

	Environmental and Social Management Framework Document	Risk and Sustainability
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Title: Distributed Battery Storage with Distributed Solar Photo Voltaic (PV) Project

Environmental and Social Management Framework

Document Identifier: ENV18-R193

Alternative Reference Number: N/A

Area of Applicability: Eskom Holdings SOC Ltd

Functional Area: Environmental Management

Revision: 1

Total Pages: 30

Next Review Date: October 2019

Disclosure Classification: Controlled Disclosure

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1. Introduction

Eskom had completed the conceptual evaluations of the project option as a suitable replacement to the 100 MW Kiwano Concentrating Solar Power (CSP) project to meet the World Bank (WB) and its co-financiers Project Development Objectives (PDO's) in October 2017. The project option is:

- 1440 MWh of Distributed Battery Storage with 60 MW Distributed Solar Photo Voltaic (PV) to be implemented at Eskom's distribution and renewable energy site.

Eskom strongly believes, given the recent and current global trends on the use of battery storage to support National Electricity Grids, that there will be significant and scalable benefits to be derived in developing this battery storage technology application for South Africa (SA). The Battery Energy Storage Systems (BESS) will be used as technology solutions (such as peak shaving, frequency regulation, voltage regulation, energy arbitrage, ancillary services, etc.) for the Distribution (Dx) constrained networks and substations: to assist peak shaving, frequency support and ancillary services in the distribution network.

The objective of this Environmental and Social Management Framework (ESMF), in the context of Eskom's Distributed Battery Storage with Distributed Solar Photo-Voltaic (PV) project, is to provide the framework for environmental and social screening, scoping assessment, management, monitoring and reporting during the development, execution, operation and maintenance of this project. The ESMF will address the South African (SA) environmental and social legislative framework as well as Eskom's policies, standards and guidelines that apply the relevant safeguards for this investment that could have an impact on biophysical and social environments in which it is undertaken.

The ESMF identifies relevant potential environmental and social risks and impacts that may arise from the Distributed Battery Storage with Distributed Solar Photo-Voltaic (PV) project. Furthermore, it presents a screening and assessment methodology for this project to allow for environmental and social risk and impact identification and classification, and specifies the appropriate roles and responsibilities of stakeholders.

2. Supporting Clauses

2.1 Scope

This ESMF is for the Eskom Distributed Battery Storage with Distributed Solar PV project within various provinces of the Republic of South Africa.

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2.1.1 Purpose

The purpose of this ESMF, in the context of Eskom's Distributed Battery Storage with Distributed Solar PV project, is to provide the framework for environmental and social screening, scoping assessment, management, monitoring and reporting during preparation and execution of this project. The ESMF will address the South African environmental and social legislative framework as well as Eskom's policies, standards and guidelines that apply the relevant safeguards for this investment that could have an impact on biophysical and social environments in which it is undertaken.

2.1.2 Applicability

This document shall apply to the Eskom Distributed Battery Storage with Distributed Solar PV project.

2.1.3 Effective date

From the date of authorisation.

2.2 Normative/Informative References

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

- [1] Constitution of the Republic of South Africa Act No. 108 of 1996
- [2] Environmental Impact Assessment for Distribution Activities 240-72597722
- [3] National Environmental Management Act No. 107 of 1998
- [4] Southern African Power Pool – Environmental and Social Management Framework, 2018

2.2.2 Informative

- [5] Occupational Health and Safety Act No. 85 of 1993
- [6] ISO 14001: 2015 Environmental Management Systems - Requirements with guidance for use

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2.3 Definitions

- 2.3.1 Environment:** The surroundings within which humans exist and that are made up of: the land, water, and atmosphere of the earth; micro-organisms and plant and animal life; any part or combination of (i) and (ii) and the interrelationships among and between them; and the physical, chemical, aesthetic, and cultural properties and conditions of the foregoing that influence human health and well-being.
- 2.3.2 Environmental and social impact assessment:** A process for predicting and assessing the potential environmental and social impacts of a proposed project, evaluating alternatives and designing appropriate mitigation, management and monitoring measures.

2.4 Abbreviations

Abbreviation	Explanation
BA	Basic Assessment
BESS	Battery Energy Storage System
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
Dx	Distribution
EA	Environmental Authorisation
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
GA	General Authorisation
OU	Operating Unit
PV	Photovoltaic
WUL	Water Use Licence

3. Distributed Battery Storage with Distributed PV Project: Environmental and Social Management Framework

3.1 Summary and purpose of the ESMF

This ESMF aims to assist Eskom to identify and manage the environmental and social risks and impacts through appropriate mitigation measures that may arise with the assessment of the battery storage project in order to ensure an environmentally and socially acceptable project and that the applicable environmental approval (Environmental Authorisation), as may be required, is obtained prior to commencement with construction.

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The Eskom's Distributed Battery Storage with Distributed Solar PV project will be implemented in two (2) phases namely: Phase one (1) of 800MWh of distributed battery storage only to be implemented at various distribution sites in Eastern Cape (EC), Northern Cape (NC), Western Cape (WC) and Kwa-Zulu Natal (KZN) by December 2019; and Phase two (2) of 640MWh of distributed battery storage with 60MW of distributed PV to be implemented in all nine (9) provinces of South Africa (SA) by December 2021.

This ESMF deals with phase 1 only, although the approach for phase two (2) will be similar. An ESMF for phase 2 will be drafted on approval of the concept release approval (CRA) by Eskom's Group Capital and Monitoring Committee (GCIMC) envisaged to be in August 2019.

Under section 28 of the South African National Environmental Management Act there is the legal obligation for Eskom to ensure environmental duty of care in all that it does. Eskom is legally bound by this act at all times to ensure that it does take reasonable measures to prevent pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment [3].

Eskom therefore has environmental management systems, based on and in most cases certified to the ISO 14001: 2015 environmental management system standard, to ensure there are measures in place to ensure compliance and environmental duty of care. Having systems and practices in place to ensure responsible environmental management in Eskom is supported by approximately 300 environmental professional in Eskom. Therefore, in terms of the Distributed Battery Storage with distributed solar PV Project, Eskom will execute the project in terms of its environmental responsibilities that ensure compliance to South African environmental law through adherence to the Eskom Distribution procedure, Environmental Impact Assessment for Distribution Activities (ref. 240-72597722) [2].

3.2 Instruction and Scope of the assessment

The successful implementation of the ESMF is ensured by the commitment of Eskom and the South African environmental authorities, in this case the Department of Environmental Affairs (DEA), the capacity within Eskom and DEA, and appropriate institutional arrangements in them.

Through the development and implementation of a number of electricity related projects undertaken by Eskom with funding from a range of local and international funders, including the African Development Bank (AfDB) and the World Bank (WB), both Eskom and the DEA have demonstrated the commitment, the capability and the resources to develop, undertaken and implement environmental and social safeguards with respect to Eskom's projects.

