environmental objectives and standards

A monitoring programme must be in place not only to ensure conformance with the EMPr, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will be stipulated by the Environmental Authorisation (once issued). Where this is not clearly dictated, Building Energy SpA will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities. The Project Manager will ensure that the monitoring is conducted and reported.

The aim of the monitoring and auditing process would be to routinely monitor the implementation of the specified environmental specifications, in order to:

» Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications.
» Ensure adequate and appropriate interventions to address non-compliance.
» Ensure adequate and appropriate interventions to address environmental degradation.
» Provide a mechanism for the lodging and resolution of public complaints.

» Ensure appropriate and adequate record keeping related to environmental compliance.
» Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, in order to enhance the efficacy of environmental management on site.
» Aid communication and feedback to authorities and stakeholders.

The ECO must monitor compliance with the EMP, will conduct monitoring activities, and will report any non-compliance or where corrective action is necessary to the Site Manager. The ECO must have the appropriate experience and qualifications to undertake the necessary tasks. The following reports will be applicable:

6.5.1 Non-Conformance Reports

All supervisory staff including Foremen, Resident Engineers, and the ECO must be provided the means to be able to submit non-conformance reports to the Site Manager. Non-conformance reports will describe, in detail, the cause, nature and effects of any environmental non-conformance by the Contractor. Records of penalties imposed may be required by the relevant authority.

The non-conformance report will be updated on completion of the corrective measures indicated on the finding sheet. The report must indicate that the remediation measures have been implemented timeously and that the non-conformance can be closed-out to the satisfaction of the Site Manager and ECO.

6.5.2 Monitoring Reports

A monitoring report will be compiled by the ECO on a monthly basis and must be submitted to DEA for their records. This report should include details of the activities undertaken in the reporting period, any non-conformances or incidents recorded, corrective action required, and details of those non-conformances or incidents which have been closed out.

6.5.3 Final Audit Report

A final environmental audit report must be submitted to DEA upon completion of the construction and rehabilitation activities. This report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions and the requirements of the EMPr.

MANAGEMENT PROGRAMME: REHABILITATION CHAPTER 7

Overall Goal: Undertake the rehabilitation measures in a way that ensures rehabilitation of disturbed areas following the execution of the works, such that residual environmental impacts are remediated or curtailed

7.1. Objectives

In order to meet this goal, the following objective, actions and monitoring requirements are relevant:

OBJECTIVE R1: Ensure appropriate rehabilitation of disturbed areas such that residual environmental impacts are remediated or curtailed

Areas requiring rehabilitation will include all areas disturbed during the construction phase and that are not required for regular operation and maintenance operations. Rehabilitation should be undertaken in an area as soon as possible after the completion of construction activities within that area.

Mitigation: Action/Control	Responsibility	Timeframe
All temporary facilities, equipment, and waste materials must be removed from site.	Contractor and EPC	Following execution of the works
All temporary fencing and danger tape must be removed once the construction phase has been completed.	Contractor and EPC	Following completion of construction activities in an area
The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these should be cleaned up.	Contractor and EPC	Following completion of construction activities in an area
All hardened surfaces within the construction camp area should be ripped, all imported materials removed, and the area shall be top soiled and re-vegetated.	Contractor and EPC	Following completion of construction activities in an area
Temporary roads must be closed and access across these blocked. Compacted surfaces of temporary roads must be ripped to facilitate their	Contractor and EPC	Following completion of construction

Mitigation: Action/Control	Responsibility	Timeframe
rehabilitation.		activities in an area
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	Contractor and EPC	Following completion of construction activities in an area
Disturbed areas must be rehabilitated to its pre-construction condition	Contractor in consultation with rehabilitation specialist	Following completion of construction activities in an area
Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	Contractor in consultation with rehabilitation specialist	Post-rehabilitation
Erosion control measures should be used in sensitive areas such as steep slopes, hills, and drainage lines as necessary.	Contractor in consultation with rehabilitation specialist	Post-rehabilitation
On-going invasive and alien plant monitoring and removal must be undertaken on all areas within the development area on an annual basis.	Building Energy SpA in consultation with rehabilitation specialist	Post-rehabilitation

Performance Indicator	» All portions of site, including construction equipment camp and working areas, cleared of equipment and temporary facilities not required for operation. » Topsoil replaced on all areas and stabilised where practicable. » Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites. » Completed site free of erosion and alien invasive plants.
Monitoring	» On-going inspection of rehabilitated areas in order to determine effectiveness of rehabilitation measures implemented during the operational lifespan of the facility. » On-going alien plant monitoring and removal should be undertaken on an annual basis.

MANAGEMENT PROGRAMME: OPERATION CHAPTER 8

Overall Goal: To ensure that the operation of the solar energy facility does not have unforeseen impacts on the environment and to ensure that all impacts are monitored and the necessary corrective action taken in all cases. In order to address this goal, it is necessary to operate the facility in a way that:

» Ensures that operation activities are appropriately managed in respect of environmental aspects and impacts.
» Enables the solar energy facility operation activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to farming practices, traffic and road use, and effects on local residents.
» Minimises impacts on fauna using the site.

An environmental manager must be appointed during operation whose duty it will be to ensure the implementation of the operational EMPr.

8.1. Objectives

In order to meet the above goal, the following objectives have been identified, together with necessary actions and monitoring requirements.

OBJECTIVE O1: Limit the ecological footprint of the facility

Indirect impacts on vegetation and fauna during operation could result from maintenance activities and the movement of people and vehicles on site and in the surrounding area. In order to ensure the long-term environmental integrity of the site following construction, maintenance of the areas rehabilitated post-construction must be undertaken until these areas have successfully re-established.

Project component/s	» Areas requiring regular maintenance. » Areas disturbed during the construction phase and subsequent rehabilitation at its completion. » Presence and operation of the facility
Potential Impact	» Impact on the surrounding landscape due to alien plant invasion, erosion or poor management of the facility.
Activity/Risk Source	» Alien plants established within the facility » Erosion within the facility » Human presence

	» Maintenance activities which may lead to negative impacts such as dust pollution.
Mitigation: Target/Objective	» Maintain minimised footprints of disturbance of vegetation/habitats on-site. » Ensure and encourage plant regrowth in non-operational areas of post-construction rehabilitation.

Mitigation: Action/Control	Responsibility	Timeframe
Access Control » Access to the site should be controlled, to the actual facility	Environmental manager	Operation
Bi-annual monitoring for alien plant species - with follow up clearing	Environmental manager	Operation
Quarterly site inspection for erosion problems – with follow up remedial action where problems are identified	Environmental manager	Operation

Performance Indicator	» No complaints from the landowner as to trespassing on the farmland » No alien species within the site » No erosion problems within the site or from access roads » Maintenance of a ground cover of perennial grasses and forns that resist erosion.
Monitoring	» Records of alien species presence and clearing actions » Records of erosion problems and mitigation actions taken with photographs » Management log detailing the management actions taken to maintain and control the vegetation within the facility.

OBJECTIVE O2: Minimise soil degradation and erosion (Erosion Management Plan)

The land type of the site and surrounding area is Bb54. The soils of this land type are dominated by plinthic loamy sands of variable depth. The field investigation showed that the site comprises shallow soils of the Dresden soil form, which has a hardpan, cemented plinthic horizon in the subsoil, some excavation and levelling has been done on the site in the past and may be the reason for the shallow soils. In some parts the plinthic subsoil is exposed right at the surface with no covering of topsoil.

The soil on site may be impacted in terms of:

» Soil degradation including erosion (by wind and water) and subsequent deposition elsewhere is of a concern across the entire site which is underlain

by fine grained soil which can be mobilised when disturbed, even on relatively low slope gradients (accelerated erosion).
» Uncontrolled run-off relating to construction activity (excessive wetting, uncontrolled discharge, etc.) will also lead to accelerated erosion and possible sedimentation of drainage systems.
» Degradation of the natural soil profile due to pollution.

Management of erosion will be required during the operation phase of the facility. An erosion management plan is required to ensure compliance with applicable regulations and to prevent increased soil erosion and sedimentation of the downstream environment. The section below provides a guideline for the management of erosion on site and will need to be supplemented with the principles for erosion management contained in the Erosion Management plan included in **Appendix C**.

