

# PROPOSED BATTERY ENERGY STORAGE SYSTEM FOR THE GOLOMOTI SOLAR PV PLANT

**ESIA Addendum Ref: EAD 99/07/05**

Prepared for: Golomoti JCM Solar Corporation  
Limited

SLR Consulting (Africa)(Pty)Ltd



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## ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
AC	Alternating Current
BESS	Battery Energy Storage System
EAD	Malawi Environmental Affairs Department
EIA	Environmental Impact Assessment
EMA	Malawi Environmental Management Act 1996, (EMA), as amended by EMA 2017
ESCOM	Electricity Supply Corporation of Malawi Limited
ESIA	Environmental and Social Impact Assessment
FSS	Fire Suppression System
HVAC	Heating & Ventilation and Air Conditioning
I&APs	Interested and Affected Parties
IPP	Independent Power Producer
JCM	Golomoti JCM Solar Corporation Limited
LFP	Lithium Iron Phosphate
MoL	Ministry of Lands
MW	Mega Watt
NMC	Lithium Nickel Manganese Cobalt oxide
PV	Photovoltaic
SOC	State of Charge
SLR	SLR Consulting (Africa) (Pty) Ltd
TA	Traditional Authority
WWEC	Water Waste and Environment Consultants (Pty) Ltd

## 1. INTRODUCTION

In February 2020, Golomoti JCM Solar Corporation Limited (JCM) submitted an Environmental and Social Impact Assessment (ESIA) in support of an application for an environmental certificate for the construction and operation of a 20Megawatt (MW) alternating current (AC) solar photovoltaic (PV) power plant in the Golomoti (Dedza) District in Malawi. As stated in the letter received from the Malawi Environmental Affairs Department, (EAD), on 14 December 2020, (Ref: EAD 99/07/05), the ESIA for the project was approved in February 2020 and is awaiting the environmental certificate. The Solar PV Plant includes the construction of a transmission line (approximately 0.5 km) to connect the power plant to the existing Golomoti Substation, as well as a short (80 m) access road extending from the M5 highway to the northeast, refer to Figure 5-4. The Golomoti Substation is operated by the Electricity Supply Corporation of Malawi Limited, (ESCOM). The electricity generated by the Solar PV Plant will be sold to ESCOM and will be transferred to the national grid via the Golomoti Substation.

JCM have an existing agreement with ESCOM to provide 20MWac of power to the national grid. In order to provide a continuous and stable supply of power to the grid, JCM now propose the installation of a Battery Energy Storage System (BESS) within the footprint of the Solar PV Plant on-site substation.

### 1.1 ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

SLR Consulting (Africa) (Pty) Ltd (SLR) was appointed by JCM to undertake the addendum to the ESIA for the proposed BESS. SLR is a global environmental and advisory consultancy with experience in the Power Sector and a proven track record in the delivery of project authorisations and technical reports compliant with African regulations, current best practice, and appropriate rehabilitation, closure and environmental management plans (<https://www.slrconsulting.com/>). SLR has appointed Water, Waste and Environment Consultants (Pty) Ltd, (WWEC), as the local representative to facilitate engagements with the Malawi Environmental Affairs Department (EAD) and relevant local authorities as well as provide guidance on the Malawi ESIA processes. Refer to Annexure A for Curricula Vitae of the project team.

**Table 1-1 Details of Environmental Assessment Team**

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Amishka Mothilal	Management of the ESIA Addendum process, including process review and report compilation	
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## 1.2 PROJECT PROPONENT

JCM is an independent power producer (IPP), dedicated to accelerating social, economic, and environmental sustainability in growth markets through the development, construction, and operation of renewable energy facilities and high voltage direct current transmission lines. JCM has also been developing a 60 MWac solar PV plant in the Salima District of the Republic of Malawi since mid-2013. The Salima Project comprises of a 60 MWac solar PV plant on a 168ha green field site in Kalonga Traditional Authority (TA), Salima District. It is adjacent to the villages of Kanzimbe and Mayambo, under Kanzimbe Group Village (KGV), 20 km from the town of Salima and 88 km from Lilongwe (along on the M5 and M14 roads). The solar plant will connect to a 4 km 132 kV transmission line that runs alongside an existing ESCOM 132 kV transmission line to the Nanjoka substation. Electricity generated will be sold to ESCOM and will be transferred to the national grid via the existing ESCOM Nanjoka substation.

The contact details of the Project Proponent/Applicant are listed below.

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## 2. LEGISLATIVE CONTEXTUALISATION

### 2.1 ENVIRONMENT MANAGEMENT ACT 1996, AS AMENDED BY ENVIRONMENT MANAGEMENT ACT 2017

The Malawi Environmental Management Act (EMA) was initially promulgated in 1996 to provide the legal framework to address key environmental issues impacting Malawi. The EMA was thereafter amended in 2017 to provide updated regulations and guidance in respect of EIA, auditing and assessment processes. Section 25 of the EMA provides an overview of the ESIA requirements.

Correspondence received from the EAD on 14 December 2020 indicated that as the BESS will be installed within the Solar PV Plant Footprint, no further assessment is required. An ESIA Addendum report is required to be submitted to the EAD. The correspondence from the EAD is attached as Annexure B.

### 2.2 GUIDELINES FOR ENVIRONMENTAL IMPACT ASSESSMENT (1997)

The EAD issued Guidelines for Environmental Impact Assessment, (EIA) shortly after passage of the EMA, in 1997. These guidelines were subsequently amended in 2017. The guidelines address prerequisites and outline requirements for EIA processes. Appendix C of the guidelines for EIA's (1997), as amended, was used as a guidance document for compilation of the ESIA Addendum report. The project brief was compiled in accordance with Appendix C and D of the Guidelines for EIA, 1997, as amended. Project Brief and ESIA Addendum Requirements.

### 3. PROJECT BRIEF

A Project Brief was prepared in accordance with Section 24 of the EMA 1996, as amended by EMA 2017. The EMA, 2017, outlines the requirement of a Project Brief to be compiled and submitted to the competent authority, the EAD, in accordance with Appendix C and D of the Guidelines for EIA, 1997, as amended by Guidelines for EIA, 2017. The Project Brief was submitted to the EAD for review and a meeting was held with JCM, WWEC and the EAD to discuss the Project Brief on 10 December 2020. Correspondence received from the EAD on 14 December 2020 (Ref: EAD 99/07/05), indicated that an ESIA Addendum report must be submitted to the EAD for consideration of the proposed BESS. The correspondence from the EAD and minutes of the meeting with the EAD are attached as Annexure B.

#### 3.1 ESIA ADDENDUM REQUIREMENTS FROM THE EAD

As per correspondence received from the EAD (Ref: EAD 99/07/05), on 14 December 2020 (refer to Annexure B), the JCM Golomoti BESS ESIA Addendum does not require further assessment, however it must contain information on the following:

1. Safety and stability;
2. Transportation;
3. Maintenance; and
4. Battery disposal after shelf life.

The Project alternatives (technology, location and no-go), potential positive and negative impacts and associated mitigation measures were discussed in the project brief document (refer to Annexure A).

### 4. NEED AND DESIRABILITY

There is currently a global drive towards the generation and implementation of affordable clean energy, in line with the UN Sustainable Development Goals for "Affordable Clean Energy." This goal recognises that the global economy is currently over reliant on finite fuel resources such as fossil fuels that increase greenhouse gas emissions.

Malawi's energy sector has gone through important sector reform efforts recently, including the partial unbundling of the national utility ESCOM. The restructuring of Malawi's power market is underway, with strong investor interest and political will for IPPs to enter the market (USAID, 2020).

The Golomoti Solar PV Plant Project (the 'Project') is an investment in renewable energy that aims to help diversify the energy sector in Malawi and increase the capacity of its national grid. Malawi has an installed generation capacity of approximately 439 MW, with approximately 384 MW of the electricity being hydroelectric power and approximately 55MW generated from solar energy (USAID, 2020). Over 85% of Malawi's electricity is generated from hydropower, with the Shire River as the main source. Malawi's heavy reliance on large hydroelectric power is often constrained by drought and low water levels (USAID, 2020)

The Project is part of the government IPP process and is part of sector reform development and aligns with global initiatives to develop renewable energy resources in developing countries. Expanding infrastructure and upgrading technology to provide clean energy in all developing countries is a crucial goal that can both encourage growth and help the environment.

The installation of the BESS will allow for the ability to store up to 8MW/12MWh in capacity which will allow for stable and consistent supply of power, as well as enabling the power to be supplied into the energy grid during power outages. This will enable the Project to adequately meet the existing agreement between JCM and ESCOM whilst provisioning for potential outages.



## 5. PROJECT DESCRIPTION

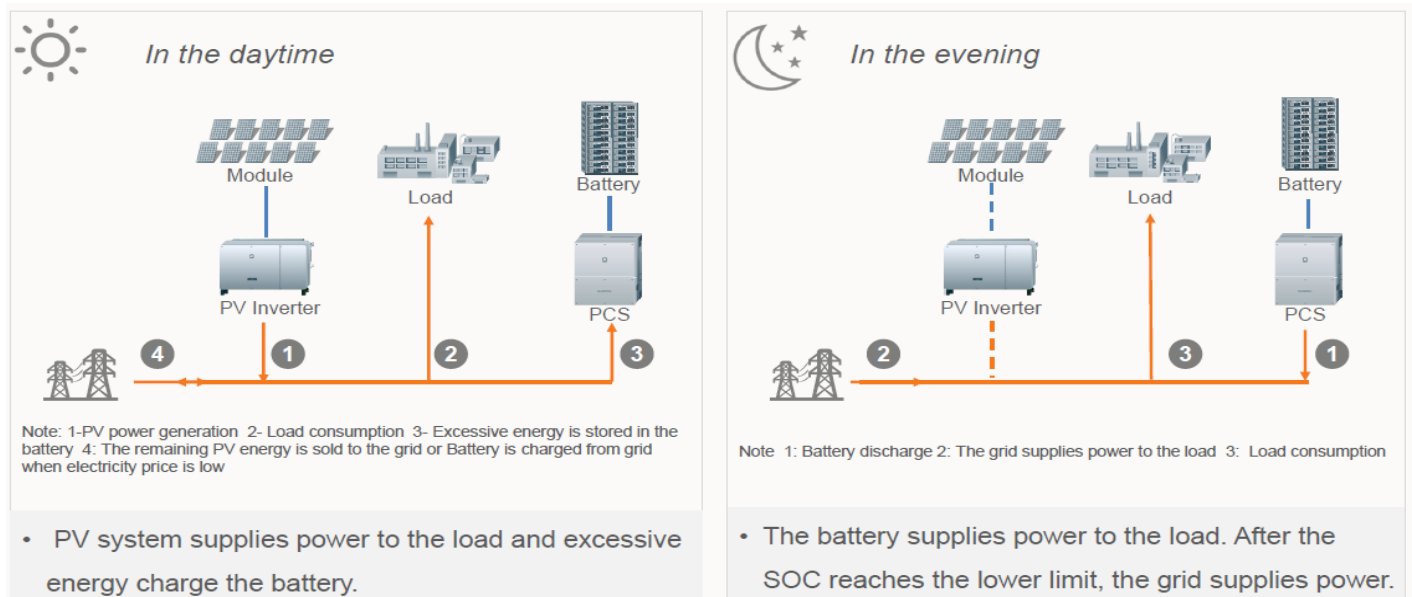
### 5.1 PROJECT LOCALITY

Figure 5-4, depicts the project locality and environmental sensitivities in proximity of the Project Site. The BESS will be constructed within the substation area located within the Solar PV Plant site. The Project Site is located approximately 0.5 km from the Golomoti Substation and less than 1 km from Golomoti Trading Centre in Dedza District. This proposed BESS will be located in the northwest area of the site to allow for easy connection to the Golomoti substation. It is located within the Kachindamoto Traditional Authority. The Project Site is characterised by flat land with subsistence agriculture as the predominant land-use. Trees on the Project Site include natural and planted trees, including mango, acacia, and baobab trees. The site area does not transect any sensitive areas such as watercourses or the forest reserves.

### 5.2 PROPOSED ACTIVITIES TO BE UNDERTAKEN

The proposed BESS for the Project involves the installation of up to 6 lithium-ion batteries within the substation site located within the existing Solar PV Plant footprint, refer to Figure 5-4 for site locality map, Figure 5-5 for the proposed Solar PV Plant site layout plan and Figure 5-6 for the proposed Solar PV Plant site substation layout plan.

The BESS will be sourced from an international battery manufacturer and transported to Malawi for installation. The proposed BESS will possess the ability to store up to 8MW/12MWh in capacity which will allow for stable and consistent supply of power, as well as enabling the power to be supplied into the energy grid during power outages. Figure 5-1 below, depicts a generic Solar PV Plant with a BESS. During the day, excessive power is stored in the BESS to allow for supply of power during periods of low state of charge (SOC), e.g. at night or periods of cloud cover.



Source: Sungrow, 2020

Figure 5-1 Solar PV Plant with BESS

Figure 5-2 and Figure 5-3 depict the external view of a BESS Project in XiZang, Tibet, China. The proposed BESS is anticipated to be installed in a similar manner with up to 6 x 40ft shipping containers, or equivalent in smaller modules and will be located within the footprint of the solar PV substation. The BESS will be located in the north-

west area of the site in proximity to the on-site substation. Refer to Figure 5-5 for the proposed Solar PV Plant site layout plan and Figure 5-6 for the proposed Solar PV Plant site substation layout plan.