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The above mentioned approach will ensure that the material risks and impacts are identified at the planning stages of the battery storage project, thereby ensuring that environmental and social studies are appropriately scoped. A suite of tools is available to Eskom through the environmental and social screening, include:

- (i) strategic environmental assessment (SEA);
- (ii) screening (Distribution Environmental Screening Document (DESD) of the Environmental Impact Assessment for Distribution Activities Procedure: 240-72597722) [2];
- (iii) basic assessments (as per South African EIA regulations) and environmental and social impact assessments (as per South African EIA regulations) [3]; and
- (iv) environmental management plans and programmes (as per South African EIA regulations [3] and Eskom's environmental management systems in terms of the ISO 14001 environmental management system standard [6]) and monitoring processes.

The key pieces of South African national environmental legislation that sets the environmental and social framework on this project are:

- **NATIONAL ENVIRONMENTAL MANAGEMENT ACT 107 OF 1998 (Updated 2018/07/16)**
 - Section 24: Environmental authorisations.
 - ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014 - GN R982/2014
 - ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS LISTING NOTICE 1 OF 2014 - GN R983/2014
 - ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS LISTING NOTICE 2 OF 2014 – GN R984/2014
 - ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS LISTING NOTICE 3 OF 2014 – GN 985/2014
 - Section 28: Duty of care and remediation of environmental damage.
 - Section 29: Protection of workers refusing to do environmentally hazardous work.
 - Section 30: Control of incidents.
- **NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT 39 OF 2004 (Updated 2018/05/22)**
 - Section 32: Control of dust.
 - NATIONAL DUST CONTROL REGULATIONS, 2013 - GN R827/2013
- **NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT 10 OF 2004 (Updated 2017/07/03)**
 - Section 52: Ecosystems that are threatened or in need of protection
- **NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT 57 OF 2003 (Updated 2017/12/12)**
 - Chapter 2: System of protected areas in South Africa

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- NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT 59 OF 2008 (Updated 2018/07/20)
 - Section 16: General duty in respect of waste management
 - Section 17: Reduction, re-use, recycling and recovery of waste
 - Section 19: Listed waste management activities
 - LIST OF WASTE MANAGEMENT ACTIVITIES THAT HAVE, OR ARE LIKELY TO HAVE, A DETRIMENTAL EFFECT ON THE ENVIRONMENT - GN 921/2013
 - Section 21: General requirements for storage of waste
 - Section 22: Storage of general waste
 - Section 23: Waste collection services
 - Section 24: Collection of waste
 - Section 25: Duties of persons transporting waste
 - Section 26: Prohibition of unauthorised disposal
 - Section 27: Littering
- NATIONAL FORESTS ACT 84 OF 1998 (Updated 2009/11/30)
 - Section 7: Prohibition on destruction of trees in natural forests
 - Section 15: Effect of declaration of protected trees
- NATIONAL HERITAGE RESOURCES ACT 25 OF 1999 (Updated 2017/03/17)
 - Section 27: National heritage sites and provincial heritage sites
 - Section 28: Protected areas
 - Section 29: Provisional protection
 - Section 30: Heritage Registers
 - Section 31: Heritage areas
 - Section 32: Heritage objects
- NATIONAL VELD AND FOREST FIRE ACT 101 OF 1998 (Updated 2008/07/17)
 - Section 12: Duty to prepare and maintain firebreaks
 - Section 13: Requirements for firebreaks
- NATIONAL WATER ACT 36 OF 1998 (Updated 2017/03/28)
 - Section 19: Prevention and remedying effects of pollution
 - Section 20: Control of emergency incidents
 - Section 21: Water use
 - GENERAL AUTHORISATION IN TERMS OF SECTION 39 OF THE NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998) FOR WATER USES AS DEFINED IN SECTION 21(C) OR SECTION 21(I) - Gen N 509/2016

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In this regard, many of the project sites will be required to receive an environmental authorisation (EA) from the DEA, through the undertaking of a basic assessment or environmental impact assessment, both of which will include public participation. Environmental management plans for both the construction of the infrastructure and the operation of the facilities will be developed, implemented and monitored for compliance.

South African environmental legislation have been found to be equivalent to the safeguard requirements of the World Bank and African Development Bank.

In terms of the World Bank's Safeguards Diagnostic Review for South Africa Eskom Investment Support Project (ref. <http://documents.worldbank.org/curated/en/931191468334806134/pdf/SR230REVISED001BLIC10Final0SDR0EISP.pdf>) it is stated that: *This Equivalence Analysis finds that South Africa's regulatory systems for all of the four safeguards applicable to the project demonstrate sufficient equivalence so as to justify proceeding to an Acceptability Assessment to determine if and on what basis the Bank can use South Africa's and Eskom's systems in lieu of Bank safeguards to address the environmental and social safeguard issues raised by the proposed project.*

In the case of the African Development Bank's publication "Assessment of the use of "Country Systems" for environmental and social safeguards and their implications for AfDB-financed operations in Africa (ref. <http://www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/SSS - Use of Country Systems- Int%C3%A9rieur web - EN.pdf>) it is stated that: *Among the six study countries, South Africa stands out as the country with legal constraints and practices that are closest to ISS requirements, as well as a strong will to innovate (for example, with the introduction of strategic environmental and social assessments (SESA), first of all as a voluntary practice, then as a legal constraint) and to make progress.*

Table 1 sets out the key South African authorities that issue environmental approvals.

Government Authority	Environmental Approval
<ul style="list-style-type: none">• National Department of Environmental Affairs (DEA)	<ul style="list-style-type: none">• Environmental Authorisation• Waste Management Licence• Atmospheric Emission Licence
<ul style="list-style-type: none">• Department of Water and Sanitation (DWS)	<ul style="list-style-type: none">• Water Use Licence, including General Authorisation• Concurrence record of decisions (related to waste licences and environmental authorisations)
<ul style="list-style-type: none">• Department of Agriculture Forestry and Fisheries (DAFF)	<ul style="list-style-type: none">• Licences for infrastructure affecting natural forests, protected trees and State forests
<ul style="list-style-type: none">• The South African Heritage Resources Agency (SAHRA)	<ul style="list-style-type: none">• Approvals with regards to Heritage Impact Assessments

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Government Authority	Environmental Approval
<ul style="list-style-type: none"> Provincial and District Municipalities 	<ul style="list-style-type: none"> Atmospheric Emission Licences Coastal Conservation Area Biodiversity permit
<ul style="list-style-type: none"> Department of Mineral Resources (DMR) 	<ul style="list-style-type: none"> Mining rights Environmental Authorisations related to mining activities Programme Reports (EMPRs)

Table 1: South African Authorities that issue relevant Environmental Approvals

In the case of the need (based on activities “triggering” a listed activity in terms of the listing under the EIA Regulation Listing Notice 1, 2 and 3 of 2014 (GN 327 & 706) under the National Environmental Management Act) for obtaining an environmental authorisation from DEA, these environmental and social assessment will be undertaken by independent environmental consultants.