Project Component/s	» PV panels. » Power line. » Ancillary buildings. » Access roads.
Potential Impact	» Soil degradation. » Soil erosion. » Increased water run-off, soil degradation due to water erosion and sediment generation
Activities/Risk Sources	» Complete denudation of the soil
Mitigation: Target/Objective	» Minimise soil degradation (removal, excavation, mixing, wetting, compaction, pollution, etc.). » Minimise erosion. » Minimise sediment transport downstream (siltation). » Minimise dust pollution.

Mitigation: Action/Control	Responsibility	Timeframe
Maintain erosion control measures implemented during the construction phase.	Building Energy SpA	Operation

Performance Indicator	» No soil erosion around site
Monitoring	» Inspections of site on weekly basis. » Monitor erosion rates and erosion sites on a weekly basis and after each storm event.

OBJECTIVE O3: Minimise dust and air emissions

During the operational phase, limited gaseous or particulate emissions are anticipated from exhaust emissions (i.e. from operational vehicles). Windy conditions and the movement of vehicles on site may lead to dust creation.

Project Component/s	» Gravel access roads. » On-site vehicles.
Potential Impact	» Dust and particulates from vehicle movement to and on-site. » Release of minor amounts of air pollutants (for example NO_2, CO and SO_2) from vehicles
Activities/Risk Sources	» Re-entrainment of deposited dust by vehicle movements. » Wind erosion from unsealed roads and surfaces. » Fuel burning vehicle and construction engines.
Mitigation: Target/Objective	» To ensure emissions from all vehicles are minimised, where possible. » To minimise nuisance to the community from dust emissions and to comply with workplace health and safety requirements.

Mitigation: Action/Control	Responsibility	Timeframe
Roads must be maintained in a manner that will ensure that nuisance to the community from dust is not visibly excessive.	Building Energy SpA	Operation
Appropriate dust suppression must be applied to the roads as required to minimise/control airborne dust.	Building Energy SpA	Operation
Speed of vehicles must be restricted, as defined by the Environmental Manager.	Building Energy SpA	Operation
Vehicles and equipment must be maintained in a road-worthy condition at all times.	Building Energy SpA	Operation

Performance Indicator	» No complaints from affected residents or community regarding dust or vehicle emissions. » Dust suppression measures implemented where required. » Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed.
Monitoring	» Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Site Manager. » A complaints register must be maintained by the Site Manager, in which any complaints from residents/the community will be logged, and thereafter complaints will be investigated and, where appropriate, acted upon. » An incident reporting system must be used to record non-conformances to the EMP.

OBJECTIVE O4: Ensure the implementation of an appropriate fire management plan during the operation phase

The increased presence of people on the site could increase the risk of veld fires, particularly in the dry season.

Project Component/s	» Operation and maintenance of the solar energy facility and associated infrastructure.
Potential Impact	» Veld fires can pose a personal safety risk to local farmers and communities, and their homes, crops, livestock and farm infrastructure, such as gates and fences. In addition, fire can pose a risk to the solar energy facility infrastructure.
Activities/Risk Sources	» The presence of operation and maintenance personnel and their activities on the site can increase the risk of veld fires.
Mitigation: Target/Objective	» To avoid and or minimise the potential risk of veld fires on local communities and their livelihoods.

Mitigation: Action/Control	Responsibility	Timeframe
Join the local Fire Protection Agency (if established).	Building Energy SpA	Operation
Provide adequate fire fighting equipment on site.	Building Energy SpA	Operation
Provide fire-fighting training to selected operation and maintenance staff.	Building Energy SpA	Operation
Ensure that appropriate communication channels are established to be implemented in the event of a fire.	Building Energy SpA	Operation
Fire breaks should be established where and when required. Cognisance must be taken of the relevant legislation when planning and burning firebreaks (in terms of timing, etc.).	Building Energy SpA	Operation
Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency.	Building Energy SpA	Operation
Contact details of emergency services should be prominently displayed on site.	Building Energy SpA	Operation

Performance Indicator	» Fire fighting equipment and training provided before the operational phase commences. » Appropriate fire breaks in place and maintained.
Monitoring	» Building Energy SpA must monitor indicators listed above to ensure that they have been met.

OBJECTIVE O5: Maximise local employment and business opportunities associated with the operational phase

The facility is expected to be operational for more than 20 years during which time approximately 12 staff members are expected to be required on-site. Therefore, long-term direct job opportunities for locals could exist, although limited. However, in an area with such high unemployment figures, these limited opportunities should still be seen as a positive impact on the quality of life of those benefiting from the employment.

Some local procurement of goods, materials and services could occur which would result in positive economic spin-offs. These opportunities for local service providers to render services to the proposed facility could include maintenance of the guardhouse, gardening at the guardhouse, cleaning services, security services and maintenance or replacement of general equipment

Project Component/s	» Day to day operational activities associated with the PV facility, including maintenance etc.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business should be maximised
Activities/Risk Sources	» The operational phase of the PV facility will create approximately 12 full time employment opportunities.
Mitigation: Target/Objective	» In the medium to long term employ as many locals as possible to fill the full time employment opportunities.

Mitigation: Action/Control	Responsibility	Timeframe
The workforce of 12 permanent staff is likely to be based in Newcastle . As part of the local content and support programs Building Energy SpA should commit to implementing a training and skills development and training programme to maximise employment for locals.	Building Energy SpA	operation
Identify local members of the community who are suitably qualified or who have the potential to be employed full time.	Building Energy SpA	Prior to commencement of operation

Performance Indicator	» Training and skills development programme developed and designed before construction phase completed. » Potential locals identified before construction phase completed.
Monitoring	» Building Energy SpA must monitor indicators listed above to

	ensure that they have been met for the operational phase.

OBJECTIVE O6: Appropriate handling and management of waste including handling hazardous/dangerous substances

The operation of the facility will involve the storage of chemicals and hazardous substances, as well as the generation of limited waste products. The main wastes expected to be generated by the operation activities include general solid waste, and liquid waste.

Project Component/s	» PV facility. » Substation. » Operation and maintenance staff. » Workshop.
Potential Impact	» Inefficient use of resources resulting in excessive waste generation. » Litter or contamination of the site or water through poor waste management practices. » Contamination of water or soil because of poor materials management.
Activity/Risk Source	» Transformers and switchgear for the substations. » Ancillary buildings.
Mitigation: Target/Objective	» Comply with waste management legislation. » Minimise production of waste. » Ensure appropriate waste disposal. » Avoid environmental harm from waste disposal. » Ensure appropriate storage of chemicals and hazardous substances.

Mitigation: Action/Control	Responsibility	Timeframe
Hazardous substances (such as used/new transformer oils, etc.) must be stored in sealed containers within a clearly demarcated designated area.	Building Energy SpA and EPC	Operation
Storage areas for hazardous substances must be appropriately sealed and bunded.	Building Energy SpA and EPC	Operation
All structures and/or components replaced during maintenance activities must be appropriately disposed of at an appropriately licensed waste disposal site or sold to a recycling merchant for recycling.	Building Energy SpA and EPC	Operation
Care must be taken to ensure that spillage of oils and	Building Energy	Operation

Mitigation: Action/Control	Responsibility	Timeframe
other hazardous substances are limited during maintenance. Handling of these materials should take place within an appropriately sealed and bunded area. Should any accidental spillage take place, it must be cleaned up according to specified standards regarding bioremediation.	SpA and EPC	and maintenance
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	Building Energy SpA and EPC	Operation and maintenance
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Building Energy SpA/ waste management contractor and EPC	Operation
Waste handling, collection, and disposal operations must be managed and controlled by a waste management contractor.	Building Energy SpA/ waste management contractor and EPC	Operation
Used oils and chemicals: » Appropriate disposal must be arranged with a licensed facility in consultation with the administering authority » Waste must be stored and handled according to the relevant legislation and regulations	Building Energy SpA and EPC	Operation
General waste must be recycled where possible or disposed of at an appropriately licensed landfill.	Building Energy SpA and EPC	Operation
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	Building Energy SpA and EPC	Operation
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Building Energy SpA and EPC	Operation

Performance Indicator	» No complaints received regarding waste on site or indiscriminate dumping. » Internal site audits identifying that waste segregation recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests. » No contamination of soil or water.
Monitoring	» Waste collection must be monitored on a regular basis. » Waste documentation must be completed and available for inspection » An incidents/complaints register must be maintained, in which any complaints from the community must be logged.