Source: Sungrow, 2020

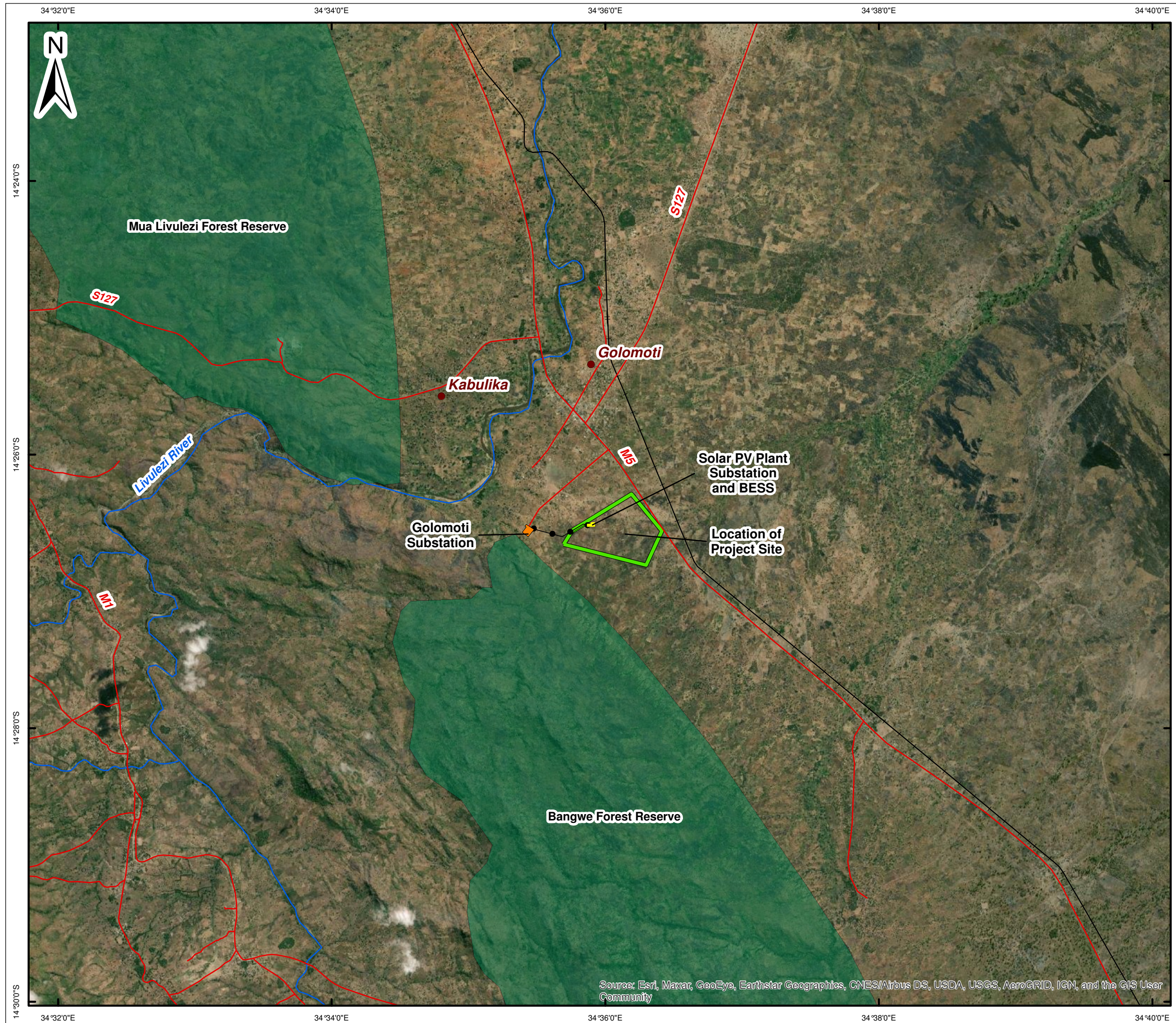
**Figure 5-2 External view of a BESS Project in XiZang, Tibet, China**



Source: Sungrow, 2020

**Figure 5-3 External view of a BESS Project in XiZang, Tibet, China**

## Figure 5-4 Project Locality Map



- Legend**
- Villages
  - Roads
  - +— Railways
  - Rivers
  - Forest Reserves
  - Golomoti Substation
  - HV Transmission 132kV
  - ▭ Proposed Project Area
  - ▭ Solar PV Plant Substation and BESS

0 500 1 000 Meters  
 Scale: 1:50 000 @ A3  
 Datum: WGS 1984

**Golomoti PV Plant Project**

**Sensitivity Map**



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2020/01/22

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

## Figure 5-5 Proposed Site Layout Plan



## Figure 5-6 Proposed Solar PV Plant Site Substation Layout Plan





### 5.3 PROJECT FOOTPRINT AND BESS COMPONENTS

All components will be located within the existing solar PV plant on-site substation footprint which, including the BESS, will be up to 3,500m<sup>2</sup>. The total footprint of the Solar PV Plant as described in the ESIA will not need to be increased to accommodate the BESS. The proposed updated Solar PV Plant layout plan and the Solar PV Plant site substation layout plan including the BESS are included as Figure 5-5 and Figure 5-6 respectively. The proposed project will comprise of the following:

- 4 x 40ft pre-assembled containers, or equivalent in smaller units;
- 1 x 40 ft container for the Power Conversion System.

### 5.4 BESS BATTERY TECHNOLOGY

The proposed project involves the installation of a BESS with the ability to store up to 8MW/12MWh in capacity. The proposed lithium-ion battery types are lithium iron phosphate (LFP) or lithium nickel manganese cobalt oxide (NMC). LFP and NMC BESS technologies are considered the most suitable for the proposed project as they are stable, safe and widely used in the energy industry. The battery type will be selected prior to installation based upon commercial readiness, cost and suitability for the application / size. LFP and NMC batteries have an estimated life-cycle of approximately 10-15 years (Soltaro, 2020).

### 5.5 LAND OWNERSHIP

The predominant land ownership in the Project Site is customary. The Customary Land Act, 2016, indicates that Customary land falls within the jurisdiction of a Traditional Authority (TA), which has been granted to a person or group and used under customary law. This land is held in trust and administered by traditional leaders (chiefs) on behalf of people in a community. The TA is mandated by the government to distribute land to individuals as well as address land disputes and report to the government through the office of the District Commissioner. All consultations in respect of land acquisition were held during the Project ESIA. JCM have completed the land and asset compensation process and received a land lease agreement certificate from the Ministry of Lands (MoL) on 04 November 2020, Deed Registry no: 93406, reference file no. CR/DZ/2020/01, refer to Appendix C of Annexure A, Project Brief. The lease agreement certificate is in respect of a 50-year term, commencing on 01 March 2020.

### 5.6 STAKEHOLDER ENGAGEMENT

During Project Brief discussions with the EAD on 10 December 2020, it was agreed upon that no public participation tasks are required for the proposed BESS installation. JCM have an existing community liaison team that conduct regular engagement with stakeholders. The community liaison team maintain a list of potential interested and affected parties (I&APs). The I&APs will receive updates on the project through the JCM community liaison process and this will include an update on the BESS project.

## 6. SAFETY AND STABILITY

### 6.1 SAFETY

The Malawi Occupational Safety, Health and Welfare Act, (1997), regulates conditions of employment in workplaces with regard to safety and the health and welfare of employees. The act outlines the roles and responsibilities of employers, the self-employed, and other persons in control of premises, manufacturers, and suppliers.

Health and safety risks were addressed in-depth in the Solar PV Plant ESIA. The proposed BESS involves no alteration to the existing project footprint and constitutes on-site assembly with no construction activities. The proposed BESS

installation will comply with the Occupational Safety, Health and Welfare Act as well as all conditions stipulated in the Solar PV Plant ESIA.

### 6.1.1 Safety Risks

The potential safety risks associated with the proposed BESS include the following:

#### Thermal Runaway

Thermal runaway is the key unplanned safety risk associated with a BESS. Thermal runaway is a situation where the current flowing through the cell or battery on charge or overcharge causes the cell temperature to rise, which increases the current with a further rise in temperature (Encyclopaedia of Electrochemical Power Sources, 2009). The BESS generates heat which can potentially propagate a thermal runaway event to neighbouring batteries. Thermal runaway can occur at any point on route to the facility, during construction or operation / maintenance at the facility or during decommissioning and safe-making for disposal. Thermal runaway is highly unlikely as the probability of occurrence is low.

#### Generation of Flammable Gases

Flammable gases generated may ignite, leading to a fire which can accelerate the runaway process and spread to other parts of the installation. The accumulation of flammable gasses within the container system can potentially ignite with explosive force. Due to the containerised approach, as well as the separation between containers, the proposed impacts may be restricted to one container at a time.

#### Significant Impact Zones Associated with Safety Risks

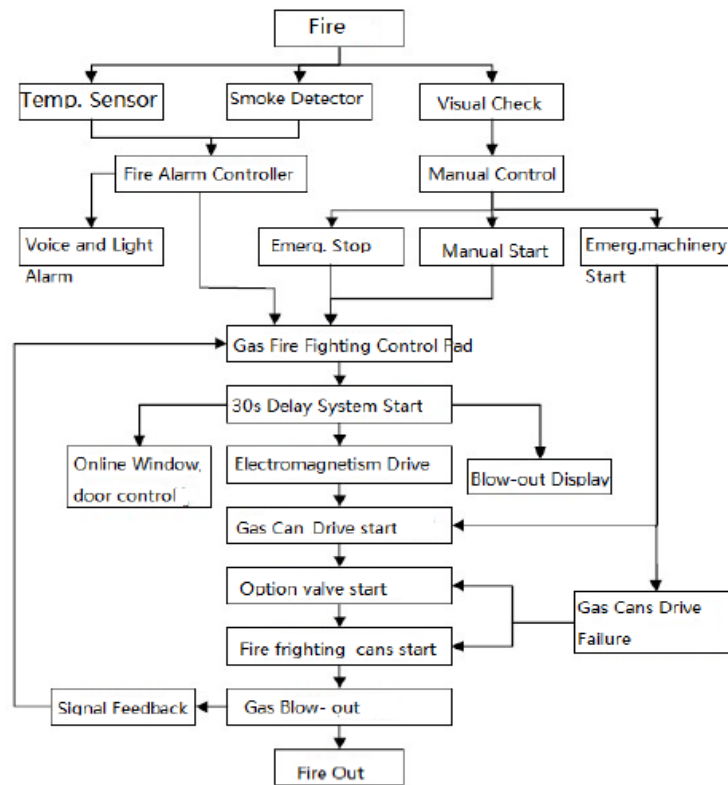
The significant impact zone refers to the potential area affected during an unplanned event. The significant impact zones in event of the worse conceivable cases are listed below.

- **Container fires:** the significant impact zone would be limited to within 10m of the container with mild impacts limited to 20m of the container.
- **Explosion:** the significant impact zone should be limited to with 10m of the container and minor impacts such as debris within 50m; and
- **Toxic smoke:** the significant impact zone would be limited to one container at any one time, provided that the units are placed suitably far apart to prevent propagation from one unit to another and to prevent large external fires. In this case, beyond the immediate vicinity of the fire, the concentrations of harmful gases within the smoke should be low.

### 6.1.2 Safety Measures to be Implemented

- All BESS components will be in line with the best available technology and international battery standards.
- A containerised approach as well as the separation between containers will be implemented to ensure that in the event of a fire, this will be restricted to one container at a time.
- JCM have developed an appropriately defined emergency response plan which includes the training of local emergency response personnel on BESS emergency response requirements. Implementation of the emergency response plan will ensure that the risks associated with unplanned events will remain low. The emergency response plan was submitted to the EAD with the Project Brief that was submitted to the EAD on 10 December 2020. The emergency response plan has been included as Appendix A of Annexure A.

- The proposed BESS system will include a multi-level management system in order to prevent situations like overcharge, over-discharge, over-current, over-voltage and under-voltage.
- The BESS will be equipped with intelligent heating, ventilation and air conditioning (HVAC) and an automatic fire suppression system (FSS, along with the high-efficiency heat dissipation and thermal insulation design of the battery. The FSS includes a smoke detector, control panel, alarm device, exhaust pipe and bump head. Before a gas blow-out can occur, the system controller will send a signal to HVAC main power switch to stop working as well as the fan thus achieving fire suppression. Figure 6-1 illustrates the fire suppression work-flow. Each container of the BESS will be equipped with an automatic Fire Suppression System (FSS). This will also ensure that potential fire risks can be localised and responded to effectively.



Source: Sungrow, 2020

Figure 6-1 Fire Suppression Work-Flow

## 6.2 STABILITY

The BESS allows for excess electricity to be “stored” and released during periods of high electricity demand, ensuring a steady and safe electricity supply. The proposed BESS will possess the ability to store up to 8MW/12MWh in capacity which will allow for stable and consistent supply of power, as well as enabling the power to be supplied into the energy grid during power outages. The Solar PV Plant will generate approximately 20 MW of power, which will be transmitted to the national grid for distribution in the Central Region of Malawi.

Stored energy is used to meet generation requirements during peak electricity consumption hours, allowing grid operators and utilities to meet demand while incrementally deferring or reducing the need for new generation

capacity. The BESS will allow for the storage of additional power reserves during the day so that peak demand can be managed more efficiently in the evening.

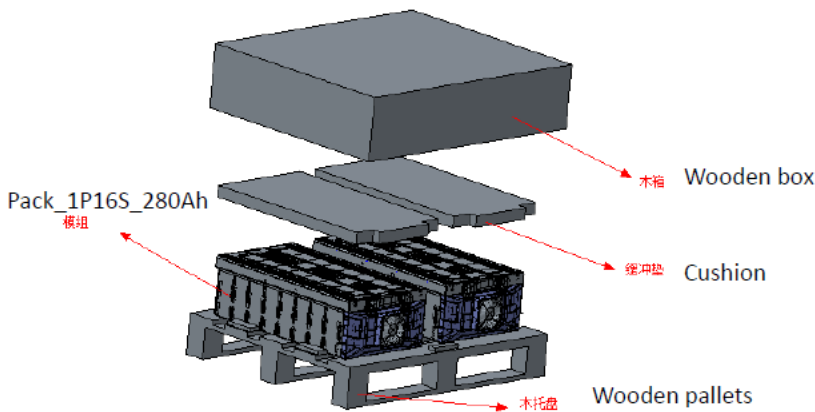
The BESS will allow the Solar PV plant to be more reliable and efficient, thereby increasing the stability of the electricity supply to ESCOM. Should a BESS not be installed at the site, no power can be stored. This could result in erratic power supply due to factors such as poor weather conditions.

## 7. TRANSPORTATION OF THE BESS

### 7.1 CONSTRUCTION PHASE

The BESS will be transported via sea to Beira, Mozambique. It will thereafter be loaded onto trucks and transported approximately 920km via road from Beira, Mozambique to Golomoti, Malawi, for assembly at the Project Site. Figure 7-2 and Figure 7-3 depict examples of the loading and transportation of a BESS to site via road. The components to be transported are as follows:

- Up to 4 x 40ft pre-assembled containers, or equivalent in smaller units;
- Up to 2 x 40 ft container with BESS modules stacked in pallets for on-site assembly (refer to Figure 7-1); and
- 1 x 40 ft container for the Power Conversion System.