Sub-projects will be checked against the “Listed Activities” as set out in the South Africa EIA Regulation Listing Notice 1, 2 and 3 of 2014 (GN 327 & 706). This is set out in table 2 below.

No	Activity description	Applicability
1	<i>The development of facilities or infrastructure for the generation of electricity from a renewable resource where- (i) the electricity output is more than 10 megawatts but less than 20 megawatts; or (ii) the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare; excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs- (a) within an urban area; or (b) on existing infrastructure.</i>	No – all sites
2	<i>The development and related operation of facilities or infrastructure for the generation of electricity from a non-renewable resource where- (i) the electricity output is more than 10 megawatts but less than 20 megawatts; or (ii) the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare</i>	No – all sites

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No	Activity description	Applicability
11	<i>The development of facilities or infrastructure for the transmission and distribution of electricity- (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more; excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is- (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development.</i>	No – all sites
14	<i>The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.</i>	No – all sites
24	<i>The development of a road- (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road- (a) which is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter.</i>	Not anticipated – site specific
27	<i>The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.</i>	Not anticipated – site specific
37	<i>The expansion and related operation of facilities for the generation of electricity from a non-renewable resource where- (i) the electricity output will be increased by 10 megawatts or more, excluding where such expansion takes place on the original development footprint; or (ii) regardless the increased output of the facility, the development footprint will be expanded by 1 hectare or more.</i>	No – all sites
47	<i>The expansion of facilities or infrastructure for the transmission and distribution of electricity where the expanded capacity will exceed 275 kilovolts and the development footprint will increase.</i>	No – all sites

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No	Activity description	Applicability
56	<i>The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre- (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas</i>	Not anticipated – site specific

Table 2: “Listed Activities” - EIA Regulation Listing Notice 1 of 2014 (GN 327 & 706)

It is noted that:

- Environmental Impact Assessment Regulations Listing Notice 3 of 2014 will be assessed for each site.
- The issue of alternatives considered will be discussed in the applicable Basic Assessment Report regarding the activity, location, and technology alternatives as this project is a technology specific (battery storage), location specific (link to Eskom infrastructure with specify technical parameters) and the activity.
- Eskom will ensure adherence to all relevant legislation in terms of obtaining required permits/authorisation, i.e. National Water Act, National Heritage Act, National Forest Act, Provincial Acts, etc.. This is kept in mind in terms of Listing Notice 2 and Scoping and EIA.

3.3 Description of programme operation

The overall intent of the environmental and social plan is to ensure the sites identified and used for this project have the least environmental and social impact, while optimising on the technical objectives of the implementation of the technology. Sites have been selected that are mostly existing Eskom substation sites, power line servitudes, municipal land or where the project will have direct benefit to the community. The initial site selection has ensure that sites close to water courses are not used as well as those in sensitive environments (areas of importance for biodiversity protection).

Eskom Distribution Operating Unit	Number of sites	Environmental progress
Western Cape	24	Five EIA consultants appointed – July 2018; sites grouped geographically.
Eastern Cape	2	Two EIA consultants appointed – July 2018; 1 per site.

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Eskom Distribution Operating Unit	Number of sites	Environmental progress
Northern Cape	7	One EIA consultant appointed – July 2018; currently in process of procuring services of the EIA consultants for balance.
KwaZulu Natal	14	Procuring services of EIA consultants will be undertaken if required based on EIA legislative requirements.
Total	47	

Table 3: Distribution Sites and Environmental Progress (September 2018)

3.4 Environmental and social baseline information at the national and regional level

As set out in the Southern African Power Pool – Environmental and Social Management Framework, 2018 [4] the following description is given for South Africa.

Climatic zones: South Africa's climatic conditions generally range from Mediterranean in the south-western corner of South Africa, to temperate in the interior plateau. The northeast is subtropical whilst a small area in the northwest has a desert climate. Most of the country has warm, sunny days and cool nights.

Topography: Mean altitude 1,200 m (3,900 ft). 40% of the surface is at a higher elevation. There are three major zones: the marginal regions, 80 to 240 km (50–150 mi) in the east to 60–80 km (35–50 mi) in the west and including the eastern plateau slopes.

Drainage/ Hydrology: Two rivers drain the interior plateau:

- The Orange (with its tributary the Vaal), which flows into the Atlantic Ocean; and
- The Limpopo, which empties into the Indian Ocean through Mozambique.

Land Uses: It is estimated that close to 18% of South Africa's natural land cover is transformed, mainly by:

- Cultivation (10.46%);
- Degradation of the natural cover (4.47%);
- Urban land use (1.51%); and
- Forestry (1.41%) (Statics SA, 2012).

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Biodiversity: South Africa occupies 2% of the world's surface area it is home to nearly 10% of the world's plant species (24,000 species), about 7% of the world's vertebrate species, and 5.5% of the world's known insect species (only about half of the latter have been described). South Africa is ranked as the 5th richest country in Africa in terms of the number of endemic species and 24th in the world. In addition to its high terrestrial biodiversity the country also has a high marine biodiversity profile. More than 11 000 species are found in South African waters, amounting to about 15% of global species, with in excess of 25% of these marine species (or 3,496 species) being endemic to South Africa. (State of the Environment Report (SOER), 2012)

Protected Areas/ World Heritage Sites: 20% of South Africa is protected area. Of that:

- 9% is Land Area Protected; and
- 11% Marine Area Protected.

There are 1,517 protected areas in South Africa (InforMEA, 2016)

Social:

- Population 55 million (2016);
- Literacy: Percentage of age 15 and over that can read and write
 - o Male 95.5%; and
 - o Female 93.1%. (2015 est.)
- Unemployment:
 - o Male 48%; and Female 55.5%. (2013 est.)
- Economic growth has decelerated in recent years, slowing to just 1.5% in 2014. South Africa's economic policy has focused on controlling inflation; however, the country faces structural constraints that also limit economic growth, such as skills shortages, declining global competitiveness, and frequent work stoppages due to strike action. The current government faces growing pressure from urban constituencies to improve the delivery of basic services to low- income areas and to increase job growth (Stats SA, 2016);
- Major Infectious diseases:
 - o Food or waterborne diseases:
 - ☐ Bacterial diarrhea;
 - ☐ Hepatitis A; and
 - ☐ Typhoid fever
 - o Water contact disease:
 - ☐ Schistosomiasis