	» Complaints must be investigated and, if appropriate, acted upon. » Regular reports on exact quantities of all waste streams exiting the site must be compiled by the waste management contractor and monitored by the ECO. » All appropriate waste disposal certificates accompany the monthly reports.

OBJECTIVE O7: Mitigate the possible visual impact associated with the operational phase.

A visual impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light.

The anticipated visual issues is minimal as the project is located in the industrial zone. The Karbochem Rubber Plant and Lanxess Chrome Chemicals Plant located next to the site, they are transmission lines on the east side of the site and the vacant mine are infrastructural and disrupting elements that currently affect visual resources in that area. There are no residential or tourist attractions located adjacent to the property and therefore the anticipated impact on the areas visual quality and sense of place is expected to be of very low significance for the operational phase.

Project Component/s	Construction site, various buildings, a generator, a substation, a power line, a fence and internal access roads.
Potential Impact	(Function of the project, Height of the proposed development above ground, Choice of technology and materials, Project association with similar developments locally, context , Numbers and degree of sensitive receptors, Shielding and exposure)
Activity/Risk Source	» Location of the installation
Mitigation: Target/Objective	» Incorporating measures during the design stage to ensure sustainability, and reduction in the impacts on natural processes » Ensure that at the design stage functions and processes with low scoring impacts are preferred

Mitigation: Action/Control	Responsibility	Timeframe
Vegetation screening between the site, the N2 and adjacent properties should be implemented and maintained. Where necessary additional vegetation screening should be established.	Building Energy SpA/ operator and EPC	Operation

Mitigation: Action/Control	Responsibility	Timeframe
Maintain the general appearance of the facility in an aesthetically pleasing way.	Operator	Operation

Performance Indicator	» Suggested mitigation measure are put into place
Monitoring	» Operational Phase Monitoring: continued assessment of the aesthetic aspects, such as fencing and signage and controlling any expansion of the project.

OBJECTIVE O8: Minimise storm water runoff (guideline for storm water management plan)

Management of storm water will be required the operational phase of the facility. A detailed storm water management plan is required to be compiled as part of the final design to ensure compliance with applicable regulations and to prevent off-site migration of contaminated storm water or increased soil erosion. The section below provides a guideline for the management of storm water on site and will need to be supplemented with the relevant method statements during the operation phase of the facility.

Project Component/s	» Storm water management components. » Any hard engineered surfaces (i.e. access roads).
Potential Impact	» Poor storm water management and alteration of the hydrological regime (i.e. drainage lines).
Activities/Risk Sources	» Construction of the facility (i.e. placement of hard engineered surfaces).
Mitigation: Target/Objective	» Appropriate management of storm water to minimise impacts on the environment.

Mitigation: Action/Control	Responsibility	Timeframe
A Method Statement for the management of storm water which also considers the recommendations below is to be submitted to the ECO prior to commencement of construction activities.	Building Energy SpA and EPC	Operation
Reduce the potential increase in surface flow velocities and the resultant impact on the localised drainage system as a result of increased sedimentation through the implementation of appropriate erosion management measures.	Building Energy SpA and EPC	Operation
Appropriately plan hard-engineered bank erosion protection structures.	Building Energy SpA and EPC	Operation
Ensure suitable handling of storm water within the site	Building Energy	Operation

Mitigation: Action/Control	Responsibility	Timeframe
(i.e. separate clean and dirty water streams around the plant and install stilling basins to capture large volumes of run-off, trapping sediments and reduce flow velocities) through appropriate design of the facility.	SpA and EPC	
Design measures for storm water management need to allow for surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows.	Building Energy SpA and EPC	Operation

Performance Indicator	» Appropriate storm water management measures included within the facility design. » Sound water quality and quantity management during construction and operation.
Monitoring	» Devise a suitable surface water quality monitoring plan for implementation during construction and operation.

MANAGEMENT PROGRAMME: DECOMMISSIONING CHAPTER 9

The solar infrastructure which will be utilised for the proposed solar energy facility is expected to have a lifespan of 20 years (i.e. with maintenance). Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the facility would comprise the disassembly and replacement of the solar infrastructure with more appropriate technology/infrastructure available at that time.

The relevant mitigation measures contained under the construction and rehabilitation sections of this EMPr should be applied during decommissioning and therefore is not repeated in this section. It must be noted that decommissioning activities will need to be undertaken in accordance with the legislation applicable at that time, which may require this section of the EMPr to be revisited and amended.

Should the activity ever cease or become redundant, the applicant shall undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered by any relevant and competent authority at that time.

9.1. Site Preparation

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

9.2 Disassemble and Remove Infrastructure

Disassembled components will be reused, recycled, or disposed of in accordance with regulatory requirements.

OBJECTIVE D1: To avoid and or minimise the potential impacts associated with the decommissioning phase

Project Component/s	» Decommissioning phase of the PV facility and associated infrastructure
Potential Impact	» Decommissioning will result in job losses, which in turn can result in a number of social impacts, such as reduced quality of life, stress, depression etc. However, the number of people

	affected (25) is relatively small. Decommissioning is also similar to the construction phase in that it will also create temporary employment opportunities.
Activity/Risk Source	» Decommissioning of the PV facility
Mitigation: Target/Objective	» To avoid and or minimise the potential social impacts associated with decommissioning phase of the PV facility.

Mitigation: Action/control	**Responsibility**	**Timeframe**
Retrenchments should comply with South African Labour legislation	Building Energy SpA and EPC	When PV facility is decommissioned

Performance Indicator	» South African Labour legislation relevant at the time
Monitoring	» Building Energy SpA and Department of Labour

The site will be rehabilitated and can be returned to the current or other beneficial land-use.

FINALISATION OF THE EMPR CHAPTER 10

The EMPr is a dynamic document, which must be updated to include any additional specifications as and when required. It is considered critical that this draft EMPr be updated to include site-specific information and specifications following the final walk-through survey by specialists of the PV facility development area, power line. This will ensure that the construction and operation activities are planned and implemented considering sensitive environmental features.

APPENDIX A:
GRIEVANCE MECHANISM FOR PUBLIC COMPLAINTS AND ISSUES

GRIEVANCE MECHANISM / PROCESS

AIM

The aim of the grievance mechanism is to ensure that grievances / concerns raised by local landowners and or communities are addressed in a manner that is:

- Fair and equitable;
- Open and transparent;
- Accountable and efficient.

It should be noted that the grievance mechanism does not replace the right of an individual, community, group or organization to take legal action should they so wish. However, the aim should be to address grievances in a manner that does not require a potentially costly and time consuming legal process.

Proposed generic grievance process

- Local landowners, communities and authorities will be informed in writing by the proponent (the renewable energy company) of the grievance mechanism and the process by which grievances can be brought to the attention of the proponent.
- A company representative will be appointed as the contact person for grievances to be addressed to. The name and contact details of the contact person will be provided to local landowners, communities and authorities.
- Project related grievances relating to the construction, operational and or decommissioning phase must be addressed in writing to the contact person. The contact person should assist local landowners and or communities who may lack resources to submit/prepare written grievances.
- The grievance will be registered with the contact person who, within 2 working days of receipt of the grievance, will contact the Complainant to discuss the grievance and agree on suitable date and venue for a meeting. Unless otherwise agreed, the meeting will be held within 2 weeks of receipt of the grievance.
- The contact person will draft a letter to be sent to the Complainant acknowledging receipt of the grievance, the name and contact details of Complainant, the nature of the grievance, the date that the grievance was raised, and the date and venue for the meeting.
- Prior to the meeting being held the contact person will contact the Complainant to discuss and agree on who should attend the meeting. The people who will be required to attend the meeting will depend on the nature of the grievance. While the Complainant and or proponent are entitled to invite their legal representatives to attend the meeting/s, it should be made clear that to all the parties involved in the process that the grievance mechanism

process is not a legal process. It is therefore recommended that the involvement of legal representatives be limited.