Source: Sungrow, 2020

Figure 7-1 Stacking of BESS Modules for Shipment



Source: Business Wire, 2021

Figure 7-2 Example of Loading the BESS onto a Truck for Road Transportation



Source: Greentech Media, 2021

Figure 7-3 Example of Road Transportation of a BESS

## 7.2 DECOMMISSIONING PHASE

The BESS modules will be deemed to reach the end of lifecycle when it no longer achieves the performance requirements or where repairs are no longer possible or viable. Such a BESS system should be decommissioned, disassembled, removed from the site, transported and disposed of according to the feasible disposal method.

Before the transportation of the components, the BESS system and its components will be de-energised and appropriately packaged for safe transportation.

## 8. BESS MAINTENANCE

The proposed BESS requires very low maintenance which included electrical checks and replacement of small parts and consumables (fans, switches, fuses, relays, meters etc) as and when required. Suitably qualified site personnel will conduct regular checks to ensure that the BESS is maintained in accordance with the manufacturer specifications. The BESS technology types are space efficient ensuring that maintenance and management of the batteries can be undertaken at ease. All parts removed for replacement, will be disposed of at a licensed disposal facility, in line with the recommended appropriate disposal methods in Section 9, below.

## 9. WASTE MANAGEMENT - BATTERY DISPOSAL

The proposed BESS will not result in additional waste generation and therefore will not require any waste management approvals. The estimated lifespan of the lithium-ion batteries are approximately 10-15 years. When the BESS reaches the end of lifecycle, it should be decommissioned, disassembled and removed from the site. JCM will provide financial provisions for the preferred BESS disposal option, refer to Appendix B of Annexure A, Project Brief for the financial provision document. The proposed BESS disposal methods are as follows:

- Return to original equipment manufacturer; and
- Disposal of the BESS at a dedicated lithium recycling facility.

## 10. CONCLUSION

The Solar PV Plant underwent an ESIA process that concluded with the final ESIA report being submitted to the EAD in February 2020. As per the letter received from the EAD on 14 December 2020 (Ref: EAD/99/07/05), the ESIA for the Solar PV Plant was approved in February 2020 and is awaiting issue of the Environmental Clearance Certificate. The installation of the proposed BESS constitutes a minor amendment to the existing environmental certificate as the BESS will be located within the existing footprint of the substation that is located within the overall Solar PV Plant site i.e. no additional footprint will be required. The proposed BESS will not result in additional waste generation and therefore will not require any waste management approvals. The BESS installation will not result in further environmental degradation or loss of habitat as described in the Project Brief (Annexure A).

Extensive stakeholder engagement meetings and community engagement were conducted during the Solar PV Plant ESIA process. The existing interested and affected parties will receive regular updates on the Project through the JCM community liaison process and this will include an update on the proposed BESS. SLR is therefore of the opinion that the construction and operation of the proposed BESS will not result in any significant environmental or social impacts and recommend that the ESIA Addendum be approved.



Amishka Mothilal  
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Stuart Heather-Clark  
(Reviewer)

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## ANNEXURE A: PROJECT BRIEF



# PROPOSED BATTERY ENERGY STORAGE SYSTEM FOR THE GOLOMOTI SOLAR PV PLANT

## PROJECT BRIEF

Prepared for: Golomoti JCM Solar Corporation  
Limited

SLR Consulting (Africa)(Pty)Ltd



SLR Project No.: 710.07078.00001  
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Report No.	1

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A	December 2020	First draft issued for client comment	AM

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## ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
AC	Alternating Current
BESS	Battery Energy Storage System
EAD	Malawi Environmental Affairs Department
EIA	Environmental Impact Assessment
EMA	Malawi Environmental Management Act 1996, (EMA), as amended by EMA 2017
ESCOM	Electricity Supply Corporation of Malawi Limited
ESIA	Environmental and Social Impact Assessment
FSS	Fire Suppression System
HVAC	Heating & Ventilation and Air Conditioning
I&APs	Interested and Affected Parties
IPP	Independent Power Producer
JCM	Golomoti JCM Solar Corporation Limited
LFP	Lithium Iron Phosphate
MoL	Ministry of Lands
MW	Mega Watt
NMC	Lithium Nickel Manganese Cobalt oxide
PV	Photovoltaic
SOC	State of Charge
SLR	SLR Consulting (Africa) (Pty) Ltd
TA	Traditional Authority
WWEC	Water Waste and Environment Consultants (Pty) Ltd

## 1. INTRODUCTION

In February 2020, Golomoti JCM Solar Corporation Limited (JCM) submitted an environmental and social impact assessment (ESIA) in support of an application for an environmental certificate for the construction and operation of a 20Megawatt (MW) alternating current (AC) solar photovoltaic (PV) power plant in the Golomoti (Dedza) District in Malawi. The project has received provisional approval but is awaiting issue of the environmental certificate. The Solar PV Plant includes the construction of a transmission line (approximately 0.5 km) to connect the power plant to the existing Golomoti Substation, as well as a short (80 m) access road extending from the M5 highway to the northeast, refer to Figure 4-2. The Golomoti Substation is operated by the Electricity Supply Corporation of Malawi Limited, (ESCOM). The electricity generated by the Solar PV Plant will be sold to ESCOM and will be transferred to the national grid via the Golomoti Substation.

JCM have an existing agreement with ESCOM to provide 20MWac of power to the national grid. In order to provide a continuous and stable supply of power to the grid, JCM now propose the installation of a Battery Energy Storage System (BESS) within the site of the substation located within the Solar PV Plant site. Preliminary discussions with the Malawi Environmental Affairs Department (EAD) and JCM have indicated that an Environmental Project Brief must be submitted in order to agree on the process to be undertaken for the construction and operation of the proposed BESS.

This report presents the Project Brief, in accordance with Section 24 of the Malawi Environmental Management Act 1996, (EMA), as amended by EMA 2017. The EMA, 2017, outlines the requirement of a Project Brief to be compiled and submitted to the competent authority, the EAD, in accordance with Appendix C and D of the Guidelines for Environmental Impact Assessment, (EIA), 1997, as amended by Guidelines for EIA, 2017.

### 1.1 ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

SLR Consulting (Africa) (Pty) Ltd (SLR) was appointed by JCM to compile the project brief for the proposed BESS. SLR is a global environmental and advisory consultancy with experience in the Power Sector and a proven track record in the delivery of project authorisations and technical reports compliant with African regulations, current best practice, and appropriate rehabilitation, closure and environmental management plans (<https://www.slrconsulting.com/>). SLR has appointed Water, Waste and Environment Consultants (Pty) Ltd, (WWEC), as the local representative to facilitate engagements with the EAD and relevant local authorities as well as provide guidance on the Malawi ESIA processes.

**Table 1-1 Details of Environmental Assessment Team**

Organisation	SLR Consulting (Africa) (Pty) Ltd
Postal address	5th Floor, Letterstedt House, Newlands on Main Cnr Main and Campground Roads Newlands Cape Town 7700
Tel No.	+27 21 461 1118
Fax No.	+27 11 467 0978
Organisation	Water Waste and Environment Consultants (Pty) Ltd
Postal address	P.O Box 31271 Lilongwe 3 Malawi 31271
Tel No.	(+265) 999831595
Fax No.	-

Name	Tasks and roles	Email
Stuart Heather-Clark	Inputs into reporting, review and approvals	<a href="mailto:amothilal@slrconsulting.com">amothilal@slrconsulting.com</a>
Amishka Mothilal	Management of the ESIA process, including process review and report compilation	
Kent Kafatia	Inputs into reporting, in-country subcontractor, Environmental Affairs Departmental Liaison	<a href="mailto:kentkafatia@yahoo.com">kentkafatia@yahoo.com</a> / <a href="mailto:kentkafatia@gmail.com">kentkafatia@gmail.com</a>

## 1.2 PROJECT PROPONENT

JCM is an independent power producer (IPP), dedicated to accelerating social, economic, and environmental sustainability in growth markets through the development, construction, and operation of renewable energy facilities and high voltage direct current transmission lines. JCM has also been developing a 60 MWac solar PV plant in the Salima District of the Republic of Malawi since mid-2013. The Salima Project comprises of a 60 MWac solar PV plant on a 168ha green field site in Kalonga Traditional Authority (TA), Salima District. It is adjacent to the villages of Kanzimbe and Mayambo, under Kanzimbe Group Village (KGV), 20 km from the town of Salima and 88 km from Lilongwe (along on the M5 and M14 roads). The solar plant will connect to a 4 km 132 kV transmission line that runs alongside an existing ESCOM 132 kV transmission line to the Nanjoka substation. Electricity generated will be sold to ESCOM and will be transferred to the national grid via the existing ESCOM Nanjoka substation.

The contact details of the Project Proponent/Applicant are listed below.

<p><b>Golomoti JCM Solar Corporation Limited (JCM)</b> <b>Plot 3/306, Sharp Avenue</b> <b>Lilongwe, Malawi</b> <b>Tel: +265 999 4150 49</b> <b>Fax: (011) 467 0978</b> <b>Email:</b></p>
--

## 2. LEGISLATIVE CONTEXTUALISATION

### 2.1 ENVIRONMENT MANAGEMENT ACT 1996, AS AMENDED BY ENVIRONMENT MANAGEMENT ACT 2017

The Environment Management Act (EMA) was initially promulgated in 1996 to provide the legal framework to address key environmental issues impacting Malawi. The EMA was thereafter amended in 2017 to provide updated regulations and guidance in respect of EIA, auditing and assessment processes. Section 24 of the EMA provides information on the need for a Project Brief, as detailed below.

A Project Brief is a short report informing the EAD that a prescribed activity is being considered. Its sole purpose is to provide sufficient information to allow EAD to determine the need for an EIA based on screening criteria discussed in Appendix D of these guidelines. Thus, a Project Brief must contain the information needed by the EAD to evaluate the report against the screening criteria.

Section 24 of the EMA requires that a Project Brief should at least state:

- The nature of the project;

- The activities that shall be undertaken;
- The possible products and by-products anticipated;
- The number of people the project shall employ;
- The area of land, air or water that may be affected;
- Any other matters as may be prescribed;
- A basic description of the project purpose, size, location and preliminary design, including any alternatives which are being considered;
- The stage of the project in the project cycle; and
- A location map of the project site or site alternatives, and a site plan as it is currently known.

## 2.2 GUIDELINES FOR ENVIRONMENTAL IMPACT ASSESSMENT (1997)

The EAD issued Guidelines for Environmental Impact Assessment shortly after passage of the EMA, in 1997. These guidelines were subsequently amended in 2017. The guidelines address prerequisites and outline requirements for EIA processes. Appendix C and D of the guidelines for EIA provide an overview of the Project Brief requirements and applicable processes.

## 3. NEED AND DESIRABILITY

There is currently a global drive towards the generation and implementation of affordable clean energy, in line with the UN Sustainable Development Goals for “Affordable Clean Energy.” This goal recognises that the global economy is currently over reliant on finite fuel resources such as fossil fuels that increase greenhouse gas emissions.

Malawi has an installed generation capacity of approximately 439 MW, with approximately 384 MW of the electricity being hydroelectric power and approximately 55MW generated from solar energy (USAID, 2020). Over 85% of Malawi’s electricity is generated from hydropower, with the Shire River as the main source. Malawi’s heavy reliance on large hydroelectric power is often constrained by drought and low water levels (USAID, 2020)

Malawi’s energy sector has gone through important sector reform efforts recently, including the partial unbundling of the national utility ESCOM. The restructuring of Malawi’s power market is underway, with strong investor interest and political will for IPPs to enter the market (USAID, 2020).

The Golomoti Solar PV Plant Project (the ‘Project’) is an investment in renewable energy that aims to help diversify the energy sector in Malawi and increase the capacity of its national grid. The Project is part of the government IPP process and is part of sector reform development and aligns with global initiatives to develop renewable energy resources in developing countries. Expanding infrastructure and upgrading technology to provide clean energy in all developing countries is a crucial goal that can both encourage growth and help the environment.

The installation of the BESS will allow for the ability to store up to 8MW/10MWh in capacity which will allow for stable and consistent supply of power, as well as enabling the power to be supplied into the energy grid during power outages. This will enable the Project to adequately meet the existing agreement between JCM and ESCOM whilst provisioning for potential outages.



## 4. PROJECT DESCRIPTION

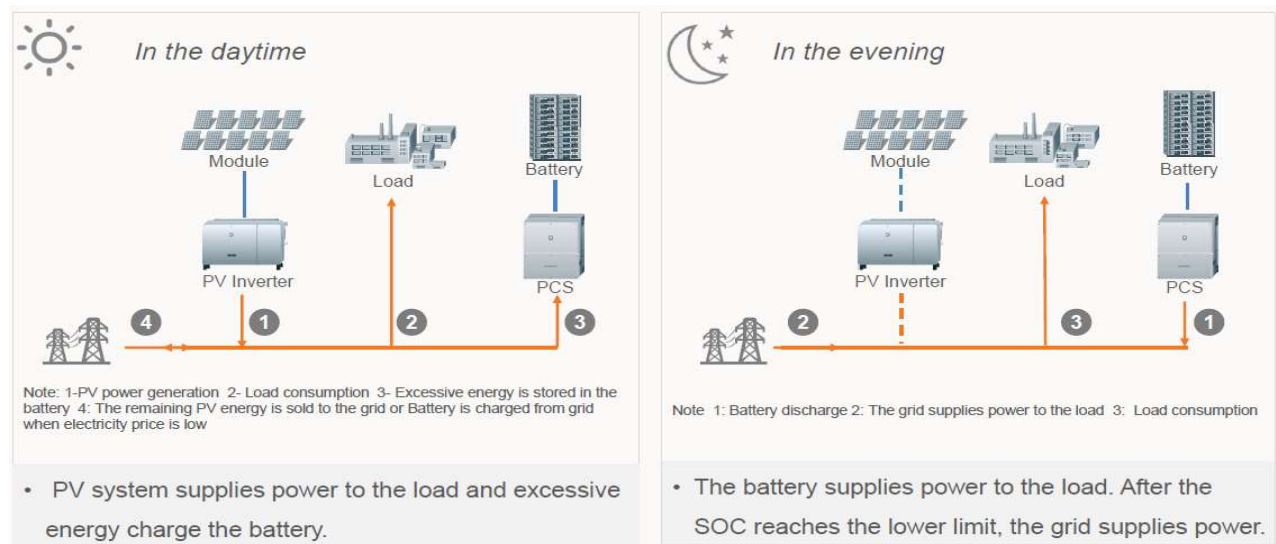
### 4.1 PROJECT LOCALITY

Figure 4-2, depicts the project locality and environmental sensitivities in proximity of the Project Site. The BESS will be constructed within the substation area located within the Solar PV Plant site. The Project Site is located approximately 0.5 km from the Golomoti Substation and less than 1 km from Golomoti Trading Centre in Dedza District. It is located within the Kachindamoto Traditional Authority. The Project Site is characterised by flat land with subsistence agriculture as the predominant land-use. Trees on the Project Site include natural and planted trees, including mango, acacia, and baobab trees. The site area does not transect any sensitive areas such as watercourses or the forest reserves.