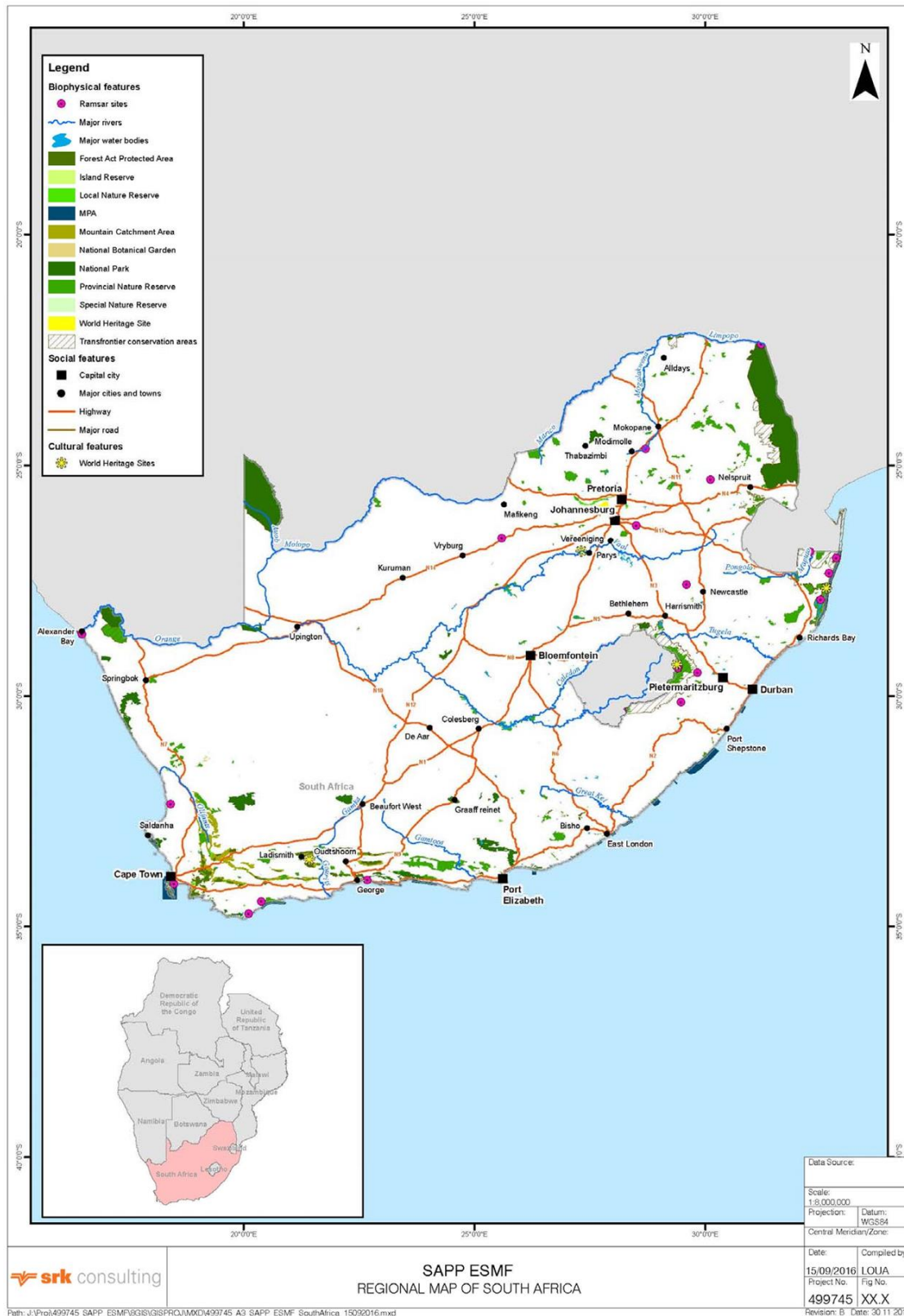
(CIA South Africa, 2013)

Energy: South Africa depends heavily on pulverized fuel power stations, with a large percentage (63%) of its electricity coming from coal. Increased total electricity demand over the past 25 years has resulted in a corresponding increase in coal consumption (by 23% since 1992). Industry is the greatest consumer of electricity, followed by the transport and commercial sectors. There are seven types of energy supply in South Africa namely: coal which makes up 69,0%, biofuels and waste which makes up 10.7%, crude oil makes up 14,8%, nuclear makes up 2.4%, gas makes up 2,9% Hydro makes up 0,1% and Solar wind makes up 0,1% (SA Energy Supply, 2012)

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This battery storage project will be undertaken at 47 different sites within four provinces in South Africa. Sites have been selected based on the technical need for battery storage to support the integration of renewable energy and the stability of the Distribution network. Therefore the majority of sites will be existing Eskom substation sites, wind energy site or adjacent municipal land. This therefore means that there will be no relocation of people.

The battery storage systems will be containerized and the containers installed primarily on already disturbed areas within existing electrical sub-stations, generating low environmental impacts. Additionally, the operation and maintenance of the facilities will be mostly carried out remotely. Therefore, no potential indirect or long term environmental impacts are expected from the project.

The battery storage technology is currently being piloted in South Africa. Should the technology prove successful, there is a potential of scaling up similar technology to allow increased capacity in energy storage from future wind and solar powered projects. This, in turn, will lead to increased access to energy in other geographical areas of South Africa. Electricity storage can also be used to help integrate more renewable energy into the electricity grid. Electricity storage can also help generation facilities operate at optimal levels, and reduce use of less efficient generating units that would otherwise run only at peak times. Further, the added capacity provided by electricity storage can delay or avoid the need to build additional power plants or transmission and distribution infrastructure.

Phase one of this project includes 47 sites throughout four of South Africa's provinces. Therefore the environmental and social context will differ. The environmental and social profile of these area are known as they are located within or as a part of Eskom's existing infrastructure and therefore existing scope of environmental management activities in Eskom distribution.

As indicated, the battery storage project entails installation of container-encased battery storage facilities (approximately 8m high) consisting of grid-scale electrochemical batteries on 47 project sites along the power grids and within the vicinity of renewable energy power plants (wind or solar) sites. The facilities will store electricity from the power plants and evacuate the power when needed. Potential negative impacts of electricity storage depend on the type and efficiency of storage technology. If not operated and maintained, the raw material used in the battery could lead to generation of hazardous waste with negative impacts to the environment.

Other potential negative environmental impacts from the project are anticipated to be low to moderate, limited to the sites where the containers housing the batteries will be installed, largely occurring from clearing vegetation during site preparation, construction of access/haul roads, undertaking of excavation works for anchoring the containers, manoeuvring and operating cranes for unloading and installation of equipment. Decommissioning activities may include removal of the temporary project infrastructure and site rehabilitation.