- The meeting will be chaired by the company representative appointed to address grievances. The proponent will provide a person to take minutes of and record the meeting/s. The costs associated with hiring venues will be covered by the proponent. The proponent will also cover travel costs incurred by the Complainant, specifically in the case of local, resource poor communities.
- Draft copies of the minutes will be made available to the Complainant and the proponent within 4 working days of the meeting being held. Unless otherwise agreed, comments on the Draft Minutes must be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days of receipt of the draft minutes.
- In the event of the grievance being resolved to the satisfaction of all the parties concerned, the outcome will recorded and signed off by the relevant parties. The record should provide details of the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- In the event of a dispute between the Complainant and the proponent regarding the grievance, the option of appointing an independent mediator to assist with resolving the issue should be discussed. The record of the meeting/s will note that a dispute has arisen and that the grievance has not been resolved to the satisfaction of all the parties concerned;
- In the event that the parties agree to appoint a mediator, the proponent will be required to identify three (3) mediators and forward the names and CVs to the Complainant within 2 weeks of the dispute being declared. The Complainant, in consultation with the proponent, will identify the preferred mediator and agree on a date for the next meeting. The cost of the mediator will be borne by the proponent. The proponent will provide a person to take minutes of and record the meeting/s.
- In the event of the grievance, with the assistance of the mediator, being resolved to the satisfaction of all the parties concerned, the outcome will recorded and signed off by the relevant parties, including the mediator. The record should provide details on the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- In the event of the dispute not being resolved, the mediator will prepare a draft report that summaries the nature of the grievance and the dispute. The report should include a recommendation by the mediator on the proposed way forward with regard to the addressing the grievance.

- The draft report will be made available to the Complainant and the proponent for comment before being finalised and signed by all parties. Unless otherwise agreed, comments on the draft report must be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days.

The way forward will be informed by the recommendations of the mediator and the nature of the grievance. As indicated above, the grievance mechanism does not replace the right of an individual, community, group or organization to take legal action should they so wish. In the event of the grievance not being resolved to the satisfaction of Complainant and or the proponent, either party may be of the opinion that legal action may be the most appropriate option.

APPENDIX B:
DEPARTMENT OF WATER AFFAIRS: WORKING FOR WATER PROGRAMME PRINCIPLES FOR INVASIVE PLANT SPECIES

ALIEN INVASIVE PLANT MANAGEMENT PLAN

OVERALL OBJECTIVE

Manage alien and invasive plant species during the construction and operation of the solar energy facility, through the implementation of an alien invasive species management and control programme.

PROBLEM OUTLINE

Alien plants replace indigenous vegetation leading to severe loss of biodiversity and change in landscape function. Potential consequences include loss of biodiversity, loss of grazing resources, increased fire risk, increased erosion, loss of wetland function, impacts on drainage lines, increased water use etc.

In addition, the Conservation of Agricultural Resources Act (Act 43 of 1983), as amended in 2001, requires that land users clear *Declared Weeds* from their properties and prevent the spread of *Declared Invader Plants* on their properties. A list of declared weeds and invader plants is attached.

Table 3 of CARA (the Conservation of Agricultural Resources Act) lists all declared weeds and invader plants. Alien plants are divided into 3 categories based on their risk as an invader.

- Category 1 - These plants must be removed and controlled by all land users. They may no longer be planted or propagated and all trade in these species is prohibited.
- Category 2 – These plants pose a threat to the environment but nevertheless have commercial value. These species are only allowed to occur in demarcated areas and a land user must obtain a water use license as these plants consume large quantities of water.
- Category 3 – These plants have the potential of becoming invasive but are considered to have ornamental value. Existing plants do not have to be removed but no new plantings may occur and the plants may not be sold.

The following guide is a useful starting point for the identification of alien species:

Bromilow, C. 2010. *Problem Plants and Alien Weeds of South Africa*. Briza, Pretoria.

SPECIFIC MANAGEMENT OBJECTIVES:

- Ensure alien plants do not become dominant in parts or the whole landscape

- Initiate and implement a monitoring and eradication programme for alien and invasive species
- Control alien and invasive species dispersal & encroachment
- Promote the natural reestablishment and planting of indigenous species

VULNERABLE ECOSYSTEMS AND HABITATS

Certain habitats and environments are more vulnerable to alien plant invasion and are likely to bear the brunt of alien plant invasion problems at the site. In addition, construction activities and changes in water distribution at the site following construction are also likely to increase and alter the vulnerability of the site to alien plant invasion.

Areas at the site which are likely to require specific attention include the following

- Wetlands, drainage lines and other mesic areas
- Cleared and disturbed areas such as road verges, crane pads and construction footprints etc.
- Construction camps and lay-down areas which are cleared or are active for an extended period

Wetlands, drainage lines and other mesic areas

There are a relatively large number of drainage lines at the site as well as a number of natural and artificial wetlands. Disturbance within these areas often results in alien plant invasion on account of the greater water and nutrient availability in this habitat. Although there are no turbines within such areas, numerous road crossings will be required. The disturbance footprint within such areas should be minimized and these areas should be checked for alien species more often than the surrounding landscape.

Cleared and disturbed areas

Cleared and disturbed areas are clearly vulnerable to invasion on account of the lack of existing plant cover to resist invasion as well as the disturbance which created during construction which promotes the germination and establishment of alien plant species.

Construction camps and laydown areas

Construction camps and lay down areas are either cleared of vegetation or prolonged activities in these areas result in negative impact on indigenous vegetation. In addition, repeated vehicle and human activity in these areas usually results in the import of alien plant seed on clothes, dirty vehicles or with construction machinery and materials.

GENERAL CLEARING & GUIDING PRINCIPLES

- Alien control programs are long-term management projects and should include a clearing plan which includes follow up actions for rehabilitation of the cleared area. Alien

problems at the site should be identified during preconstruction surveys of the development footprint. This may occur simultaneously to other required searches and surveys. The clearing plan should then form part of the preconstruction reporting requirements for the site.

- The plan should include a map showing the alien density & indicating dominant alien species in each area.
- Lighter infested areas should be cleared first to prevent the build-up of seed banks.
- Dense mature stands of woody species where present should be left for last, as they probably will not increase in density or pose a greater threat than they are at the moment.
- Collective management and planning with neighbours may be required as seeds of aliens are easily dispersed across boundaries by wind or water courses.
- All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing.

CLEARING METHODS

- Different species require different clearing methods such as manual, chemical or biological or a combination of both.
- However care should be taken that the clearing method (s) used does not encourage further invasion. As such, regardless of the method (s) used, disturbance to the soil should be kept to a minimum. Fire is not a natural phenomenon at the site and fire should not be used as a clearing method or vegetation management approach at the site.
- The best-practice clearing method for each species identified should be used. The preferred clearing methods for most alien species can be obtained from the DWAF Working for Water Website. http://www.dwaf.gov.za/wfw/Control/

USE OF HERBICIDES FOR ALIEN CONTROL

Although it is usually preferable to use manual clearing methods where possible, such methods may create additional disturbance which stimulates alien invasion and may also be ineffective for many woody species which re-sprout. Where herbicides are to be used, the impact of the operation on the natural environment should be minimised by observing the following:

- Area contamination must be minimised by careful, accurate application with a minimum amount of herbicide to achieve good control.
- Specific care must be taken to prevent contamination of any water bodies. This includes: due care in storage, application, cleaning of equipment and disposal of containers, product and spray mixtures.
- Equipment should be washed where there is no danger of contaminating water sources and washings carefully disposed of in a suitable site.
- To avoid damage to indigenous or other desirable vegetation, products used should have least effect on non-target vegetation.

- Coarse droplet nozzles should be fitted to avoid drift onto neighboring vegetation.
- The appropriate health and safety procedures should also be followed regarding the storage, handling and disposal of herbicides.

For all herbicide applications, the following guidelines should be followed:

Working for Water: Policy on the Use of Herbicides for the Control of Alien Vegetation.

ALIEN PLANT MANAGEMENT PLAN

CONSTRUCTION PHASE ACTIVITIES

The following management actions are aimed at reducing soil disturbance during the construction phase of the development, as well as reducing the likelihood that alien species will be brought onto site or otherwise encouraged.