### 4.2 PROPOSED ACTIVITIES TO BE UNDERTAKEN

The proposed BESS for the Project involves the installation of up to 6 lithium-ion batteries within the substation site located within the existing Solar PV Plant footprint, refer to Figure 4-2 for site locality map, Figure 4-4 for the proposed Solar PV Plant site layout plan and Figure 4-5 for the proposed Solar PV Plant site substation layout plan.

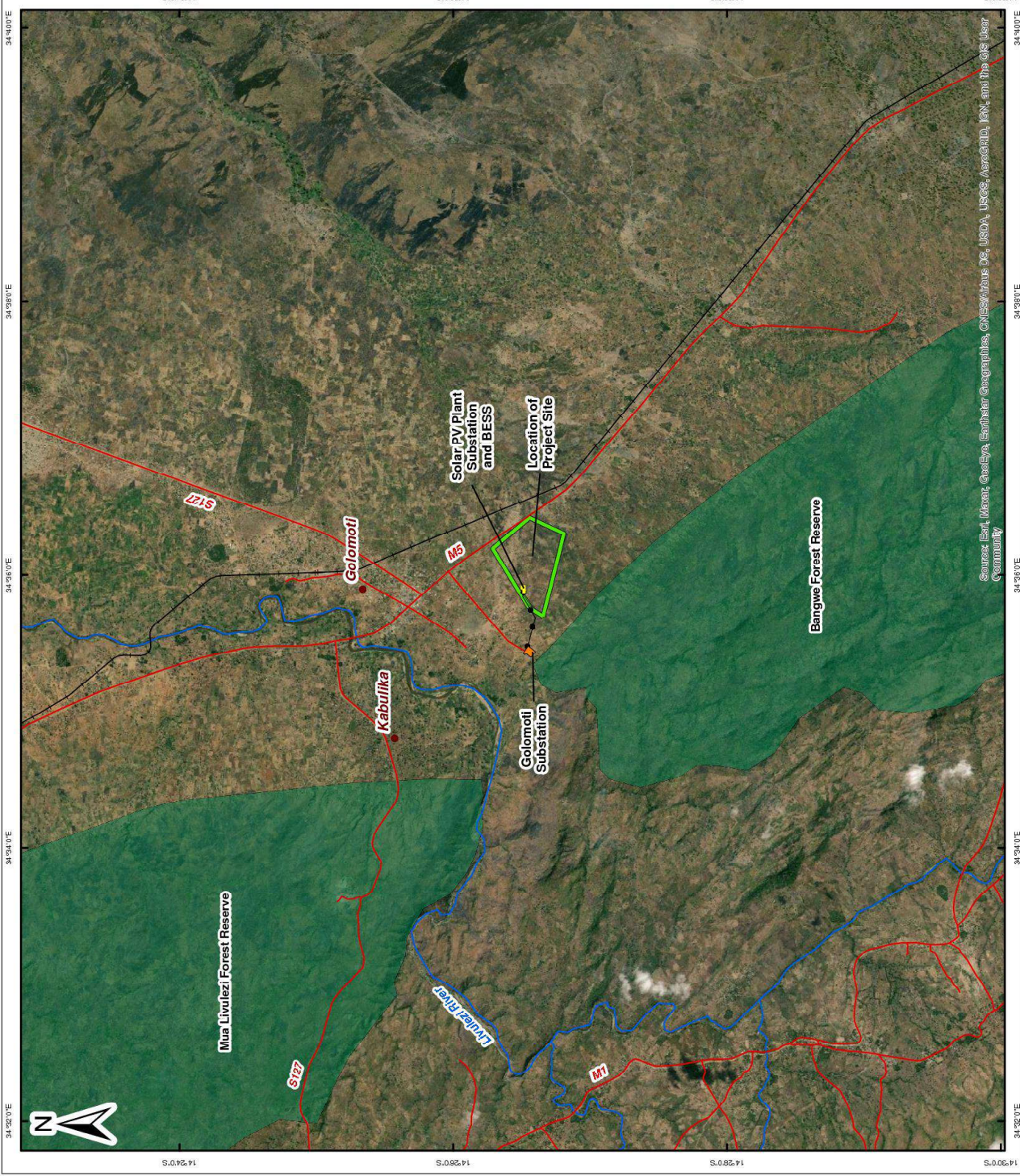
The BESS will be sourced from an international battery manufacturer and transported to Malawi for installation. The proposed BESS will possess the ability to store up to 8MW/10MWh in capacity which will allow for stable and consistent supply of power, as well as enabling the power to be supplied into the energy grid during power outages. Figure 4-1 below, depicts a generic Solar PV Plant with a BESS. During the day, excessive power is stored in the BESS to allow for supply of power during periods of low state of charge (SOC), e.g. at night or periods of cloud cover.



Source: Sungrow, 2020

Figure 4-1 Solar PV Plant with BESS

## Figure 4-2 Project Locality Map



- Legend**
- Villages
  - Roads
  - Railways
  - Rivers
  - Forest Reserves
  - Golomoti Substation
  - HV Transmission 132kV
  - Proposed Project Area
  - Solar PV Plant Substation and BESS



Golomoti PV Plant Project

Sensitivity Map



716.07078.00001 2020.01.22

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 4-3 depicts an external view of a BESS Project in XiZang, Tibet, China. The proposed BESS is anticipated to be installed in a similar manner with up to 6 x 40ft shipping containers, or equivalent in smaller modules and will be located within the existing substation footprint. The BESS will be located in the north-west area of the site in proximity to the on-site substation. Refer to Figure 4-4 for the proposed Solar PV Plant site layout plan and Figure 4-5 for the proposed Solar PV Plant site substation layout plan.



Source: Sungrow, 2020

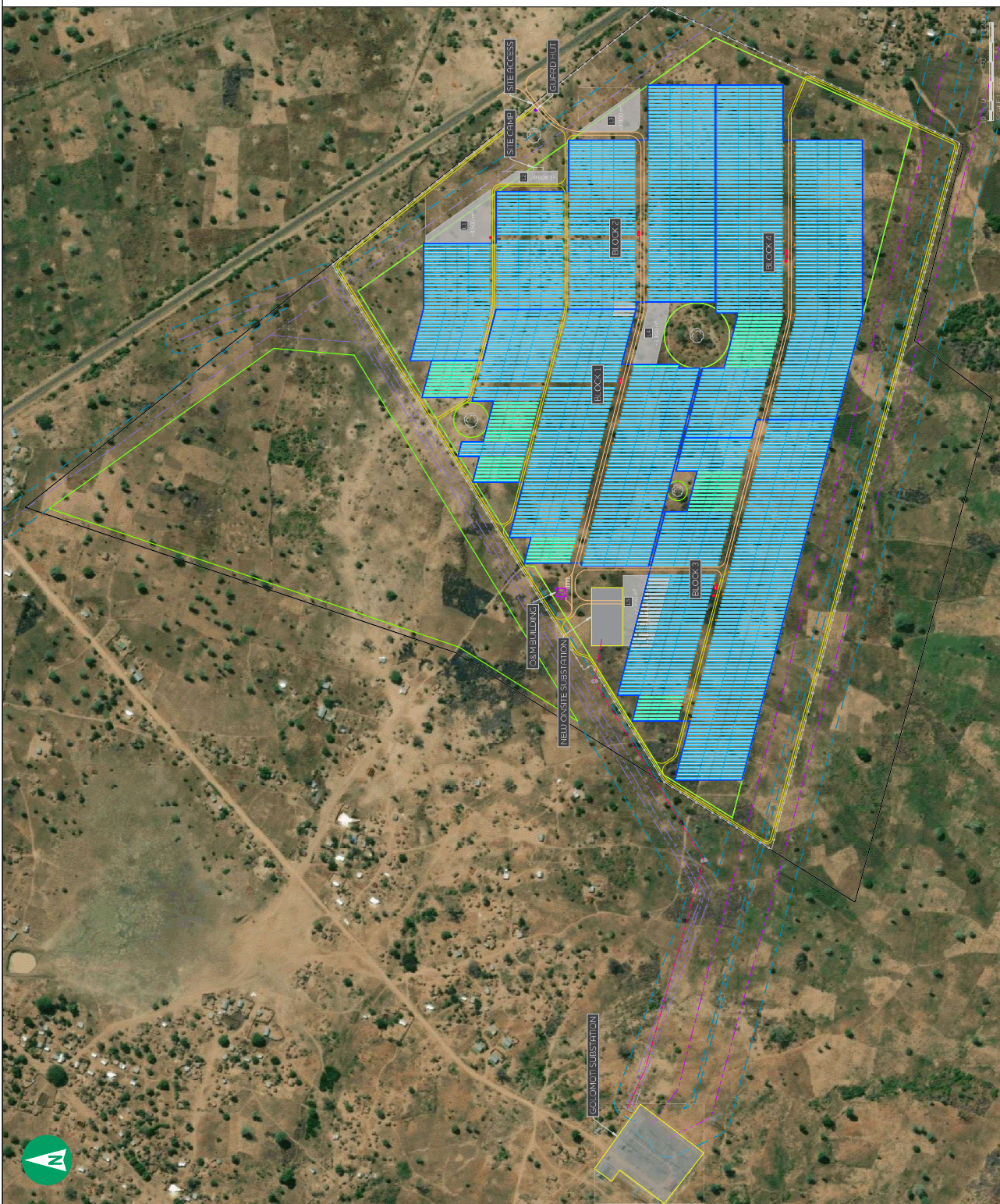
#### Figure 4-3 Example of a BESS Project

### 4.3 PROJECT FOOTPRINT

The BESS footprint is estimated to consist of up to 6 x 40ft shipping containers, or equivalent in smaller modules and will be located within the existing substation footprint which, including the BESS, will be up to 3,500m<sup>2</sup>. The total footprint of the Solar PV Plant as described in the original ESIA will not need to be increased to accommodate the BESS.

The proposed updated Solar PV Plant layout plan and the Solar PV Plant site substation layout plan including the BESS are included as Figure 4-4 and Figure 4-5 respectively.

## Figure 4-4 Proposed Site Layout Plan



**LEGEND**

- SITE BOUNDARY
- PV ARRAY DEVELOPMENT AREA
- FENCE
- TRACKING PV TABLE WITH 3 x PV STRINGS
- TRACKING PV TABLE WITH 2 x PV STRINGS
- STRING INVERTERS
- PAD-MOUNTED TRANSFORMER HOUSING (PTH)
- COM BUILDING
- GUARD HUT
- SITE ROADS (VIA/PO)
- SITE ROADS (MINOR)
- MET STATIONS
- LANDCULTURE AREAS
- EXISTING 132 kV OVERHEAD LINE
- EXISTING PV OVERHEAD LINES
- NEW 132 kV OVERHEAD LINE
- SETBACKS FROM EXISTING OVERHEAD LINES
- BRACING TREES

**PLANT DETAILS**

EQUIPMENT INFO	
PV MODULE	RECEN PSM044-9J-518 BMD6
PV MODULE POWER	535 Wp
PV MODULE DIMENSIONS	2288 x 1134 x 0.020m
INVERTER MANUFACTURER & TYPE	SUNGROWUL STRING INVERTER
INVERTER MODEL	SG250HAK
INVERTER RATING (10°C)	2501 VA

SYSTEM INFO	
SYSTEM TYPE	SINGLE AXIS TRACKING NE-TITANIAN HORIZONTAL
SYSTEM VOLTAGE	1500 V
PV TABLE CONFIGURATION	3P
PITCH	5.83 m
ROW TO ROW CLEARANCE	~3.3 m
ROW WIDTH (MINOR/MAJOR)	3 m / 4 - 5 m
MODULES IN SERIES PER STRING	28
TOTAL NO. OF PV STRINGS	2004
TOTAL NO. OF PV MODULES	56112
TOTAL NO. OF INVERTERS	104
TOTAL NO. OF PTHs (6.3MVA)	4
PLANT DC POWER (25°C)	3001892 kWp
PLANT AC POWER (25°C)	26,000 MW
PLANT AC POWER (40°C)	23,400 MW
PLANT AC POWER (55°C) (25°C 740 CI)	21,511 MW