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In general, these project sites and surrounding areas are sparsely populated and largely characterized by semi-arid or arid landscapes that are predominantly used for grazing sheep or cattle. In determining the appropriate sites for the battery storage facilities, a high level environmental screening was carried out to ensure that the selected sites are not close to water bodies and critical biological areas. sites located in the Western Cape Province, are among the sites to be established within the environmental footprint of the existing facility, near the northern end of the coast of Western Cape Province predominantly characterized by a flat terrain, with low ridges, supporting shrub vegetation that has been used for low-density sheep grazing. The project sites in the Northern Cape Province are largely characterized by flat, sparsely vegetated land in proximity to the Kalahari Desert. None of the project sites are located within sensitive/critical ecosystems and are already disturbed to varying extent by livestock grazing and the construction and operation of the existing electrical sub-stations.

Eastern Site,: The area is covered by unimproved grassland and dry land cultivation, the presence of grasslands indicates the potential for livestock and area falls within the rural settlement areas. The BESS proposed location it outside the Critical Biodiversity Areas and Corridor. The purpose of this assessment is to analyse all the factors in order to provide an unbiased assessment of the Potential social impacts of the proposed installation, in the Eastern Cape area. The Report will present the potential prospects and constraints that would arise as a result of the implementation of this project. The assessment of the key issues indicated that there are no negative impacts that can be classified as fatal flaws and which are of such significance that it cannot be successfully mitigated. Stated differently, the proposed development is unlikely to result in any permanent damaging social impacts

Expected impact during Construction could be dissimilarity in social practices is more likely to come to the fore if construction workers are housed in a construction camp and if such a camp is located close to existing formal and informal settlements.

The introduction of a new proposed BESS project to the area can be viewed as a positive impact if people perceive the project as infrastructural and/or economic development that is not intrusive on their lives and do not cause them immediate danger.

In terms of the Northern Cape, there are seven project sites that forms part of phase 1 of the Northern Cape sites.

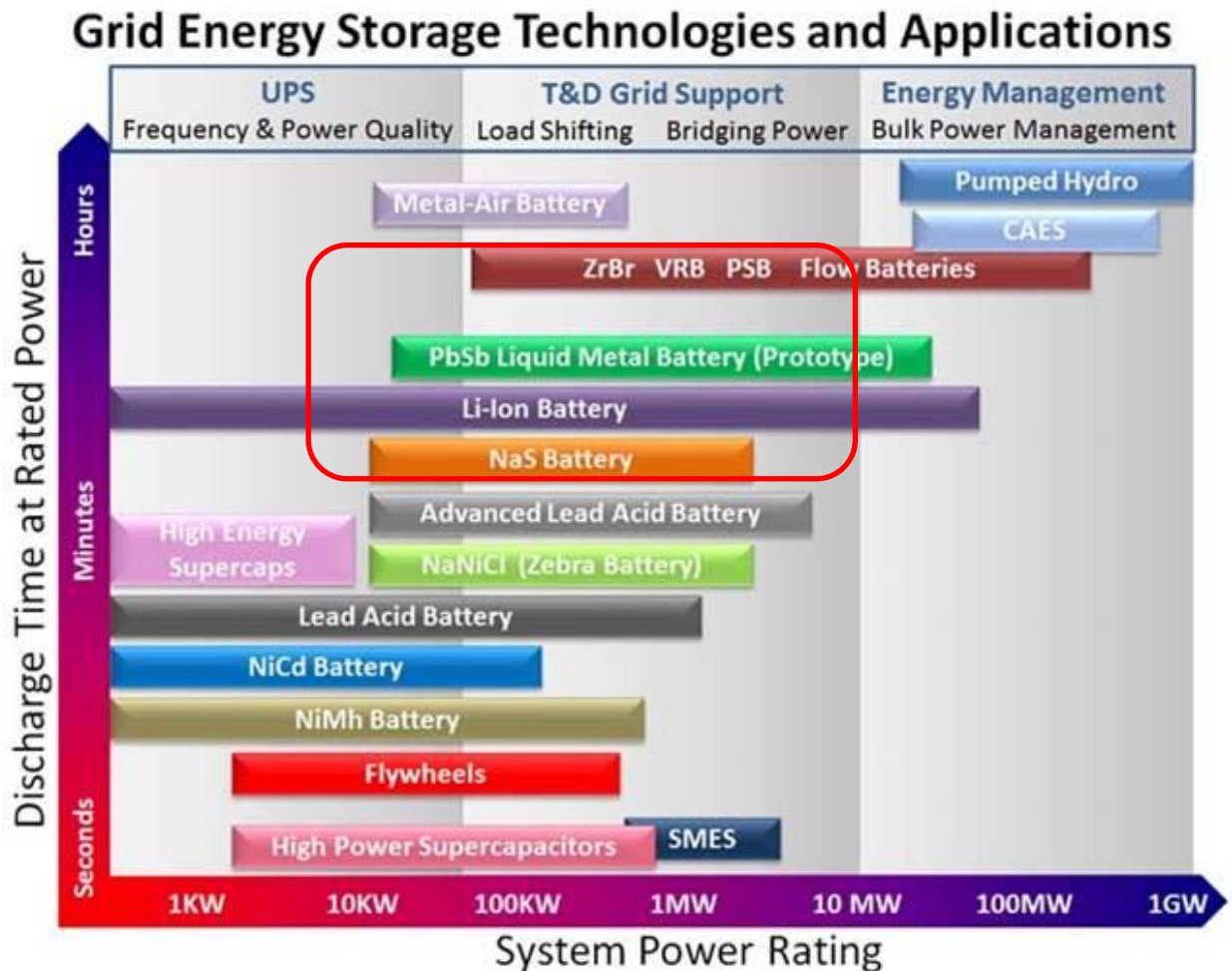
3.4.1 Battery Energy Storage System (BESS)

Electrical Energy storage systems consist of Mechanical, Chemical, Electrical, Thermal and Electrochemical systems. The figure below summarizes the various Electrical Energy Storage systems. The Electrochemical/battery storage system was selected as the preferred solution to meet the strategic requirements. The battery energy storage system can be broken into solid state and flow battery systems.

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a. Solid State Battery Systems

Solid state batteries consist of lithium ion, lead acid etc. lithium ion is used extensively in the Electrical Energy Storage systems. Current estimates indicate that approximately 85% of the electrochemical systems installed use lithium ion batteries. Lithium-ion" refers to a wide array of chemistries in which lithium ions are transferred between the electrodes during the charge and discharge reactions. The construction/composition of the lithium ion battery varies from manufacturer to manufacturer. Lithium ion has the smallest installation foot print when compared to the technologies for the similar energy capacity.

b. Flow Battery

Flow or redox flow battery is where chemical energy is provided by two chemical components dissolved in liquids contained within the system and separated by a membrane. Typical systems use Vanadium or Zinc Bromine.