Action	Frequency
The ECO is to provide permission prior to any vegetation being cleared for development.	Daily
Clearing of vegetation must be undertaken as the work front progresses – mass clearing is not allowed unless the entire cleared area is to be rehabilitated immediately.	Weekly
Should re-vegetation not possible immediately, the cleared areas must be protected with packed brush, or appropriately battered with fascine work. Alternatively, jute (Soil Saver) may be pegged over the soil to stabilise it.	Weekly
Cleared areas that have become invaded can be sprayed with appropriate herbicides provided that these are such that break down on contact with the soil. Residual herbicides should not be used.	Weekly
Although organic matter is frequently used to encourage regrowth of vegetation on cleared areas, no foreign material for this purpose should be brought onto site. Brush from cleared areas should be used as much as possible. Arid soils are usually very low in organic matter and the use of manure or other soil amendments is likely to encourage invasion.	Weekly
Clearing of vegetation should not be allowed within 50m of any wetland or pan, 80m of any wooded area, within 1:100 year floodlines, in conservation servitude areas or on slopes steeper than 1:3, unless permission is granted by the ECO for specifically allowed construction activities in these areas.	Weekly
Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. (Particular attention must be paid to imported material such as building sand or dirty earth-moving equipment.) Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed.	Weekly

Alien vegetation regrowth must be controlled throughout the entire site during the construction period.	Monthly
The alien plant removal and control method guidelines should adhere to best-practice for the species involved. Such information can be obtained from the DWAF Working for Water website.	Monthly
Clearing activities must be contained within the affected zones and may not spill over into demarcated No Go areas.	Daily
Pesticides may not be used. Herbicides may be used to control listed alien weeds and invaders only.	Monthly
Drainage lines and other sensitive areas should remain demarcated with appropriate fencing or hazard tape while construction activities within the area are underway. These areas are no-go areas (this must be explained to all workers) that must be excluded from all development activities.	Daily

MONITORING – CONSTRUCTION PHASE

The following monitoring actions should be implemented during the construction phase of the development.

Monitoring Action	Indictor	Timeframe
Document alien species present at the site	List of alien species	Preconstruction
Document alien plant distribution	Alien plant distribution map	3 Monthly
Document & record alien control measures implemented	Record of clearing activities	3 Monthly
Review & evaluation of control success rate	Decline in documented alien abundance over time	Biannually

OPERATIONAL PHASE ACTIVITIES

The following management actions are aimed at reducing the abundance of alien species within the site and maintaining non-invaded areas clear of aliens.

Action	Frequency
Surveys for alien species should be conducted regularly. Every 3 months for the first two years after construction and biannually thereafter. All aliens identified should be cleared.	Every 3 months for 2 years and biannually thereafter
Re-vegetation with indigenous, locally occurring species should take	Biannually, but re-

place in areas where natural vegetation is slow to recover or where repeated invasion has taken place.	vegetation should take place at the start of the rainy season.
Areas of natural vegetation that need to be maintained or managed to reduce plant height or biomass, should be controlled using methods that leave the soil protected, such as using a weed-eater to mow above the soil level.	When necessary
No alien species should be cultivated on-site. If vegetation is required for esthetic purposes, then non-invasive, water-wise locally-occurring species should be used.	When necessary

MONITORING – OPERATIONAL PHASE

The following monitoring and evaluation actions should take place during the operational phase of the development.

Monitoring Action	**Indictor**	**Timeframe**
Document alien species distribution and abundance over time at the site	Alien plant distribution map	Biannually
Document alien plant control measures implemented & success rate achieved	Records of control measures and their success rate. A decline in alien distribution and cover over time at the site	Quarterly
Document rehabilitation measures implemented and success achieved in problem areas	Decline in vulnerable bare areas over time	Biannually

DECOMMISSIONING PHASE ACTIVITIES

The following management actions are aimed at preventing the invasion, by alien plant species, of the re-vegetated areas created during the decommissioning phase. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to operation.

Action	**Frequency**
All damaged areas shall be rehabilitated if the infrastructure is removed and the facility is decommissioned.	Once off
All natural areas must be rehabilitated with species indigenous to the area. Re-seed with locally-sourced seed of indigenous grass species that were recorded on site pre-construction.	Once off, with annual follow up re-vegetation where

	required.
Maintain alien plant monitoring and removal programme for 3 years after rehabilitation.	Biannually

MONITORING – DECOMMISSIONING PHASE

The following monitoring and evaluation actions should take place during the decommissioning phase of the development.

Monitoring Action	**Indictor**	**Timeframe**
Monitor newly disturbed areas where infrastructure has been removed to detect and quantify any aliens that may become established for 3 years after decommissioning and rehabilitation.	Alien plant surveys and distribution map	Biannually until such time as the natural vegetation has recovered sufficiently to resist invasion.
Monitor re-vegetated areas to detect and quantify any aliens that may become established for 3 years after decommissioning and rehabilitation.	Alien plant surveys and distribution map	Biannually for 3 years
Document alien plant control measures implemented & success rate achieved	Records of control measures and their success rate. A decline in alien distribution and cover over time at the site	Annually for 3 years

REFERENCES:

AGIS (2006) Weeds and Invasive Plants Atlas (www.agis.agric.za/wip)

APPENDIX C:
EROSION MANAGEMENT PLAN

PRINCIPLES FOR EROSION MANAGEMENT

1. Purpose

An Erosion Management Plan addresses the management and mitigation of significant impacts relating to soil erosion. The objective of the plan is to provide:

» A general framework for erosion management, which enables the contractor to identify areas where erosion can be accelerated from their action.
» An outline of general methods to monitor, manage and rehabilitate erosion in ensuring that all erosion caused by this development is addresses.

2. Legislation and Standards

Soil conservation pertaining to erosion has been a topic within legislation form the 1930's till today in South Africa. Internationally, standards have been set by the International Finance Corporation and the World Bank to address soil erosion in construction and decommissioning of areas. Therefore this document will ensure that the developer meets the South African legislative requirements and the IFC standards with regards to monitoring, managing and rehabilitating soil erosion on the solar energy facility site.

Relevant legislation:

» Conservation of Agricultural Resources Act No 43 of 1983
» Environmental Conservation Act No 73 of 1989
» National Forestry Act No 84 of 1998
» National Environmental Management Act No 107 of 1998
» The Department of Water Affairs and Forestry, February 2005. Environmental Best Practice Specifications: Construction Integrated Environmental Management Sub-Series No. IEMS 1.6. Third Edition. Pretoria.

3. Areas with a high soil erodability potential

The following areas are generally associated with high soil erodibility potential:

» Any areas without vegetation cover
» Excavated areas
» Steep areas
» Areas where the soil has been degraded already
» Dispersive, duplexed soil areas
» Areas with fine grained soil material with a low porosity
» Areas which undergo overland flow of water.
» Areas close to water

» Irrigated areas
» Compacted areas
» Rivers
» Drainage lines
» And any areas where developments cause water flow to accelerate on a soil surface.
» Coarsely gravelly covered surfaces

4. Precautionary management activities to avoid erosion

In the assessment process the contractor must assess all:
» Infrastructure and equipment placements and function to ensure that the infrastructure or equipment is not causing accelerating soil erosion on the site.
» Construction activities to ensure that no erosion indicators are forming as a result of the construction activities.

5. Monitoring

5.1. General Erosion

The developer must assess the site for erosion indicators in the monitoring process, which include:

» Bare soil
» Desiccation cracks
» Terracettes
» Sheet erosion
» Rill erosion (small erosion features with the same properties and characteristics as gullies)
» Hammocking (Soil build-up)
» Pedestalling (Exposing plant roots)
» Erosion pavements
» Gullies
» Evidence of Dispersive soils

In the assessment process, the contractor must assess all:

» Infrastructure and equipment placements and function to ensure that the infrastructure or equipment is not causing accelerated soil erosion on the site.
» Construction activities to ensure that no erosion indicators are forming as a result of the construction activities.

If any activities or placement of equipment cause pooling on the site, degrade the vegetation, result in removal of the surface or subsurface soil horizons, create

compacted surfaces with steep gradients, or minimise runoff areas, the erosion potential on the site will increase.