**NOTES**

1. NOTE THE ABOVE RATINGS EXCLUDE THE BIFACIAL GAIN.

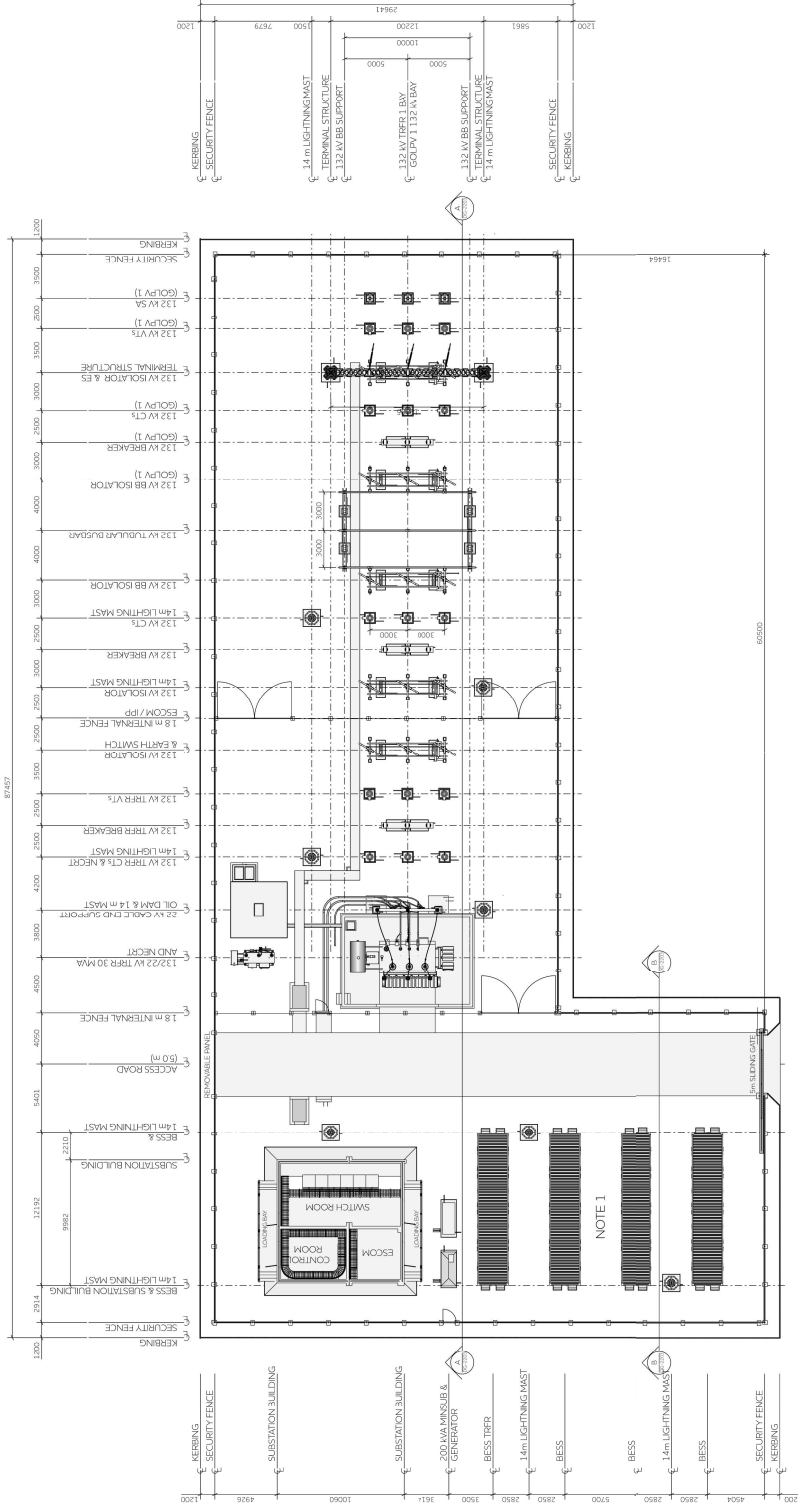
<b>OWNER</b>	<b>JCMPOWER</b> ADVANCING THE CLEAN ENERGY FACE			<b>CONSULTANT</b>	<b>ZUTARI</b> IMPACT. ENGINEERED.			<b>REVISION DETAILS</b>	<b>APPROVED</b>	<b>SCALE</b>	<b>SIZE</b>	<b>PRELIMINARY</b>	<b>PROJECT</b>	<b>PG NUMBER</b>
<b>REV</b>	<b>BY</b>	<b>DATE</b>	<b>DESCRIPTION</b>	<b>CK</b>	<b>CK</b>	<b>CK</b>	<b>CK</b>	<b>CK</b>	<b>CK</b>	<b>1:3000</b>	<b>A1</b>	<b>NOT FOR CONSTRUCTION</b>	<b>GOLMOTI SOLAR PV</b>	<b>508560</b>
A	RF	2020-07-14	FOR INFORMATION											
B	RF	2020-07-24	UPDATED PERIMETER ROADS											
C	PS	2020-10-30	UPDATED NAKTRUCKER LAYOUT											
D	RF	2020-11-27	UPDATED DESIGN											
													<b>TITLE</b>	<b>GOLMOTI PV FIELD</b>
													<b>GENERAL ARRANGEMENT</b>	
													<b>PROJECT NAME</b>	<b>GOLPV</b>
													<b>DISCIPLINE</b>	<b>GEN</b>
													<b>TYPE</b>	<b>DG</b>
													<b>NUMBER</b>	<b>1001</b>
													<b>SHEET</b>	<b>01</b>
													<b>REV</b>	<b>D</b>



## Figure 4-5 Proposed Solar PV Plant Site Substation Layout Plan

**NOTES**

NOTE 1:  
BES SYSTEM



OWNER		CONSULTANT		REVISION DETAILS		APPROVED		SCALE		SIZE		PRELIMINARY		PROJECT	
JCMPOWER		ZUTARI						1:200		A1		NOT FOR CONSTRUCTION		GOLOMOTTI SOLAR PV	
ADVANCING THE CLEAN ENERGY AGE		IMPACT. ENGINEERED.						DRAWN		GOSHTHIZEN		DATE		132/22 kV GOLPV IPP	
								CHECKED		ALIBAYRAQ		2020-11-29		SUBSTATION	
								REVIEWED		J. MEUTER		PROJECT NAME		GENERAL ARRANGEMENT	
								APPROVED		J. MEUTER		DRAWING No.		ELE - 2202	
												DISCIPLINE		TYPE	
												NUMBER		2202	
												SHEET		01	
												REV		C	
												PROJECT NUMBER		508560	



## 4.4 LAND OWNERSHIP

The predominant land ownership in the Project Site is customary. The Customary Land Act, 2016, indicates that Customary land falls within the jurisdiction of a Traditional Authority (TA), which has been granted to a person or group and used under customary law. This land is held in trust and administered by traditional leaders (chiefs) on behalf of people in a community. The TA is mandated by the government to distribute land to individuals as well as address land disputes and report to the government through the office of the District Commissioner. All consultations in respect of land acquisition were held during the original Project ESIA. JCM have completed the land and asset compensation process and received a land lease agreement certificate from the Ministry of Lands (MoL) on 04 November 2020, Deed Registry no: 93406, reference file no. CR/DZ/2020/01, refer to Appendix C. The lease agreement certificate is in respect of a 50-year term, commencing on 01 March 2020.

## 4.5 PROJECT ALTERNATIVES

### 4.5.1 Technology Alternatives

The proposed project involves the installation of a lithium iron phosphate (LFP) BESS with the ability to store up to 8MW/10MWh in capacity. The LFP BESS is an air-cooled containerised system with fire suppression systems in each container. A Lithium nickel manganese cobalt oxide (NMC) BESS was considered. LFP batteries are considered more stable than NMC because of the additional aluminium. LFP batteries operate at a much lower temperature, -4.4 degrees C to 70 degree Celsius (Soltaro, 2020). LFP batteries can also stand high voltage use for extended periods of time which results in high thermal stability (Soltaro, 2020). LFP batteries have a life-cycle of approximately 10-15 years. The lower the thermal stability, the higher the risk of electric shortages and possibly fires. LFP is therefore considered the preferred type of BESS.

### 4.5.2 Location Alternatives

The proposed BESS requires installation at the Solar PV Plant. Location alternatives would therefore involve the placement within the site footprint. Figure 4-2 depicts the site locality, Figure 4-4 depicts the proposed Solar PV Plant site layout plan and Figure 4-5 depicts the proposed Solar PV Plant site substation layout plan with the proposed BESS. This BESS is located in the northwest area of the site to allow for easy connection to the ESCOM substation. No other location alternatives will be considered.

### 4.5.3 No-Go Alternative

The no-go alternative would result in the status quo for the Solar PV Plant. The BESS allows for storage of excess power generated during optimal environmental conditions. This will result in a stable supply of power to ESCOM. Should a BESS not be installed at the site, no power can be stored. This could result in erratic power supply due to factors such as poor weather conditions. The no-go alternative is therefore not desirable as the installation of the BESS can provide added benefits.

## 4.6 WASTE MANAGEMENT - END OF LIFE BATTERY DISPOSAL

The proposed BESS will not result in additional waste generation and therefore will not require any waste management approvals. The estimated lifespan lithium-ion batteries are approximately 10-15 years. There are two proposed battery disposal methods. JCM will provide financial provisions for the preferred BESS disposal option, refer to Appendix B for the financial provision document. The proposed BESS disposal methods are as follows:

- Return to original equipment manufacturer; and
- Disposal of the BESS at a dedicated lithium recycling facility.

## 4.7 EMPLOYMENT OPPORTUNITIES

JCM has an implemented recruitment policy in place for all projects. The recruitment policy prioritises employment of local residents where feasible. All Project employment will be in accordance with the Employment Act, 2000, as amended, and the Labour Relations Act, 1996, as amended.

The Solar PV Plant will generate approximately 200 employment opportunities during the construction phase, this is anticipated to reduce to approximately 20 employees during the operational phase. In addition, there would be possibilities to engage local small and medium enterprises (SMEs) in the local and broader district area with procurement opportunities.

The BESS is unlikely to result in additional employment opportunities as existing planned labour resources will be used for the installation and connection of the BESS.

## 4.8 STAKEHOLDER ENGAGEMENT

JCM have an existing community liaison team that conduct regular engagement with stakeholders. The community liaison team maintain a list of potential interested and affected parties (I&APs). The I&APs will receive updates on the project through the JCM community liaison process.

# 5. POTENTIAL PROJECT IMPACTS

The potential impacts listed below have been assessed in accordance with the impact assessment methodology of the Solar PV Plant ESIA report.

## 5.1 POTENTIAL POSITIVE IMPACTS

The potential positive impact associated with the proposed BESS is listed below.

### 5.1.1 Storage of Electricity

The BESS allow for excess electricity to be “stored” and released during periods of high electricity demand, ensuring a steady and safe electricity supply. The proposed BESS will possess the ability to store up to 8MW/10MWh in capacity which will allow for stable and consistent supply of power, as well as enabling the power to be supplied into the energy grid during power outages. The Solar PV Plant will generate approximately 20 MW of power, which will be transmitted to the national grid for distribution in the Central Region of Malawi. T

Stored energy is used to meet generation requirements during peak electricity consumption hours, allowing grid operators and utilities to meet demand while incrementally deferring or reducing the need for new generation capacity. The increased stability in the power supply as a result of the BESS will be the storage of additional power reserves during the day so that peak demand can be managed more efficiently in the evening. The BESS will also reduce dependency on hydroelectric power and diesel-powered emergency generation sets, which would lower cost to the end consumer and reduce the impact on climate change.

The BESS will allow the Solar PV plant to be more reliable and efficient, thereby assisting the project to provide clean renewable power to the electricity mix, thereby reducing the use of carbon-based non-renewable electricity and thus ultimately assisting in mitigating the negative effects of climate change.

The impacts associated with the storage of electricity by the BESS will further add to the original **positive impact significance** of the Solar PV Plant ESIA.

## 5.2 POTENTIAL NEGATIVE IMPACTS

There will be no additional negative impacts that will change the ratings of the Solar PV Plant ESIA. The potential negative impacts associated with the proposed BESS are listed below.

### 5.2.1 Air Quality

Air emissions from construction activities will be temporary and associated with the following activities:

- Particulate (dust) emissions from exposed areas and earthmoving activities; and
- Vehicle emissions from supply vehicles and generator operation.

No further emissions are anticipated during the operational phase.

The air quality impacts posed by the BESS is **negligible during construction and operation**.

### 5.2.2 Noise

The construction and operational noise impacts of the BESS will remain within the noise levels assessed in the Solar PV Plant construction and operational activities. The Proposed BESS will therefore not result in any further noise impacts.

### 5.2.3 Water Quality

Contamination of surface or ground waters through spills or leaks of toxic substances. The proposed BESS will be located within a closed container system to prevent potential groundwater contamination. Due to the containerised approach, the separation between containers and the likely restriction of events to one container at a time, the impacts on water quality posed by the BESS is **negligible during construction and operational activities**.

### 5.2.4 Impacts on Vegetation

The Proposed BESS will not result in further impacts on vegetation as the BESS as it will be located within the on-site substation footprint.

### 5.2.5 Unplanned Events: Thermal Runaway and the Generation of Flammable Gases

Thermal runaway is a situation where the current flowing through the cell or battery on charge or overcharge causes the cell temperature to rise, which increases the current with a further rise in temperature (Encyclopaedia of Electrochemical Power Sources, 2009). The BESS generates heat which can potentially propagate a thermal runaway event to neighbouring batteries. Thermal runaway can occur at any point on route to the facility, during construction or operation / maintenance at the facility or during decommissioning and safe-making for disposal.

Flammable gases generated may ignite, leading to a fire which can accelerate the runaway process and spread to other parts of the installation. The accumulation of flammable gasses within the container system can potentially ignite with explosive force. Due to the containerised approach, as well as the separation between containers, the proposed impacts may be restricted to one container at a time.

### Significant Impact Zone

The significant impact zone refers to the potential area affected. The significant impact zones in event of the worse conceivable cases are listed below.

- **Container fires:** the significant impact zone would be limited to within 10m of the container with mild impacts limited to 20m of the container.
- **Explosion:** the significant impact zone should be limited to with 10m of the container and minor impacts such as debris within 50m; and

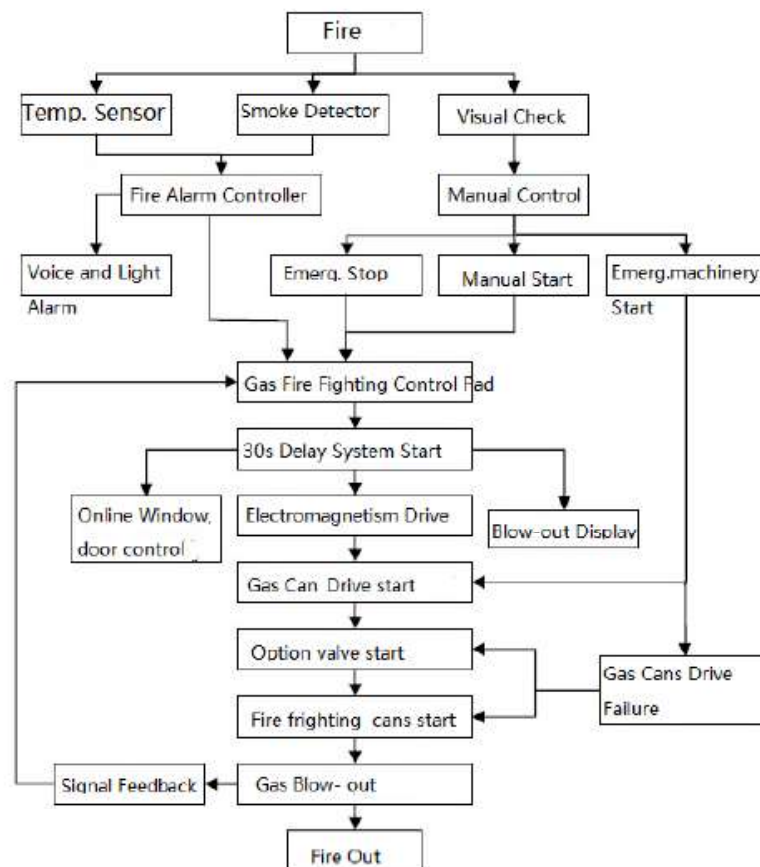
- **Toxic smoke:** the significant impact zone would be limited to one container at any one time, provided that the units are placed suitably far apart to prevent propagation from one unit to another and to prevent large external fires. In this case, beyond the immediate vicinity of the fire, the concentrations of harmful gases within the smoke should be low.