- i) The vanadium redox battery (VRB), also known as the vanadium flow battery (VFB) is a rechargeable flow battery that employs vanadium ions in different oxidation states to store chemical potential energy. The battery consists of an assembly of cells in which the two electrolytes are separated by a proton

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exchange membrane; both half-cells are additionally connected to storage tanks and pumps so that the electrolytes can be circulated through the cell.

The main advantages of the vanadium redox battery are that it can offer almost unlimited energy capacity simply by using larger electrolyte storage tanks; it can be left completely discharged for long periods with no ill effects; if the electrolytes are accidentally mixed, the battery suffers no permanent damage; a single state of charge between the two electrolytes avoids the capacity degradation due to a single cell in non-flow batteries; the electrolyte is aqueous and inherently safe and non-flammable.

The main disadvantage with vanadium redox technology is a relatively poor energy-to-volume ratio.

- ii) Zinc Bromine flow battery uses a solution of Zinc bromide stored in two tanks the electrolyte is pumped from one tank to the other tank during the charging and discharging process.

The advantages and disadvantages listed for the vanadium redox is applicable to the Zinc bromine flow battery.

- iii) Sodium-Sulphur (NaS) battery system is also an energy storage system based on electrochemical charge/discharge reactions that occur between a positive electrode (cathode) that is typically made of molten Sulphur S and Sodium (Na).

The NaS battery has the general advantages as for the Vanadium and Zinc bromine i.e. long life, high number of charge and discharge cycle, ability to discharge fully with no effects to the performance. The disadvantage is the low energy to size ratio.

3.5 Procedures to assess potential environmental and social impacts and risks of sub-projects

The environmental framework under which this project is undertaken is firstly that of the South Africa environmental and social law as set out in Table 4 below.

Description	Relevance to South African Legislation (in General Terms)
Assessment and Management of Environmental and Social Risks and Impacts	<ul style="list-style-type: none">• Constitution of the Republic of South Africa, 1996 (Section 24): sets out the right of all to an environment that is not harmful to their health or well-being and to have the environment protected for the benefit of present and future generations;• NEMA, 1998 (Act No. 107 of 1998): Section 28 (duty of environmental care);• National Environmental Impact Assessment Regulations (EIAR), 2014• Promotion of Access to Information Act, 2000 (Act No. 2 of 2000).
Labour and Working Conditions	<ul style="list-style-type: none">• Basic Conditions of Employment Act, 1997 (Act No. 75 of 1997);• Labour Relations Act, 1995 (Act No. 66 of 1995);• Occupational Health and Safety Act, 1993 (Act No. 85 of 1993).

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Description	Relevance to South African Legislation (in General Terms)
Resource Efficiency and Pollution Prevention	<ul style="list-style-type: none"> NEMA, 1998 (Act No. 107 of 1998): Section 28 (in terms of duty of care and remediation of environmental damage); National Environment Management (NEM): Air Quality Act, 2004; NEM: Waste Act, 2008 (Act No. 59 of 2008); National Water Act, 1998 (Act No. 36 of 1998).
Community Health, Safety, and Security	<ul style="list-style-type: none"> Constitution of the Republic of South Africa, 1996 (Section 27): Health care, food, water and social security; Occupational Health and Safety Act, 1993 (Act No. 85 of 1993); Promotion of Access to Information Act, 2000 (Act No. 2 of 2000).
Land Acquisition and Involuntary Resettlement	<ul style="list-style-type: none"> Constitution of the Republic of South Africa, 1996 (Section 27): Property; Expropriation Act, 1975 (Act No. 63 of 1975); Restitution of Land Rights Act, 1994 (Act No. 22 of 1994) Land Reform (Labour Tenants) Act, 1996 (Act No. 3 of 1996); Extension of Security of Tenure Act, 1997 (Act No. 62 of 1997); Prevention of Illegal Eviction from and Unlawful Occupation of Land Act, 1998 (Act No. 19 of 1998); Interim Protection of Informal Land Rights Act, 1996 (Act No. 31 of 1996)
Biodiversity Conservation and Sustainable Management of Living Natural Resources	<ul style="list-style-type: none"> NEM: Biodiversity Act, 2004 (Act No. 10 of 2004); NEM: Protected Areas Act, 2003 (Act No. 57 of 2003).
Indigenous Peoples	<ul style="list-style-type: none"> Constitution of the Republic of South Africa, 1996 (Section 31): Cultural, religious and linguistic communities; NEMA, 1998 (Act No. 107 of 1998); National Heritage Resources Act, 1999 (Act No. 25 of 1999); Expropriation Act, 1975 (Act No. 63 of 1975); Restitution of Land Rights Act, 1994 (Act No. 22 of 1994); Land Reform (Labour Tenants) Act, 1996 (Act No. 3 of 1996); Extension of Security of Tenure Act, 1997 (Act No. 62 of 1997); Prevention of Illegal Eviction from and Unlawful Occupation of Land Act, 1998 (Act No. 19 of 1998); Interim Protection of Informal Land Rights Act, 1996 (Act No. 31 of 1996). Broad -Based Black Economic Empowerment Codes of Good Practice
Cultural Heritage	<ul style="list-style-type: none"> Constitution of the Republic of South Africa, 1996 (Section 31): Cultural, religious and linguistic communities; NEMA, 1998 (Act No. 107 of 1998); National Heritage Resources Act, 1999 (Act No. 25 of 1999).

Table 4: South African Environmental and Social Legislation

As part of Eskom's environmental management system, a number of environmental policies, procedures and standards exist to ensure environmental and social duty of care and compliance in the undertaking of its business practices.

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Eskom Environmental and Social Governance Documents:

- Eskom SHEQ Policy (32-727)
- Eskom Climate Change Policy
- Eskom's Climate Change Strategy
- Eskom's Adaptation to Climate Change Strategy
- Eskom's Environmental Management Strategy
- Eskom Corporate Social Investment Strategy
- Eskom Stakeholder Relations Management Policy (240-54652166)
- Eskom Supplier Development and Localisation Plan 2012 to 2016
- Integrated Socio-economic Development Policy for Eskom (240-69723512)
- Water Management Policy (32-1163)
- 32-1110 – Water Accounting Framework
- 240-43921804 Groundwater Governance Guideline
- Atmospheric Emission Management Policy (32-419)
- Eskom Waste Management Standard (32-245)
- Land and Biodiversity Policy (32-736)
- Land Development Procedure (460-2301) – applicable within Eskom's land Development area – Eskom Real Estates, Group capital
- Land and Biodiversity Standard (32-815)
- Environmental Impact Assessment for Distribution Activities (240-72597722)
- Wildlife Interaction and Management Standard (32-829)
- Vegetation Management and Maintenance Within Eskom Land, Servitudes and Rights of Way (EPC 32-247)
- Management of Involuntary Resettlement and Relocation of Legal Occupiers on Affected Eskom Land (36-355)
- Land Acquisition and Disposal Environmental and Social Due Diligence Procedure (464-0603)
- Incident Management for occupational health and Safety (OH&S) Incidents Procedure (32-95)
- Incident Management for Environmental Incidents Procedure (240-133087117)

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3.6 Measures to develop appropriate ESMPs for sub-projects

Mitigation or management measures to be put in place will be specifically targeted actions aimed at effectively minimising an environmental or social risk and impact to an acceptable level below a threshold. Management measures will be measurable and include clear roles and responsibilities, timeframes for implementation and monitoring requirements. The management will aim to be clearly understandable for non-subject matter experts and be practical to implement.