If any erosion features are begin forming or are present as a result of the activities mentioned above the developer:

» Assess the situation.
» Take photographs of the soil degradation.
» Determine the cause of the soil erosion.
» Inform and show the relevant contractors the soil degradation.
» Inform the contractor that rehabilitation must take place and that the contractor is to implement a rehabilitation method statement and management plan.
» Monitor that the contractor is taking action to stop the erosion and assist them where needed.
» Report and monitor the progress of the rehabilitation weekly and recorded all the findings in a site diary.
» All actions with regards to the incidents must be reported on a monthly compliance report which will be submitted to the department.

The contractor/ developer (in consultation with the ECO) must:

» Select a system to treat the erosion
» Design the treatment system
» Implement the system
» Monitor the area to see if the system functions like it should, if the system fails, the method must be adapt or adjust to ensure the accelerated erosion is controlled.
» Monitoring must continue until the area has been stabilised

5.2. Stormwater Management

The developer must assess the site for erosion indicators such as:

» Bare soil
» Exposed plant roots, pedestalling
» Sheet erosion
» Rill erosion
» Hammocking
» Erosion pavements
» Terracettes
» Gullies

In the assessment process the developer must assess all:

» Disturbed watercourse areas by the development: roads, bridges, river crossings, cabling, permanent laydown areas, crane pads and any other remaining hard surfaces.
» Construction activity limited to specified areas. Stockpiles of aggregate and material will be positioned at least 50 m away from drainage lines and wetlands.

If any erosion features are present as a result of the activities mentioned above the developer must:

» Assess the situation
» Take photographs of the soil degradation.
» Determine the cause of the erosion.
» Inform and show the relevant contractors the soil degradation.
» Inform the contractor that rehabilitation must take place and that the contractor is to implement a rehabilitation method statement and management plan.
» Monitor that the contractor is taking action to stop the erosion and assist them where needed.
» Monitor the rehabilitation weekly and record the findings in a site diary.
» All actions with regards to the incidents must be reported on in the monthly compliance monitoring report.

The contractor/ developer must (in consultation with the ECO):

» Select a system to treat the erosion
» Design the treatment system
» Implement the system
» Monitor the area to ensure that the erosion has been addressed adequately.
» Monitor the erosion until the area has been stabilised.

6. Rehabilitation

The following erosion control measures and rehabilitation specifications must be implemented to ensure that good environmental practice is conducted and environmental compliance is achieved.

6.1. General Erosion Management

In this section the equipment needed to remediate erosion, the precautionary measures which must be taken to avoid erosion and mitigation requirements for already degraded areas.

6.1.1. Equipment

The civil works contractor may use the following instruments to combat erosion when necessary:

» Reno mattresses
» Slope attenuation
» Hessian material
» Shade catch nets
» Gabion baskets
» Mulching Run-off control (increase the amounts of runoff areas to disperse the water)
» Silt fences
» Storm water channels and catch pits
» Shade / catch nets
» Soil bindings
» Geofabrics
» Hydroseeding and/or re-vegetating
» Mulching over cleared areas
» Stone packing
» Tilling (roughing the surface)

6.1.2. Methods to prevent accelerated erosion

The following practises should be considered and adhered to:

» Ensure steep slopes are stabilised.
» Ensure that steep slopes are not stripped of vegetation and left to dry out and become water repellent (which will case increased runoff and a decreased infiltration rate) increasing the erosion potential.
» Ensure that all water on site (rain water or water wastage from the construction process) does not result in any surface flow (increase velocity and capacity of water) as a result of the poor drainage systems.
» Ensure that pooling of water on site is avoided, as the site and the general area consists of dispersive soils, pooling will cause an increase of infiltration on one area, causing the subsurface to begin eroding.
» Ensure that heavy machinery does not compact those areas which are not intended to be compacted (i.e. areas intended to be managed), as this will result in compacted hydrophobic, water repellent soils which increase the erosion potential of the area. where compaction does occur, the areas should be ripped.
» Ensure that compacted areas have adequate drainage systems to avoid pooling and surface flow.
» Prevent the concentration or flow of surface water or stormwater down cut or fill slopes, or along pipeline routes or roads, and ensure measures to prevent erosion are in place prior to construction.
» Ensure that stormwater and any runoff generated by hard surfaces should be discharged into retention swales or areas with rock rip-rap. These areas should

be grassed with indigenous vegetation. These energy dissipation structures should be placed in a manner that surface flows are managed prior to being discharged back into a natural watercourse to support the maintenance of natural base flows within the ecological systems and prevent erosion, i.e. hydrological regime (water quantity and quality) is maintained.

» Ensure siltation and sedimentation through the use of the erosion equipment mentioned structures.
» Ensure that all stormwater control features have soft engineered areas that attenuate flows, allowing for water to percolate into the local ground watertable in low quantities (to reduce runoff but prevent subsurface erosion).
» Minimise and restrict site clearing to areas required for construction purposes only and restrict disturbance to adjacent undisturbed natural vegetation.
» Ensure that vegetation clearing is conducted in parallel with the construction progress across the site to minimise erosion and/or run-off.
» Ensure that large tracts of bare soil which would cause dust pollution in high winds, or have high erosion susceptibility and increase sedimentation in the lower portions of the catchment are controlled through temporary surface covering.
» Ensure no diversion of water flows in catchment occurs.
» Ensure that dust control measures are implemented, but prevent over-wetting/ saturating the area (to cause pooling) and run-off (that may cause erosion and sedimentation).
» Watercourse (stream) crossings should not trap any run-off, thereby creating inundated areas, but allow for free flowing watercourses.

6.1.3. Mitigation for previously degraded areas

Previously degraded areas could pose a threat to construction activities in the area and must therefore be stabilised, then remediated and rehabilitated through:

» Protecting, stabilise and isolate the degraded areas to ensure no further damage is caused by erosion due to construction activities.
» Increase the drainage in the area but avoid pooling.
» Prevent increasing sedimentation in areas that have been chocked by soils from degraded areas.
» Once construction has been completed, a method statement must be drafted for the rehabilitation of the previously degraded areas, using equipment mentioned above and implemented.
» Stabilisation of steep slopes must be undertaken.
» Ensure that bare soil is covered and hydro seeded to reduce topsoil loss.

6.2. Methodologies

The following erosion control measures and rehabilitation specifications may be required to be implemented to ensure that good environmental practice is conducted and environmental compliance is achieved.

» Topsoil covered with a geotextile or hessian material and a grass seed mixture (see Rehabilitation Specifications).
» Logging or stepping following the contours of the slope, to reduce surface runoff.
» Earth or rock-pack cut-off berms.
» Packed branches to roughen the surface and promote infiltration.
» Benches (sand bags).
» Stabilisation of near vertical slopes (1:1 – 1:2), if created during construction, will be required to utilise hard structures that have a natural look. The following methods may be considered:
  - Gabions (preferred method with geotextile material).
  - Retaining walls.
  - Stone pitching.
» The slopes of all stream diversions must be protected. The following methods may be considered:
  - Reno mattresses (preferred method), ensure that the reno mattresses are buried deep into the subsurface, to avoid undercutting from the water.
  - Coarse rock (undersize rip-rap)
  - Sandbags.
  - Stone packing with geotextile
» Where feasible use rubber dams as stream diversions when establishing water course crossings. Although (and considering that these are non-perennial watercourses) the recommendation is to construct watercourse crossings during dry periods (or no flow periods), where possible.
» Any concentration of natural water flow caused by road works or hardstands areas will be treated as follows:
  - if water flow is sub-critical, nothing is required
  - if water flow is supercritical, the outlets will be provided with protection (either gabions or stone pitching – depending on the flows) to release water subcritical back into the watercourse at a low velocity.

6.3. Engineering Specifications

A detailed Stormwater Management Plan describing and illustrating the proposed stormwater control measures must be prepared by the Civil Engineers and this includes erosion control.