**Proposed Mitigation Measures**

- JCM Power will implement an appropriately defined emergency response plan which will include the training of local emergency response personnel on BESS emergency response requirements.
- A containerised approach as well as the separation between containers will be implemented to ensure that proposed impacts may be restricted to one container at a time

Each container of the BESS will be equipped with an automatic fire suppression system (FSS). This will also ensure that potential fire risks can be localised and responded to effectively. *Source: Sungrow, 2020*

- Figure 5-1 illustrates the fire suppression work-flow.
- The FSS has an automatic and manual mode. The FSS includes smoke detector, control panel, alarm device, exhaust pipe and bump head. It uses clean fire suppression gas to minimize the second loss. Before gas blow-out, system controller will send signal to the heating, ventilation and air condition (HVAC) main power switch to stop working as well as the fan thus achieve fire suppression process.



*Source: Sungrow, 2020*

## Figure 5-1 Fire Suppression Work-Flow

This unplanned event is highly unlikely as the probability of occurrence is low. Implementation of the emergency response plan will ensure that the risks associated with unplanned events will remain low.

## 6. CONCLUSION

The Solar PV Plant underwent an ESIA process that concluded with the final ESIA report being submitted to the EAD for decision-making in February 2020. The proposed BESS constitutes a minor amendment to the existing environmental certificate as the BESS will be located within the existing footprint of the substation that is located within the overall Solar PV Plant site i.e. no additional footprint will be required. The proposed BESS will not result in additional waste generation and therefore will not require any waste management approvals. The BESS installation will not result in further environmental degradation or loss of habitat. Extensive stakeholder engagement meetings and community engagement was conducted during the Solar PV Plant ESIA process. The existing interested and affected parties will receive regular updates on the Project through the JCM community liaison process. SLR therefore propose the following for consideration by the EAD:

- Acceptance of the BESS Project Brief document for the issue of an environmental clearance certificate, with no further reporting requirements;
- Should the BESS Project Brief not be sufficient for the issue of an environmental clearance certificate, an updated impact assessment and environmental and social management plan will be submitted through an ESIA addendum report;
- No public meetings be held. JCM's community liaison officer will inform the interested and affected parties of the project; and
- No specialist studies will be required as the studies undertaken during the Solar PV Plant ESIA will still be applicable.



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## APPENDIX A: EMERGENCY RESPONSE PLAN


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# Golomoti Solar PV

## Emergency Preparedness and Response Plan


**Document Number: GOL-JCM-HS-RP-003**



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## Document Version Control

Date	Revision	Prepared By	Approved By	Notes
2020-12-08	A	L. Palmer		

	Golomoti Solar PV	Document No.	GOL-JCM-HS-RP-003
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## Abbreviations and Acronyms


Abbreviation / Acronym	Definition
AC	Alternative Current
AED	Automated external defibrillator
CLO	Community Liaison Officer
DC	Direct Current
EPRP	Emergency Preparedness and Response Plan
EPC	Engineering, Procurement and Construction
ESCOM	Electricity Supply Corporation of Malawi Limited
ha	Hectare
HASP	Health and Safety Plan
HCSs	Hazardous chemical substances
HR	Human Resources
JCM	JCM Matswani Solar Corp Limited
kV	kilovolt
LOTO	Lock-Out-Tag-Out
MW	Megawatt

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Abbreviation / Acronym	Definition
HSE	Health, Safety and Environmental
OPIM	Other potentially infectious material
PEP	Post Exposure Prophylaxis
PPE	Personal Protective Equipment
PV	Photovoltaic
TL	Transmission line

## List of Annexures

Annexure	Description
Annex A	Construction First Aid Plan

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## 1 Introduction

Golomoti JCM Solar Corporation Limited (JCM) will be constructing a 20 megawatt (MW) solar photovoltaic (PV) plant ('the Project'). The power from the Project will be fed directly into the national grid via a short (approximately 0.5 km) 132 kilovolt (kV) transmission line (TL) through to the Golomoti substation. The solar plant is being developed on approximately 108 hectare (ha) land plot near the village of Golomoti, in the Dedza District in the Central Region of Malawi. The Project includes the construction of an 80 m access road that extends from the highway, to the northeast (M5), to the Project site. The TL wayleave will be managed by the Electricity Supply Corporation of Malawi Limited (ESCOM).

The Engineering, Procurement and Construction (EPC) contract for the Project will commence in 2021; date to be confirmed. The construction works will be completed, as follows:


- Civil, Piling, and Mechanical Works: TBC
- Electrical Works: TBC
- Independent Consultant: TBC
- Site Security: TBC

This Emergency Preparedness and Response Plan (EPRP) has been drafted to outline the preventive and protective measures and procedures necessary to prepare and respond to an emergency on site during the construction phase to protect the health and safety of all workers.

### 1.1 Purpose of this Document

The purpose of this EPRP is to help prevent incidents, to assure preparedness in the event incidents occur and to provide a systematic and orderly response to emergencies. All activities must be undertaken in line with the Construction Health and Safety Management Manual (HSMM) (Document Ref: GOL-JCM-HS-RP-0002), this EPRP as well as relevant legislation, and in such a manner to minimize the health and safety risks to employees and the public. The types of emergencies that are covered in this EPRP include:

- Medical (e.g. injury, illness);
- Physical (e.g. working at heights, electrocution);
- Chemical (e.g. fire and explosions, hazardous chemical spillages)
- Biological (e.g. natural disaster); and
- Security (e.g. labor unrest; bomb threats etc.)

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This EPRP must be updated as the Project and designs are updated and changed to ensure the documentation remains Project specific and that new risks or issues are identified and addressed accordingly. Any new legislation or standards that are promulgated or accepted during the construction phase must automatically be applied.

## 1.2 Scope

This EPRP applies to all personnel working on site.

## 1.3 Applicable Legislation

Legislation applicable to this EPRP includes:


- Occupational Safety, Health and Welfare Act 1997 (No.21 of 1997);
- Public Health (Corona Virus Prevention, Containment and Management) Rules, 2020, Government Notice 5 of 2020;
- COVID-19 Workplace Guidelines, 2020;
- National Disaster Risk Management Policy, 2015;
- National Environmental Management Act 19 of 2017; and
- International Finance Corporate (IFC) Performance Standard 2 – Labor and Working Conditions.

## 1.4 Project Overview

### 1.4.1 Project Description

The Project comprises of a 20 MW solar PV plant on a 108 ha of green field predominantly used for subsistence agriculture site near Golomoti within the Dedza District. The solar plant will connect to a 0.5 km 132 kV transmission line that will be constructed to connect the solar power plant to the existing Golomoti Substation. Additionally, a short, 80 m access road will be constructed and will extend from the highway to the northeast (M5). Electricity generated will be sold to ESCOM and will be transferred to the national grid via the existing substation. The PV solar technology chosen for this Project consists of the following main components:

- PV cell: the PV cell is the device that generates electricity when exposed to solar radiation;
- PV module: the PV module is the set of interconnected photovoltaic cells encapsulated between a transparent front (usually glass) and a backing support material then mounted in an aluminum frame;

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- Mounting structures: multiple PV modules are bolted onto a mounting structure which tracks the suns progress across the sky in an east to west direction;
- PV array: the PV array is the complete power generating plant consisting of multiple PV modules wired in series and in parallel.;
- Inverter: the inverter converts the Direct Current (DC) to Alternative Current (AC);
- Substation: the substation receives all power from the inverters via underground cables and provides protection and control equipment required to safely manage the plant and to ensure grid code compliance regulations;
- Transformer: the transformer steps up the AC power from the inverters (typically at 33 kV) to match the grid voltage (expected to be 132 kV);
- Stores, offices and control building;
- Access tracks and fencing; and
- 0.5 km 132 kV transmission line.

The Project will be completed in three phases:

- Site preparation and construction;
- Operation; and
- Decommissioning.

#### 1.4.2 Remaining Construction Activities

The EPC contract for the Project will commence in 2021 (date to be confirmed). The completion of the works under the EPC contract is shown in Table 1 below.


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Table 1: Project Construction Progress

Activity	% Complete
Engineering and Design	90
Procurement (PV modules, trackers, inverters, cables, overhead line towers, conductors etc.)	0
Construction:	0
PV area	0
132 kV Facility Substation	0
132 kV Overhead Line	0
132 kV ESCOM Golomoti Line Bay	0
Facility Commissioning	0
Performance Testing	0

This HASP applies to the following activities and components:

#### 1.4.2.1 Site Preparation

During this phase, vegetation will be cleared as necessary for the contractor(s) to complete the required works. A temporary camp consisting of site offices, , residential rooms, hygiene facilities, temporary laydown areas and kitchen areas will be constructed and subsequently, cleaned, and disinfected.


#### 1.4.2.2 Construction Phase

- Civil works – road wearing course, drainage, and permanent fence
- Completion and remediation of pile installation
- Tracker and module installation
- All electrical works including trenching, wiring, installations, terminations and commissioning
- HV substation
- Overhead line
- Golomoti substation line bay
- O&M Building, Weather Stations, CCTV system, ancillaries

#### 1.4.2.3 Transportation (logistics)

A limited number of parts and equipment shall be ordered to complete the construction of the Project. Majority of these items will likely be sourced from South Africa and will be delivered to site via ground transportation.




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## 2 Roles and Responsibilities

The key role-players during the construction phase of the Project, for the purposes of emergency preparedness and response on site, include but are not limited to: the Country Director, Project Manager, Construction Manager, Health, Safety and Environmental Manager (HSE Manager), the Contractors, the Contractors HSE Officers, H&S Representatives, First Aiders and Emergency Responders.

Table 2: Roles and Responsibilities

Role	Responsibility
JCM Country Director	<ul style="list-style-type: none"> <li>Be the issuing authority for this EPRP</li> <li>Ensure effective implementation of this Plan, including provision of adequate resources;</li> <li>Ensure this Plan, as part of the Construction H&amp;S Management Manual is reviewed at least every 3 months.</li> <li>Maintain a working knowledge of the emergency management system, plan and processes; and</li> <li>Ensure all necessary positions are staffed.</li> </ul>
JCM Project Manager	<ul style="list-style-type: none"> <li>Maintain a working knowledge and familiarity of this EPRP;</li> <li>Participate in the scheduled review of the EPRP; and</li> </ul>
JCM Construction Manager	<ul style="list-style-type: none"> <li>Act as initial point of contact and person in charge during emergencies until relieved by authorized emergency services or control is handed over to another member of the Project Team.</li> <li>Ensure that drills and exercises are conducted throughout the Project to test the plan.</li> </ul>
JCM HSE Manager	<ul style="list-style-type: none"> <li>Maintain the Project Emergency Response Plans and associated processes;</li> <li>Ensure that adequate emergency response information and instructions are provided at inductions etc.;</li> <li>Conduct planned inspections to ensure emergency response equipment and facilities are complete.</li> </ul>
First aiders	<p>Nominated employees of JCM and its contractors will be trained as first aiders to act as first respondents at incidents or accidents. Every group of crews (5-50 employees) will have a Level 1 first aider.</p> <p>In addition, there shall be a qualified nurse on site.</p>
Emergency responders	<p>Nominated employees of JCM and its contractors will be trained as emergency responders to act as first respondents at incidents or accidents. There will be at least one first aid nurse, between 1-7 level 1 first aiders on site at all times. In addition, each group of crews will have an appointed spill responder and an employee trained in firefighting.</p>
H&S Committee	<p>A H&amp;S committee will be established to review measures taken to ensure the safety and health at work of employees.</p>
Emergency response teams	<p>Emergency response teams must be established among employees of JCM and contractors on site. Depending on the nature of an emergency, various key persons</p>

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Role	Responsibility
	<p>must be deployed to minimize the extent of the disaster. Teams must include the following, but not be limited to:</p> <ul style="list-style-type: none"> <li>• Firefighting;</li> <li>• Height rescue;</li> <li>• Spill response; and</li> <li>• First aider(s).</li> </ul>

### 3 Training

It is the responsibility of JCM and its contractors to ensure that whoever is employed under their charge is formally trained and made conversant with this EPRP. Written proof to ensure that the employees are briefed on the latest version of this plan must be made available to any official that reserves the right to peruse such proof. Training is to be undertaken in accordance with the HSMM (Document No: (GOL-JCM-HS-RP-0002) but should include:

#### 3.1 Employees

All site workers must be trained on site-specific emergency procedures (refer to Section 6). This training should be done as part of site induction training and shall include the following:


- Alarms and other emergency communications used on the site.
- Evacuation procedures including routes and assembly areas to be used.
- Initial emergency response actions.
- Location of first-aid kits and identification of first-aid providers.
- Location of spill contamination kits.
- Emergency response team members.

#### 3.2 Visitors

Visitors are always to be accompanied by an inducted person. Visitors will receive emergency procedure training via the visitor's induction.

#### 3.3 Emergency Response Teams Coordination Training

Emergency response team members must receive specific training for the duties they are to undertake. Training for emergency response team personnel will include relevant topics related to their role including

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- Training in the contents of this EPRP; and
- First aid and CPR for those identified as first aiders in this plan.

Emergency Evacuation and Response exercises are to be held as training activities to a schedule prepared by the JCM HSE Manager.

### 3.4 Evacuation Drills

JCM will conduct emergency drills every two months throughout the construction phase to check effectiveness of the training.

## 4 Communication

Changes to the team or any of the processes and procedures in this EPRP are to be communicated to all site personnel by the JCM HSE Manager through daily site task instructions, updated induction programmes, toolbox talks, formal communication to Contractors and notice boards.

### 4.1 Contact Details


A detailed lists of emergency response providers (both internal and external) including their contact numbers is to be displayed at key positions on the site. The emergency contacts must only reflect the first contact point to eliminate multiple calls to emergency response units.

## 5 Emergency Preparedness

To assure preparedness in the event incidents occur, JCM and/or the contractors shall establish and maintain the following throughout the construction phase.