An adaptive approach will be adopted, whereby the efficacy of such measures is monitored. After monitoring, if it is found that the desired mitigation or management objectives are not being achieved via the current management practice, the measures should be amended to achieve greater effectiveness. Changing project conditions may also necessitate the review and amendment of mitigation or management measures.

These will be developed so as to ensure Eskom's corporate environmental and social responsibilities are met as required under section 28 (duty of care) of the National Environmental Management Act. The management plans will be developed either through the legislative basic assessment or EIA undertaken to obtain an environmental authorisation from DEA or in those cases when an environmental authorisation is not required, then as part of the environmental management system within Distribution and in particular Annex C - Environmental Management Plan – of the Eskom procedure: Environmental Impact Assessment for Distribution Activities (ref. 240-72597722). Based on this procedure, the following are the typical controls that will be in place:

- 1) The Eskom project manager or coordinator shall be responsible for ensuring that the land owners have been informed before any work is carried out on site. Contractors shall find out if the landowners have been informed before moving onto site.
- 2) No infrastructure may be placed with 32 meters of any watercourse (rivers, streams, dams). If this cannot be avoided, consultation is needed with Department of Water and Sanitation and an application for a Water Use License (WULA) or General Authorisation.
- 3) No Infrastructure may be placed within 500meters of any wetland (seasonal or permanent). If this cannot be avoided, consultation is needed with Department of Water Affairs and an application for a Water Use License (WULA) or General Authorisation.
- 4) No Infrastructure may be placed within 100meters of the high-water mark of the sea or estuary or any river with a saline component (particularly relevant to coastal towns) without an Environmental Authorisation (on completion of EIA process).
- 5) No tree cutting/ clearance/ pruning may be done without identifying the type of tree, identifying whether it is a protected tree or not and/ or whether it is in a forest/ plantation area. A permit is required if Eskom needs to cut/ disturb any protected tree, champion tree, heritage value tree or any tree in a forest/ plantation area.
- 6) No fences, gates or locks shall be damaged to obtain access onto a site. Arrangements shall be made in advance to obtain permission for access.
- 7) Use of private roads shall be arranged in advance. Any damage to private roads shall be repaired and to the satisfaction of the landowner. This shall be the responsibility of the project manager or coordinator.

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- 8) Permission shall be obtained from landowners before any water is used.
- 9) No fires shall be lit on private property. If fires are lit on Eskom's property or in the construction camp, provision shall be made that no accidental fires are started. No firewood shall be collected in the veld.
- 10) No property may be accessed after normal working hours except with the permission of the landowner. Privacy shall be respected at all times.
- 11) Eskom, Eskom's contractors and their employees shall at all times be courteous towards landowners, tenants and the local community.
- 12) Eskom, Eskom's contractors and their employees shall not cause damage to property, crops or animals. Activities that may cause conflict with landowners, tenants, the local work force or the local community shall be avoided. Should conflict arise it shall be immediately reported to the Eskom project manager or coordinator.
- 13) Vehicles shall be driven at a moderate speed on private roads and stay within the statutory speed limit on public roads.
- 14) All movement of vehicles shall take place on the established Eskom servitude road or on private roads as agreed in advance. Keep to existing tracks. No movement shall take place through the veld.
- 15) Special care shall be taken to prevent excess damage during wet weather.
- 16) If any vehicle should get stuck, the damage shall be repaired immediately so that no deep ruts remain.
- 17) Any damage to private property shall immediately be reported to Eskom and the owner. The damage shall be rectified immediately if possible and/or appropriate compensation shall be paid to the owner at the discretion of the project manager/coordinator in consultation with the property owner. A record of damages and rectifying action shall be kept. The landowner's satisfaction with the outcome of rectifying action shall be obtained in writing.
- 18) A proper system of waste management shall be instituted in the construction camp. This entails that sufficient waste bins are available on site and in the construction camp. The waste shall be dumped at an approved waste disposal site. No containers, scrap metal, conductor etc. shall be left on site. All scrap shall be removed and taken to an appropriate disposal site. No oil, diesel or other chemicals shall be spilled or discarded anywhere. If an accidental spill occurs, it shall be reported immediately and cleaned to the satisfaction of Eskom and the landowner.
- 19) Washing and toilet facilities shall be provided on site and in the construction camp. The facilities shall comply with Eskom standards and shall have the approval of the landowner, where applicable.
- 20) Herbicides shall only be applied with Eskom's permission.
- 21) Camp and office sites shall be dismantled and removed after completion of the construction phase of the project. The site shall be rehabilitated to as close as possible to its original condition to the satisfaction of the landowner, which shall be in writing.
- 22) All excavations shall be enclosed to prevent animals or people from accidentally falling into excavations.

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- 23) No trees shall be cut or removed without prior permission from the landowner. Permits shall be obtained for the cutting and removal protected trees (protected trees shall be dealt with in 2, Special conditions)
- 24) Should any natural heritage object be found, or exposed during excavations, all work shall be terminated immediately and the finding reported to the Project Manager who shall inform the Eskom Environmental Practitioner and the SAHRA.

Based on Annex C - Environmental Management Plan - of the Environmental Impact Assessment for Distribution Activities Procedure: 240-72597722, Table 5 sets out the generally anticipated impacts and mitigation measures.

ENVIRONMENTAL CONCERNS	MITIGATION MEASURES
AGRICULTURE	
Loss of standing crop due to access road to site.	<ul style="list-style-type: none"> - Limit width of access road to site. - Avoidance of crop areas. - Monetary compensation for crop loss. - Time construction to avoid growing season.
Soil Compaction	<ul style="list-style-type: none"> - Scheduling activities to times of the year when soils are least susceptible to compaction. - Stop activities when ground conditions are poor. - Use of equipment with low bearing capacity. - Chisel ploughing.
Construction of new access roads	<ul style="list-style-type: none"> - Locate access roads along existing traffic routes.
Topsoil – subsoil mixing/soil rutting	<ul style="list-style-type: none"> - Scheduling activities. - Stop activity when ground conditions are poor. - Use of equipment with low bearing capacity. - Use of gravel roads. - Removal of spoil and/or bentonite from foundation operations. - Segregation of topsoil and subsoil.
Disturbance to farm operations	<ul style="list-style-type: none"> - Maintain contact with landowner/tenant regarding preferences.
SOCIAL IMPACTS	
Mud and Dust	<ul style="list-style-type: none"> - Wetting down dry soils. - Cleaning roads to remove mud. - Temporary planting of grasses.
Aesthetics	<ul style="list-style-type: none"> - Screen with natural or planted vegetation restoration. - Landscaping.
Heritage resources	<ul style="list-style-type: none"> - Avoidance/isolation. - Screening. - Protection by use of enclosures, barrier fencing, covering. - Salvage in conjunction with SAHRA. - Relocation in conjunction with SAHRA.
Tourism and recreation resources	<ul style="list-style-type: none"> - Design measures to make facility less obtrusive of disruptive. - Screening and restoration.