Requirements for project design:

» Erosion control measures to be implemented before and during the construction period, including the final stormwater control measures (post construction).
» The location, area/extent (m²/ha) and specifications of all temporary and permanent water management structures or stabilisation methods.
» A resident Engineer to be responsible for ensuring implementation of the erosion control measures on site during the construction period.
» The Developer holds ultimate responsibility for remedial action in the event that the approved stormwater plan is not correctly or appropriately implemented and damage to the environment is caused.
» Concrete lined drains placed adjacent to road to transfer the water to the existing water courses.
» Frequent gravel drains hydroseeded placed on permanent roadway edges.
» At the point where stormwater is discharged, energy dissipaters to be constructed to reduce the flow rate of run-off.
» All cut and fill banks will be seeded with an approved seed mix (as per the rehabilitation specifications) to ensure bank stabilisation and the elimination of potential erosion. Reno mattresses may be used to ensure that the area remains stable.

6.4. Rehabilitation Specifications

» Employ a Horticultural Landscape Contractor to fulfil the rehabilitation of disturbed areas post-construction.
» A detailed Rehabilitation Plan describing and illustrating the proposed rehabilitation activities on site must be prepared i.e. areas of top soiling, seeding and replanting of vegetation; species mix; requirements for fertilisation; seed sowing rates; watering etc. (i.e. bill of quantities).
» The following document should be consulted for further support with respect to information regarding rehabilitation, namely: The Department of Water Affairs and Forestry, February 2005. Environmental Best Practice Specifications: Construction Integrated Environmental Management Sub-Series No. IEMS 1.6. Third Edition. Pretoria.
» These specifications may be modified by the Horticultural Landscape Contractor on consideration of site conditions.

6.5. Post- and during construction rehabilitation activities

» Correct and appropriate stockpile management of topsoil will be required during the construction phase.
» Rehabilitation of disturbed areas will be implemented as these areas become available for rehabilitation.
» Disturbed areas will include, for example: construction camp site, areas where underground cabling has been layed/buried, roadsides of new access roads.

7. Rehabilitation steps to mitigate the eroded areas

» Stockpiled topsoil must be spread over disturbed areas (150 – 200mm thick) just prior to planting/seeding.
» Rip and scarify along the contours of the newly spread topsoil prior to watering and seeding.
» Organic fertilizers or compost shall be used if site conditions require it and can be applied as part of hydro-seeding applications.
» Seed should be sown into weed-free topsoil that has been stockpiled (i.e. original topsoil from the site).
» Indigenous plants shall be used to rehabilitate disturbed areas.
» Applying the seed through hydromulching (hydro-seeding) is advantageous (or organic mulching after seeding).
» Watering is essential and rehabilitation should ideally occur during the wet season.
» The topsoil in the area is vulnerable to erosion therefore the hydro-seeded surfaces must be covered with a shade cloth material or natural fibre (hessian material) to reduce the loss of soil while the plants establish.

7.1. 'Watering' to avoid erosion

» Movement of livestock in newly rehabilitated areas must be restricted, where possible, while taking into consideration drinking areas/paths.
» Watering the rehabilitated areas should be undertaken in the wet/rainy season essential but if this is not possible, an initial watering period (supplemental irrigation) will be required to ensure plant establishment (germination and established growth).
» Generous watering during the first two weeks, or until the seeds have germinated, is required (unless adequate rainfall occurs) i.e. seed beds will need to be kept moist for germination to occur.
» For grass to establish (once germination has occurred), rainfall or irrigation is needed at regular intervals, ideally every few days and possibly every day if weather conditions require it.
» During dry periods, with no rainfall, 100 litres per m² (or 100mm of rain) over a month or more, may be necessary to establish plants capable of surviving dry weather (or otherwise specified by the Horticultural Landscape Contractor).

7.2. Seeding

The developer should make use of an appropriate mix of grass species for rehabilitation 9to be determined in consultation with a suitably qualified ecologist) and they must be mixed for sowing either in summer or in winter. Grass species application (Rutherford, 2006) is at the rate secified as kg/ha.

7.3. Steep slopes

» Areas that have a steep gradient and require seeding for rehabilitation purposes should be adequately protected against potential run-off erosion e.g. with coir geotextile netting or other appropriate methodology.
» Provision for wind should also be made on these slopes to ensure the fine grained soil is not removed.

7.4. Maintenance and duration

» Rehabilitation will occur during construction, as areas for plant rehabilitation become available.
» The rehabilitation period post construction is estimated to be over a period of 6 (minimum) to 12 months (maximum), or a time period specified by the Horticultural Landscape Contractor, particularly if planting of trees and shrubs occurs.
» The rehabilitation phase (including post seeding maintenance) should be at least 6 months (depending on time of seeding and rainfall) to ensure establishment of plants with a minimum 80% cover achieved (excluding alien plant species).
» If the plants have not established and the 80% is not achieved within the specified maintenance period, maintenance of these areas shall continue until at least 80% cover is achieved (excluding alien plant species).
» Additional seeding may be necessary to achieve 80% cover.
» Any plants that die during the maintenance period must be replaced.
» Succession of natural plant species should be encouraged.

8. Conclusion

The Erosion Management Plan is a document to assist the Developer with guidelines on how to manage erosion. The implementation of management measures is not only good practice to ensure minimisation of degradation, but also necessary to ensure comply with legislative requirements. This document forms part of the EMPr, and is required to be considered and adhered to during the design, construction, operation and decommissioning phases of the project.

9. References

Department of Environmental Affairs. (1983). *Conservation of Agricultural Resources Act 43 of 1983.* Pretoria: Department of Environmental Affairs.

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APPENDIX D:
GUIDELINES FOR INTEGRATED MANAGEMENT OF CONSTRUCTION WASTE

ENVIRONMENT PROCEDURE

Waste Management Plan

Table of Contents

Introduction

Sound waste management is better achieved when an Integrated Waste Management System is implemented. This is more evident on sites or in areas where different parties and aspects are involved. Integrated Waste Management is better achieved when system is underlined by sound environmental principles. These principles derived from section 2 of the National Environmental Management Act (Act 107 of 1998). The following principles apply to waste management.

A **Precautionary approach** will be followed in the sense that harm to health and the environment is prevented when waste is generated, treated and disposed off. The contractor as the generator of waste have to abide by the **Duty of Care** principle by ensuring that waste is disposed off in a manner that is environmentally sound and responsible. Management of waste must also follow an **Integrated and Holistic Approach** integrating health, safety and the environment in to the management approach and managing all aspects as a whole. By following the Best Practical Environmental Option one selects and implements the most sustainable management option in terms of the environment and the people surrounding it. The last principle that has to be considered in waste management is the **Polluter Pays** principle. This principle indicates that the costs for remediation and prevention of further pollution will fall on the responsible party.

Purpose of this document

A Waste Management Plan plays a key role in achieving sustainable waste management. This document is set to indicate the procedure that has to be followed during the handling, storage, transportation and disposal of waste that is generated from the activities on site.

Scope

The Waste Management Plan Procedure provides guidelines for waste management and applicable to employees, sub-contractors working on behalf of the Developer.

Waste Management Strategy

Waste will be managed according to the waste hierarchy as set in the National Environmental Management: Waste Act (Act 59 of 2008).The waste hierarchy dictates that the generation of waste should be avoided and minimised. If this is not possible the most desirable options will be reuse, recycle and recover waste. The last option will be disposal.

When waste is disposed it must be done in an environmentally safe manner and at a disposal site that is permitted and authorised to dispose of that waste. It is the generators duty to ensure that such disposal sites have sound and responsible management practices.

Waste will be segregated at source to facilitate re-use, recycling, and recovery. Segregation of waste will be made possible by means of waste containers that are allocated and marked for different waste streams that are identified within the content of this document.

Emergency Procedures will be followed in the unforeseen event of a spill or if waste burns on site.

All employees will receive training on waste management issues by means of induction training and toolbox talks that will take place once per week. Littering on site is prohibited. No person is allowed to discard of any litter on site expect in bins provided for that purpose.

Waste generation

Daily operational activities will generate general waste, metal waste as well as hazardous waste on monthly basis. Figures of these wastes are not yet known and will vary within project cycles as there will be times of acceleration in activity and times decreased activity.