### 5.1 Evacuation Routes

Drawings indicating evacuation routes towards a place of safety are to be developed by JCM. The areas identified must be kept clear for safe and easy access. Evacuation routes may be required to change from time-time. The JCM HSE Manager must be responsible to update the emergency team members of any such changes. The JCM HSE Manager must also identify potential emergency evacuation difficulties and initiate a review when necessary.

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## 5.2 Assembly Points

Different areas must be declared as places of safety during an emergency. The size of the assembly point must be determined by the maximum number of persons likely to be present in the area reserved for the emergency assembly point. A reflective sign must be placed in positions across the site to indicate where all employees and visitors are to assemble in the event of an emergency.

Following the alarm, all persons on site are to evacuate to Assembly Points and wait for further instructions from the JCM Construction Manager irrespective of the type of incident.

Employees and visitors are to walk and not run during an emergency. The reasonable estimated time for employees to evacuate to a place of safety is two and half minutes. The area must only be utilized for emergency assembling purposes.


## 5.3 Emergency Equipment

The Golomoti construction site must have the correct equipment readily available to effectively respond to emergency situations.

- Emergency equipment must be maintained through preventive maintenance procedures (inspection and testing) in accordance with the manufacturer’s recommendation to ensure that equipment is in ready condition for use.
- Subcontractors providing their own requirement emergency equipment must maintain equivalent inventories and inspection protocols. These records are to be provided to the JCM HSE Manager.
- Safe work method statements shall identify emergency equipment required for that task (refer examples provided in Table 3).
- The inventory should be completed, and an inspection of emergency equipment shall be conducted monthly to ensure that equipment is available and functioning properly.
- The type of emergency equipment available on site should be reviewed periodically to reflect changing site conditions.

Table 3: Emergency Equipment required on Site

Item	Location	Quantity
Torches	To be provided to each security guard (night shift)	One per security guard
Airhorn	Site office (JCM HSE Manager’s office)	One
Firefighting equipment	TBD	
First Aid Kits	Refer to Annex A, First Aid Plan.	

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Item	Location	Quantity
Spill Kits	Storage area; fuel tank and a spare Diesel storage container (e.g. the Aboveground Storage Tank)	As needed (approximately three)


## 5.4 First Aid

A first aid plan for the Golomoti Project site is included as Annex A. This plan defines specific first aid resources required to effectively respond to medical emergencies that may be associated with the risks as identified in Section 1 of this EPRP.

# 6 Emergency Response Procedures

## 6.1 Fire

1. The individual detecting a fire must inform and allow personnel to evacuate the area immediately following the evacuation routes to the demarcated assembly point and sound the alarm.
2. The JCM Construction Manager must be notified immediately and, if it is safe to do so, try to fight the fire with the nearest relevant firefighting equipment.
3. At the assembly point (prevailing winds to be considered in the selection of the assembly point):
  - Take a roll call;
  - Should an employee or visitor be found missing during the roll call JCM HSE Manager must immediately search for him/her;
  - Do not attempt to enter areas where there is an accumulation of smoke or possible accumulation of gasses;
  - Trained first aiders are to apply first aid to any injured;
  - Notify the Golomoti District Hospital; and
  - Transport patients to the Hospital for any injuries that cannot be treated by first aid.
4. The JCM Construction Manager decides if a full evacuation of the site is necessary, and if a systematic shut down of the site is recommended.
5. Security personnel are to give any firefighting personnel immediate access to the site on arrival.

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- All fires are to be reported and recorded in an issue log. All fires are to be investigated, and mitigating actions implemented before the site returns to normal operations.

## 6.2 Electrocutation

- Do not touch injured persons before all power is switched off and Lock-Out-Tag-Out (LOTO) is in place to prevent other personnel to switch on power incidentally.
- Ensure that first aid is given to the injured person(s) as quickly as possible by a trained first aider.
- Call for assistance (via radio if necessary) to the JCM HSE Manager or Construction Manager. Describe the incident.
- The JCM HSE Manager or other person receiving the call must immediately call emergency responders for ambulance and rescue team.
- One person must meet emergency responders at the entrance/exit of the site and direct them to the injured person(s).
- When emergency responders arrive on the site they must take over and the JCM HSE Manager must designate needed assistance to the rescue team.
- No work may be resumed before an investigation has been conducted, root cause analysis finalized, and corrective action implemented.
- Do not disturb anything at the site of the accident unless it is essential to do so to assist the injured person, or in the interests of general safety, or protection of property.
- Ensure that personnel are protected from any remaining hazards as far as possible.
- Observe the site and features of the accident looking for factors that may assist the investigation.
- As soon as possible after the accident, make written notes on the above observations.

## 6.3 Rescue from Heights

- Attend to persons as required, prevent injury / further injury, and ensure that no other person is put at risk in the process.
- Call for assistance (via radio if necessary) to the JCM HSE Manager or the Construction Manager.
- Ensure that first aid is given to the injured person(s) as quickly as possible by a trained first aider. In the case of a fall from heights, do not move the injured person.

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4. One person must meet emergency responders at the entrance/exit of the site and direct them to the injured person(s).
5. Do not disturb anything at the site of the accident unless it is essential to do so to assist the injured person, or in the interests of general safety.
6. Cooperate with the Construction Manager and/or JCM HSE Manager regarding investigation.
7. Ensure that personnel are protected from any remaining hazard.
8. As soon as possible after the accident, make written notes on the above observations.
9. No work may be resumed before an investigation has been conducted, root cause analysis performed, and corrective actions implemented.


## 6.4 Natural Disaster

Natural disasters in Malawi include, but are not limited to, the storms and lightning and floods. The nature and extent of the disaster must dictate the appropriate actions, but the following general rules may apply:

1. The JCM Construction Manager must take immediate control and decide on the action required, inter alia, a complete evacuation of the entire area and sending personnel home if needed.
2. In the case of a storm close all windows, and isolate/ switch off all electrical appliances that may be switched on.
3. In the event of a lightning storm, all personnel located in the solar panel area must be evacuated into a housed administrative area.
4. As soon as possible after the disaster the emergency response team must firstly assess injury to personnel and then damage to buildings and equipment.
5. After the assessment, the JCM Construction Manager must declare the area safe and allow personnel to return to work.

## 6.5 Labor Unrest

1. When any confrontation exists, the JCM Construction Manager must attempt to contain the confrontation to the affected area.
2. The JCM Construction Manager, together with the JCM Human Resources (HR) Advisor and/or JCM Community Liaison Officer (CLO), must obtain a list of the grievances or reason for the labor unrest.

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3. The JCM Construction Manager must on receipt of any grievance(s) or demand(s) from employees consult with the JCM Country Director and emergency response team and decide on what action to take. The JCM Construction Manager must have the full authority to:
  - Communicate with any aggrieved person(s); and
  - Liaise with employee representative or trade union.
4. The JCM Construction Manager may at his/ her discretion also inform the Police Services and ask them to remain at a distance and monitor proceedings.
5. The JCM Construction Manager, together with the HR Advisor and/or CLO must discuss the grievance(s) and attempt to resolve the issue(s) whilst the employees return to their working areas.

## 6.6 Terrorism

In the case of a terrorist attack the following procedure must be followed:


1. The JCM Construction Manager must inform the Police Services and site security immediately.
2. If possible, the emergency response teams must assist with the evacuation of personnel from the affected area and assist the injured.
3. If it is not possible to evacuate; personnel must be informed to remain calm and find cover.
4. All employees must co-operate and must not try to attack any perpetrator.
5. The Police Services must take charge on arrival.
6. The JCM Construction Manager, in consultation with the Police Services, are to determine when it is safe to allow personnel to return to work.

## 6.7 Bomb Threat

In any instances of a threat of a bomb, the JCM Construction Manager must:

1. Evacuate all the personnel immediately.
2. Get the Police to conduct a search of the area where the bomb is proposed to be, extend the search area if necessary, demarcate any area containing suspect parcels, defuse or remove any parcels and take control of the situation.
3. The JCM Construction Manager in consultation with the Police Services and site security are to determine when it is safe to allow personnel to return to work.




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## 6.8 Explosions

1. In case of an explosion, the area must be evacuated immediately by sounding the alarm and all personnel are to follow the evacuation routes to the demarcated assembly point.
2. The JCM Construction Manager is to be notified immediately
3. Take roll call at the assembly points.
4. Assist and apply first aid to any injured.
5. Do not attempt to enter areas where there is accumulation of smoke or possible accumulation of gasses.
6. When the affected area is under control the JCM Construction Manager and JCM HSE Manager to investigate and ensure that the area is safe, and no chain reaction explosions must occur.
7. The JCM HSE Manager must demarcate the area with tape and ensure that nobody enters the area and that no evidence is removed from the scene.
8. The JCM Construction Manager must report the explosion through his/ her chain of command to the local government.
9. Operations must only resume after consultation with the local government and permission granted by them.
10. The H&S Committee must launch a full investigation immediately and implement an action plan.

## 6.9 Road Transport Incidents

1. Any JCM employee or contractor involved in a company vehicle accident must report this to the JCM Construction Manager.
2. The JCM Construction Manager must immediately commence an investigation.
3. Depending on the nature of injuries, the injured personnel must be treated either by a trained first aider or transported to the Golomoti District Hospital for further medical treatment.
4. A full investigation must be undertaken in conjunction with the Police Services and relevant Traffic Services should the accident occur on a public road.

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## 6.10 Medical Emergencies


Heart attacks, diabetes, malaria and other acute illnesses may need to be treated on-site. The site first aid nurse must determine the level of emergency response and notify the appropriate level of ambulance or response required. This procedure is to be read in conjunction with Annex A: First Aid Plan.

When a medical emergency occurs on site the following must be done:

1. Notify supervisor (or nearest Person in Charge) immediately. Be prepared to provide the following information:
  - Your name
  - Exact location
  - Name of the ill or injured person(s)
  - A brief description of situation, symptoms, accident and nature or type of injury/illness.
2. Do not leave the injured unless you must do so to notify somebody, then return.
3. Do not move the injured unless he/she is in immediate danger of further injury.
4. Where possible, ensure that first aid is given to the injured person(s) as quickly as possible by a trained first aider.
5. Automated external defibrillator (AED) is used to treat a person who experiences sudden cardiac arrest. Only authorized/trained personnel may operate the AED. Golomoti DMO shall advise and oversee the AED program.

In addition, the following work practices will be followed:

- Employees must wash hands immediately after contact with blood or other potentially infectious material (OPIM).
- If hand-washing facilities are not immediately available after exposure, exposed employees will be provided with an antiseptic hand cleanser with cloth or paper towels or antiseptic towelettes. Exposed employees will wash their hands with running water and soap as soon as possible after using the antiseptic alternatives.
- When skin or mucous membranes are exposed to blood or OPIM, those areas of the body will be washed or flushed with running water as soon as possible after contact and seek appropriate Post Exposure Prophylaxis (PEP).

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- After removal of Personal Protective Equipment (PPE) used during exposure to blood or OPIM, the employee(s) will wash hands or other exposed skin areas with running water and soap as soon as possible.
- Do not eat, drink, smoke, apply cosmetics or lip balm, or handle contact lenses in work areas where there is a reasonable likelihood of exposure to blood or OPIM.

## 6.11 Scorpions

1. If an employee is stung by a scorpion the color of the scorpion and the size of its pincers must be noted and reported to the first aid nurse.
2. The person must be transported to the site first aid station and be made comfortable.
3. Depending on the assessment by the first aid nurse, the employee may be transported to the Golomoti District Hospital for further treatment.

## 6.12 Bee Stings


1. If an employee is stung by a bee(s) the first aid nurse must monitor the affected person for an allergic response.
2. If the person remains stable and does not show any signs of an allergic reaction for more than two hours they can be released back to the workplace.
3. If the person that was stung by a bee shows signs of an allergic reaction the first aid nurse is to attend to the employee immediately. Persons known to have allergies should always have their own supply of adrenalin.

## 6.13 Snake Bites

Black Mamba, Eastern Green Mamba, Puff Adder and Tree Snakes are the most likely dangerous snakes to be found in the area. All bites are potentially fatal. All people on site are required to wear long trousers and ankle covering shoes.

If an employee is bitten by a snake, the following steps are to be undertaken:

1. The person closest to the injured must report the incident to the site first aid nurse immediately, via the supervisor or directly.
2. The person closest to the injured must take note of the color and size of the snake and if possible, a photo should be taken of the snake for identification purposes and for the doctor to administer the correct snake bite serum.

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3. All employees should be evacuated from the area until the snake is found and removed.
4. The injured person must be made comfortable and kept calm to keep the heart rate slow, to prevent the injured from going into a state of shock.
5. It must always be assumed that the snake is poisonous, and the ambulance or closest doctor must be contacted immediately to treat the injured person for snake bite.
6. A snake catcher must attempt to capture and move the snake from the area. The snake must be removed from the area to an area of safety.
7. If the snake was killed by accident the specimen must be taken to the doctor or ambulance personnel for identification purposes.


## 6.14 Poisonous Plants

There are a variety of poisonous plants on site (e.g. velvet beans or buffalo beans), that may cause any one of the following symptoms upon dermal contact with them:

- Red rash within a few seconds of contact
- Possible bumps, patches, streaking, or weeping blisters
- Swelling
- Itching

The following procedure should be followed by the Site First Aid Nurse or a trained First Aider if an employee comes into contact with one of these plants:

1. Rinse the skin with rubbing alcohol, degreasing soap or detergents and lots of water;
2. Scrub under nails with a brush;
3. Apply wet compress, hydrocortisone cream to the skin to reduce itching and blistering;
4. The first aid nurse may administer antihistamine in extreme cases to relieve itching; and
5. In severe cases where the rash has developed on sensitive body parts, such as the face or on genitalia, refer the victim to Golomoti District Hospital.

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## 6.15 Heat Stroke

Heat stroke is possible due to the high summer temperatures and physical work. If an employee(s) presents with nausea, confusion, disorientation and/ or seizures, the following steps must be followed:

1. The body temperature must be recorded;
2. If conscious, cold water must be provided to drink and cool the employee using ice packs; and
3. The employee must be removed from the site and transported to the Golomoti District Hospital for treatment.


## 6.16 Hazardous Chemical Substances Spillage

It is not envisaged that there will be large quantities of hazardous chemical substances (HCSs) on site. However, fuel bowsers with fuel, gas and other chemicals may be on-site. It is vital that the construction personnel operate with due care and consideration of the environment.

All chemicals used on-site are to have the appropriate MSDS, and a safe work procedure, and/ or method statement for the safe usage, storage, disposal and emergency response. A list of the products is to be provided by each Contractor to the JCM HSE Manager. The list is to be kept up to date and changes communicated to all parties.