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	<ul style="list-style-type: none"> - Minimise noise and dust. - Safety precautions to protect the public. - Scheduling to avoid peak use periods.
WATER QUALITY	
Sedimentation of streams due to erosion from the site	<ul style="list-style-type: none"> - Minimise use of slopes adjacent to streams during soils testing, construction and maintenance. - Maintain a cover crop. - Retain buffers.
Contamination of surface or ground waters through spills or leaks of toxic substances.	<ul style="list-style-type: none"> - Spill control material and procedures readily available. - Spill containment: drip trays, bunded areas.
Contamination by petrochemicals.	<ul style="list-style-type: none"> - Spill control material and procedures made readily available. - Restoration methods investigated.
FAUNA & FLORA	
Loss of habitat, breeding and/or food source for terrestrial wildlife.	<ul style="list-style-type: none"> - Environmental mapping to identify sensitive areas. - Avoidance of areas containing rare/endangered species. - Construction and maintenance activities to be timed where possible to avoid peak breeding periods. - Use design with low risk to wildlife electrocution or collision - Fit bird flight diverters to power lines in bird migration areas.

Table 5: Generally Anticipated Impacts and Mitigation

3.7 Arrangements for monitoring and sub-project supervision

Monitoring and evaluation is a key component of the ESMF during the implementation of the battery storage project. Periodic monitoring by Eskom will ensure that management measures are being implemented to mitigate environmental and social impacts. Monitoring activities will allow Eskom to: (i) improve environmental and social management operations, practices and plans; (ii) check the efficiency and quality of the environmental and social management plan (ESMP); (iii) establish the scientific reliability and credibility of the applicable environmental and social assessment tools that were utilised for the battery storage project; and (iv) provide the opportunity to report the results on safeguards and impacts and proposed mitigation measures implementation. Eskom will conduct monitoring activities during the project execution, aiming to appreciate the extent to which mitigation measures are successfully implemented. Monitoring will focus on following two key areas:

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- **Compliance monitoring** - will verify that the required mitigation measures are considered and implemented. During the project preparation phase, compliance monitoring activities will focus on ensuring effective ESMF implementation. The environmental staff of Eskom will ensure that ESIA process is properly and timely conducted in compliance with the South Africa legislative requirements as may be applicable. During the implementation phase, compliance monitoring would include inspections during construction of the project's components to verify the extent to which environmental authorisation conditions and the EMP are being adhered to. The monitoring of environmental and social performance during project construction, operation and decommissioning will be the full responsibility of the respective Eskom Distribution Operating Units. In addition, those sub-projects that require an environmental authorisation by DEA will be subjected to any required compliance monitoring by the Department's Environmental Management Inspectorate; and
- **Impact monitoring** – will be the ultimate responsibility of Eskom, through the respective Distribution Operating Units in which the sub-projects take place who may in addition have conditions of environmental authorisation need to report to the DEA directly or through appointed Environmental Control Officers (ECO). The ESIA, ESMP, conditions of Environmental Authorisations, Distribution Environmental Screening Reports and other environmental and social safeguards documents will form the basis for contractor activities at the project site to ensure that works proceed in accordance with established mitigation and management measures.

In summary, the environmental and social monitoring against the relevant conditions of the environmental authorisation and the environmental and social management plan will be undertaken by the appointed environmental officer for each project site. This will be overseen by the Operation Unit's Environmental Manager in which the projects take place. In addition, for those site in which an environmental authorisation is obtained by the DEA, there may be an additional requirements for the appointment of an environmental control office (ECO) to monitor compliance.

3.8 Arrangements for reporting

Monthly project environmental and social progress reports will be compiled as part of the project performance reporting. These would be produced by the appointed environmental officer and reviewed by the respective Operation Unit's Environmental Manager. Such environmental and social reporting would be integrated with overall project status and performance reporting.

3.9 Outline of proposed mitigation and enhancement measures

These will be set out in the EMP/ESMPs for each project. In the event of any environmental incident, these will be report and investigated following Eskom's environmental incident procedure to determine root cause so as to implement corrective and preventative measures.

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3.10 Requirements for training and capacity building to enable ESMF implementation

Eskom has a well-established and mature environmental management function within Eskom. Through a centre-led corporate function Eskom's environmental policies, strategies, procedures and key performance indicators are set. The centre-led function is made up of 28 environmental professionals set up in centres of excellence in terms of air quality, biodiversity, systems, EIAs, waste and water. This function provides an environmental assurance role to Eskom's executive management and Board by the undertaking of review and audits, monitoring and reporting of performance and compliance.

Within the operating Divisions of Eskom, such as the Distribution Division in which this battery storage projects will be developed, executed and operated, each of its Operating Units (Western Cape, Eastern cape, Northern cape and KwaZulu Natal) have environmental professional for both the project development phase and for operations. Eskom's operational Divisions are all performing their processes and activities based on a certified environmental Management system (ISO 14001).

Eskom therefore has the skills and resources for the enabling of the ESMF and this has been demonstrated through the various projects (e.g. Medupi power station) partly funded by the African Development Bank and World Bank.

3.11 Conclusion

This project will be executed through Eskom's environmental control procedures and requirements (Environmental Impact Assessment for Distribution Activities Procedure: 240-72597722). This will ensure environmental duty of care and therefore the expected environmental and social impacts and mitigation measures will ensure that the Battery Storage Project will meet South African legislation and thereby the African Development Bank's safeguards requirements.

4. Acceptance

This document has been seen and accepted by:

Name	Designation
Andrea Van Gensen	Environmental Manager: Eskom Distribution Northern Cape Operating Unit
Angelina Shalang	Environmental Manager: Eskom Distribution Eastern Cape Operating Unit
Justine Wyngaardt	Environmental Manager: Eskom Distribution Western Cape Operating Unit
Namhla Dondi	Senior Environmental Advisor: Eskom Distribution Western Cape Operating Unit

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5. Revisions

Date	Rev.	Compiler	Remarks
October 2018	1	DD Lucas	Set the environmental and social management framework for the Distributed battery storage and PV project.

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