Sources of waste will include: empty containers, office paper, plastic water bottles, and food waste canteens, printer cartridges, and used vehicle oil from workshops

Legal Requirements

The following sources of South African Law have been identified and will form the basis of the (WMP). Developer will comply with all environmental policies or Acts that apply to the Project, and the Project Manager should familiarize himself with, and have access to, the following pieces of legislation as a minimum:

- Constitution of South Africa (Act No. 108 of 1996);
- National Environmental Management Act (Act 107 of 1998);
- National Environmental: Waste Act (Act No. 59 of 2008);
- Hazardous Substances Act (Act No. 15 of 1973);
- Impacts and Aspects Register;
- Environmental Management Plan (EMPr)
- Environmental Authorisation
- Minimum Requirements for the Disposal of Waste by Landfill, Edition 3 (2005); and
- Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste, Edition 3 (2005).

Definations and Abbreviations

a. **Defination of waste relevant to operations**

Environment Surroundings within which human exists and that are made up of:

- The land, water and atmosphere of the earth;
- Micro- organisms, plant and animal life;

- Any part or combination of the above and the interrelationships among and between them; and
- The physical, chemical, aesthetic and cultural properties and conditions of foregoing that influence human health and well-being. (NEMA Act, Act No. 107 of 1998).

Waste means any substance, whether or not that substance can be reduced, re-used, recycled or recovered:

a) that is surplus, unwanted, rejected, discarded, abandoned or disposed of;
b) which the generator has no further use of for the purposes of production;
c) that must be treated or disposed of; or
d) that is identified as a waste by the minister, by notice in the Gazette, but:
   i) a by-product is not considered waste; and
   ii) any portion of waste, once re-used, recycled and recovered, ceases waste.

Hazardous Means a source of or exposure to danger (NEMA, 1998)

Recovery Means the controlled extraction of a material or the retrieval of energy from waste to produce a product

Recycle a process where waste is reclaimed for further use, which process involves the separation of waste from a waste stream for further use and the processing of that separated material as a product or raw material.

Re-use to utilise articles from the waste stream again for a similar or different purpose without changing the form or properties of the articles

Container means a disposable or re-usable vessel in which waste is placed for the purposes of storing, accumulating, handling, transporting, treating or disposing of that waste, and includes bins, bin –liners and skips

Disposal Means the burial, deposit, discharge, abandoning, dumping, placing or release of any waste into air or any land.

Hazardous Waste

Waste that has the potential to cause a negative threat/impact to humans and/or the environment. It includes, but is not limited to, batteries, neon lights, fluorescent lights, printer cartridges, oil, paint, paint containers, oil filters, IT equipment etc.

General waste Waste which does not pose an immediate hazard or threat to health or to the environment' and includes the following waste flows: domestic waste, construction and demolition waste, business waste, insert waste.

EMP	Environmental Management Plan. A detailed plan of action prepared to ensure that recommendations for preventing the negative environmental Impacts and where possible improving the environment are implemented during the life cycle of the project. (Project EMP).

b. Abbreviations

ECO	Environmental Control Officer
EMP	Environmental Management Plan
WMP	Waste Management Plan
NEM: WA	National Environmental Management: Waste
(Act 59 of 2009)	
DWA	Department of Water Affairs
I&AP	Interested and Affected Parties/Person

Responsibilities

i) The Developer Environmental Officer shall be responsible for compliance with this waste management plan and ensure that all waste generated during construction activities on site is managed in safely and in accordance with legislations..

ii) Developer EO shall provide the Team HSE and ECO with a written monthly waste report, detailing both compliance with the environmental Specifications as well as Environmental Performance;

iii) It is the responsibility of all employees to segregate at source and store waste in the appropriate bins and in designated areas and to ensure that waste is kept to a minimum and environment is not polluted and contaminated.

General waste

a. Management of general waste

General waste will be segregated at source and place in the correct waste bins designated for each waste stream. General waste will not be stored on site for longer than 30 days and will be collected and emptied on a weekly basis by waste management company for disposal.

b. General waste stream

This is waste that does not pose an immediate threat to health or the environment. Most of these waste streams will be designated to be re-used, recycle and recovered.

i) Compactable General waste

This is any waste type that are small in size and that can be compacted

- General waste: waste that does not fall within the defined waste streams that will be disposed of in landfill. Domestic waste will be discarded in waste bins that are labelled "General Waste". Source of this waste will be kitchen, beverage cans, plastic waste and carteens.
- Waste papers: These are waste paper boxes that are unwanted. This waste will be discarded in waste bins labelled "Waste paper, Boxes"

ii) Un-compactable general waste

This is waste that is large in size that cannot be disposed of in normal waste bins or skip. Most of the waste types in this category can be recycled or re-used within the operations on a construction site or can be recycled in to the local community.

- Scrap metals: all metal or steel that is discarded or termed off-cuts will form the bulk of the scrap metal waste stream. These metals will be placed in waste bins labelled "Metal Waste"

c. Recycling Procedure

All scrap/metal waste generated will be collected and sent to the recycling facilities for recycling purpose. Used oil shall be collected by recycling companies where applicable.

Hazardous waste

a. Management of hazardous waste

Hazardous waste will be stored in a safe and responsible manner. Hazardous waste will not be stored on site for more than 30 days. This hazardous waste will be placed in a waste bin labelled 'Hazardous Waste" and will be collected and disposed of as Hazardous waste at approved landfill site. All hazardous waste types will be identifiable at all times. Incompatible waste type will be stored separately.

b. Hazardous waste types

- Hydrocarbon contaminated materials: such as soil due to spills and oil leaks;
- Used equipments/vehicles oils: from vehicles being serviced at workshop;
- Printing cartridges; and
- Chemical waste (such as used oil, paint, insecticide).

Waste bins

a. Waste bins conditions

Developer will ensure that the waste bins used are suitable for the waste that is to be stored within. The waste bins will be in a good condition, not be corroded and may not permit leachate or be otherwise unfit for the safe storage of waste designated to that container. Bins will have mechanisms in place to prevent waste from becoming wind blow litter and it must be scavenger proof. Hazardous waste bins will be sealed to ensure that no spillages can occur. These bins will be also be labelled so as to identify type of waste, date of storage commencement and generator details.

b. Inspections of waste bins

Waste bins will be inspected on a daily basis to ensure that they remain in an acceptable condition for safe storage of waste. These inspections will be documented and records will be kept for future references.

c. Placement of waste bins

The bins will be placed in centralised locations in order to ensure that it is accessible to all employees. The waste bins will be emptied and the waste will be taken to the relevant designated areas (the central storage area or the waste transfer station) awaiting collection by waste removal companies.

Waste storage areas and collecion points

a. Specifications of waste storage areas

Waste will be managed in such a way as to prevent it from becoming a nuisance such as odour and to prevent the breeding of vermin and vectors. Management practices will ensure that no environmental harm is caused. All waste area will be clearly marked with signs to specify that waste is being stored in that area and to indicate what the nature of waste is. Storage areas will be fenced with access control to prevent unauthorised access.

i) General waste storage areas

Storage areas for general waste will be kept clean and neat, with a high level of housekeeping.

ii) Hazardous waste storage areas

Storage areas for hazardous waste will be having a roof to divert rain water from waste containers and must be fully bunded (110%) with pollution collection measurements in place in case of any spills or leakages. A high level of house keeping must be maintained in and around the storage. A file with (MSDS) documents and waste acceptance forms must be kept on site.

b. Requirements of collection points

Points from which waste is collected to be taken to the storage areas or the transfer stations will be clearly accessible for vehicles.

d. Waste removal schedule

Waste bins will be emptied on a regular basis. This will either be daily, weekly or when bins have reached their capacity. A call for service will be issued to the waste removal company when bins are full.

General rules

a. Records

All waste removal records will be maintained on site where it is accessible to all interested and affected parties. These records will include an updated list of the waste streams and volumes generated and disposed of, all collection certificates and disposal certificate and all material recycled or re-used and the volume thereof.

b. Review

Developer Project Manager and Developer Environmental Officer will review this Waste Management Plan on a monthly basis.

c. Reporting

Waste disposal figures will be reported on a monthly basis to the HSE and ECO.

Conclusion

Compliance and implementation of this procedure will ensure effective management of waste on site. Developer and their sub-contractors will comply with the requirements of the EMP, the project RoD and other legislative requirements that may have an impact on waste management in general.

References

- (Emergency preparedness and Response Plan
- ISO 14001:2004;