In the event of a spill, the steps to be taken are as follows:

1. Isolate the spillage to minimize danger to employees;
2. Stop spillage at source if possible;
3. Erect a barricade around the spillage to prevent spread and further contamination;
4. Obtain the HAZMAT spill kits;
5. Evacuate the area if there is danger of fire or fumes;
6. Notify the firefighting teams; and
7. Send any affected persons for further medical treatment to the Golomoti District Hospital;
8. Clean up the spillage using the appropriate materials, using the prescribed PPE.
9. Dispose of any hazardous waste in accordance with the waste management plan (refer to the JCM Construction Environmental and Social Management Manual).

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## 7 Reporting and Record Keeping

When reporting an emergency, the following information should be included:

- Nature of the emergency;
- Exact location, including Block number, Area number (where applicable);
- Present situation; and
- Name of person reporting the emergency, location and/or contact number (where applicable).

All injuries and occupational illnesses that require treatment by professional medical personnel will be recorded in the “injury and illness referred cases log”. Fatalities, and any injuries or occupational illness that result in an in-patient hospitalization, amputation, or loss of an eye, must be reported to the Golomoti District Labor Office within 8 hours.

Daily records of all first-aid treatments, not otherwise reportable as an injury or illness will be maintained on a prescribed form furnished to the First Aid Nurse upon request.

## 8 Monitoring and Review

Monitoring and review of the implementation of this EPRP will be undertaken in accordance with the requirements of the JCM HSMM (Document No: GOL-JCM-HS-RP-0002).



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**Annex A:**  
**Construction Phase First Aid Plan**

**Document Number: GOL-JCM-HS-RP-0003 -Annex A**



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## Document Version Control

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## List of Annexures

Annexure	Description
Appendix A	First Aid Kit Inspection Checklist Template
Appendix B	First Aid Supplies Inventory

## Abbreviations and Acronyms


Abbreviation / Acronym	Definition
CESMP	Construction Environmental and Social Management Plan
CPR	Cardiopulmonary resuscitation
DMO	District Medical Officer
EPRP	Emergency Preparedness and Response Plan
HIRA	Hazard Identification Risk Assessments
JHA	Job Hazard Analysis
JSA	Job Safety Analysis
MSDS	Material Safety Data Sheets

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Abbreviation / Acronym	Definition
OPIM	Other potentially infectious material
PPE	Personal Protective Equipment

## Glossary

Term	Definition
Automated external defibrillator	A small, portable device attached to a person's chest with wires that checks an individual's heart rhythm and gives the heart an electric shock (called a defibrillating shock) if necessary, that restores the correct, natural rhythm.
Bloodborne pathogen	Microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV), which causes acquired immune deficiency syndrome (AIDS).
Cardiopulmonary resuscitation	A method of external cardiac compressions, with or without mouth-to-mouth breathing, to keep oxygenated blood circulating after the heart has stopped.
First aid	Treatment that consists of using a non-prescription medication at nonprescription strength; administering tetanus immunizations (but not other immunizations or vaccines); cleaning, flushing, or soaking skin surface wounds; applying wound coverings such as bandages, Band-Aids™, gauze pads, butterfly bandages, or Steri-Strips™ (but not sutures, staples, and other wound closing devices); hot and cold therapies; applying non-rigid means of support such as elastic bandages, wraps, and non-rigid back belts; using temporary immobilization devices (e.g., slings, splints, neck collars, and back boards) to transport accident victims; drilling fingernails or toenails to relieve pressure; draining fluid from a blister; applying eye patches; removing foreign bodies from the eye using irrigation or a cotton swab (but not other means); removing splinters or foreign material from areas other than the eye by irrigation, tweezers, cotton swabs, or other simple means; using finger guards; massage therapy (but not physical therapy or chiropractic treatment); and administering fluids to relieve heat stress. In short, emergency care provided for injury or sudden illness before emergency medical treatment is available.
First aider	An individual trained in the delivery of initial medical emergency procedure, using a limited amount of equipment to perform a primary assessment and intervention while awaiting the attention of emergency medical services personnel.

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Term	Definition
Medical treatment	The response by professional medical personnel to serious injuries and illnesses such as puncture wounds, fractures, infections, second- and third-degree burns, and other injuries that require more than one-time first-aid treatment or observation.
Other potentially infectious material	Body fluids visibly contaminated with blood, including saliva in dental procedures, semen, vaginal secretions, amniotic fluid, and other such material where it is difficult to differentiate between body fluids.
Personal protective equipment	Protective covering for the head, eyes, hands, feet, and body, such as gloves, face shield, face mask, eye protection, or an apron or gown

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## 1 Introduction and Purpose

This document seeks to present a summary of the basic elements for a first aid plan at the JCM Golomoti Solar PV Site. The Plan defines specific first aid resources required to effectively respond to medical emergencies that may be associated with risks as identified in the JCM Golomoti Emergency Preparedness and Response Plan (EPRP) (Document No: GOL-JCM-HS-RP-0003).

### 1.1 Scope

This Plan has been developed to guide medical related responses at the Golomoti Solar PV Construction site or those caused or directly brought about in pursuance of the aforementioned Project. This shall apply to occupational related incidents or illnesses only. Project employees (including JCM and its contractors' personnel) and authorized visitors shall be covered by this First Aid Plan within site.


### 1.2 Objectives

The objectives of this First Aid Plan are to:

- Minimize the outcome of occupational related incidents or illnesses.
- Ensure compliance with requirements related to first aid.
- Determine quantities of appropriate and readily accessible first-aid supplies and first-aid equipment.
- Assign and train first -aid providers who will act as first respondents at incidents or accidents.
- Instruct all personnel about the First Aid Plan, including what employees should do if a co-worker is injured or ill.
- Provide for a scheduled review and update of the First Aid Plan to ensure the Plan is current and applicable to emerging risks in the workplace, including regular assessment of adequacy of the first-aid training course.

## 2 First Aid Plan Implementation

JCM shall ensure that a medical practitioner is readily available for consultation and provide advice on occupational health related matters (e.g. Golomoti District Health Office (DHO), Golomoti District Medical Officer (DMO)).

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The first aid plan shall be implemented taking full consideration of the JCM COVID-19 Infection Prevention and Control Measures (Document Ref: GOL-JCM-HS-RP-0005).

## 2.1 Site First Aid Facilities

The nearest health center, Golomoti Health Center is approximately 2.8 km north of the construction site (five-minute drive) and the nearest hospital, Mua Mission Hospital is located 18.7 km north west of the construction site (20-minute drive). Therefore, first-aid must always be available for all JCM and contractor employees and visitors.

Appropriately equipped first-aid stations must be easily accessible throughout the place of work. In addition, emergency showers and/or eyewash facilities will be made available in the first aid room and at site where there is a risk of exposure to corrosive materials. First Aid boxes and stations need to be checked and restocked when required by using a First Aid Kit Inspection Checklist (refer to template in Appendix A).

A qualified Nurse, responsible for administering first aid, will be based on site. Where on site first aid is unable to treat the condition/ injury the individual will be transferred to the local clinic for treatment. If the injury is severe the individual must be transported to the Mua Mission Hospital. JCM will maintain a well-equipped ambulance at site for emergency evacuation.

The on-site first aid room and first aid equipment shall be decontaminated as per the JCM COVID-19 Infection Prevention and Control Measures (Document Ref: GOL-JCM-HS-RP-0005).


## 2.2 First Aid Supplies

First aid supplies shall be approved by a consulting Physician (DMO) (see Appendix B for first aid supplies inventory). Site first aiders shall record expended items on regular basis. Each first aid kit shall be restocked by the First Aid Nurse following guidelines before being sent out on each job on need basis. The contents of the first-aid kit will be stored in a weatherproof container with individually sealed packages for each type of item.

Consultation with the DMO, Site First Aid Nurse, or a health care professional will determine the need for additional supplies and/or quantities of first aid equipment and supplies on the basis of Hazard Identification Risk Assessments (HIRA), employee requests, incident investigations, illness and injury reports or audits.

## 2.3 First Aid Personal Protective Equipment

Trained personnel and/or the First Aid Nurse administering cardiopulmonary resuscitation (CPR), first aid or other associated tasks (i.e. cleanup, disposal, etc.) will use universal precautions and wear the appropriate Personal Protective Equipment (PPE) in order to prevent contact with blood or other potentially infectious material (OPIM). All blood and OPIM shall be considered infectious regardless of the perceived status of the source.

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PPE for administering first aid shall be placed in the first aid boxes. In the first aid room, JCM shall ensure that PPE in appropriate sizes is readily available at all times for first aid. All PPE will be cleaned, laundered, repaired and disposed of at no cost to employees.

In addition, all employees who are responsible for administering first aid must:

- Wash hands immediately or as soon as feasible after removing gloves or other PPE.
- Remove PPE after it becomes contaminated and before leaving the work area.
- All first aid related PPE must be collected and disposed of in appropriate bins at the first aid room.
- Remove immediately or as soon as possible any garment contaminated by blood or OPIM in such a way to avoid contact with the outer surface.

## 2.4 Waste Disposal

Waste disposal shall follow the procedure laid down in the JCM Construction Environmental and Social Management Plan (CESMP) (Document No: GOL-JCM-ES-RP-0002). Bins from first aid room shall be color coded “Burgundy/Maroon-purple” and labeled accordingly. All first aid tools and equipment shall be considered contaminated and be treated as such. First aid room wastes shall not be combined with the rest of the wastes.


Disposable PPE, such as gloves and paper face masks, must not be shared and used again once removed. Place all PPE with visible contamination with blood or OPIM in a Sharps or Biohazard container.

## 3 Training

Only employees trained in first aid shall be allowed to provide first aid. First aid trained employees shall be made aware of their role during first aid such as reporting, assisting the first aider or first aid nurse, etc.

The primary source of first aid training and CPR shall be through authorized or certified institutions such as the St John Hospital, Red Cross Society, etc. Employees designated as responsible for rendering first aid or medical assistance will be trained on the sources, hazards, and avoidance of bloodborne pathogens, including universal precautions and the use of PPE. (see JCM COVID-19 Infection Prevention and Control Measures (Document Ref: GOL-JCM-HS-RP-0005) for more information).

JCM shall ensure that there is a first aid representative from either each team or section. Due to the nature of work and responsibility, first Aid training shall be required for a safety representative from all teams involved in hazardous or high-risk activities.

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### 3.1 Refresher Training

First aider responders trained in CPR shall participate in review and practice sessions every six months Instructor-led retraining for life-threatening emergencies will occur at least annually.

## 4 Record Keeping

In addition to H&S records that will be maintained on-site as per the JCM Health and Safety Management Manual (Document Ref: GOL-JCM-HS-RP-0002), copies of first aid certificates, training courses and refresher training will also be maintained at the JCM HR Office on site including the details (name, contact details, position) of each first aider.

First aiders shall have primary access to Material Safety Data Sheets (MSDS) for all chemicals kept and used at site.

## 5 Plan Review and Update


This First Aid Plan will be reviewed monthly by JCM and the Contractor(s) HSE Officers to determine if it continues to address the needs as identified by the JCM EPRP (Document Ref: GOL-JCM-HS-RP-0003) and JCM COVID-19 Infection Prevention and Control Measures (Document Ref: GOL-JCM-HS-RP-0005).

Job hazards information, injuries, illnesses shall be evaluated during the monthly reviews of the First Aid Plan. The evaluation will include the following information:

- Job Hazard Analysis (JHA)/Job Safety Analysis (JSA) reports;
- Injury and illness incidents reports, near-miss reports, and investigation reports;
- Worker’s compensation insurance carrier reports;
- Applicable Government Departments reports;
- Emergency Drill reports; and
- Method Statements.


Training, supplies and equipment needs will be modified to account for change in workplace safety and health hazards, worksite location and worker schedules since the last review.



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## Appendix A

### First Aid Kit Inspection Checklist Template

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## First Aid Kit Inspection Template

Inspected by: (insert name)

Kit Number	Location	Month / Year	Month / Year	Month / Year	Month / Year	Month / Year	Month / Year	Month / Year	Month / Year
		✓							
		x							

\*By ticking that first aid boxes and their contents have been inspected, the following has been inspected:

- XXXXX

(sites are to update this according to national legislative requirements and Appendix B)

Remarks:

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## Appendix B





### First Aid Supplies Inventory

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## First Aid Kits

Workplace Environment	Number of Employees	Recommended First Aid Box	Peak employment	Estimated First Aid Boxes
Low Risk	< 25	1 Small Kit	350	None
	25 - 100	1 Medium Kit		None
	100+	1 Large Kit per 100 employees		None
High Risk	< 5	1 small kit		None
	5 - 25	1 medium Kit		6 Site first Aiders
	25+	1 Large kit per 25 Employees		1 First Aid room

## Medical Supplies







Category	Item Description	Purpose	Location	Sample	Quantity required
Bandages & dressings	Conforming bandages	Dressing, retention and support sprains	First aid box		10x10
	Crepe Bandages	Padding & protection, light support to sprain and strains	Kit		5 boxes
	Adhesive dressing strips		Kit		10 boxes
	Eye/wound dressings	Promote healing and protect from further harm	Kit First aid room		10 boxes


	Gauze swabs	Ideal for cleaning around wound prior to dressing and help stop blood flow. An ideal alternative to cotton wool	Kit First aid room		10 boxes
	Large adhesive dressing		Kit First aid room		10 boxes
Biohazards	Sharps disposal containers	To avoid cross contamination by accidental contact, Disposal for incineration	First aid room		1 x >40L
	Disinfectant spray refillable bottle only	70% Isopropyl hand and surface disinfectant	First aid room Kit Ambulance		0
Burns first aid	Burns dressing	For treating 1 <sup>st</sup> , 2 <sup>nd</sup> & 3 <sup>rd</sup> degree burns and scalds	Kit First Aid Room		15
	Burns gel	Provide immediate relief from burns, scalds and sunburn	Kit First aid room		2
	Sun cream	UVA & UVB Protection	First aid room		5 tubes

Plaster	Blue detectable plasters	Highly visible and metal detectable. Designed to be used in catering first aid	Kit at kitchen		1 pack
Emergency Eye wash	Plastic eye bath	For immersing eyes during eye bathe	Work site First aid room		4
Empty first aid boxes and bags	Empty standard first aid boxes (medium)	To accommodate first aid products  To be deployed to various work fronts Suitable for protecting contents from weather elements			6
	Empty active first aid bag for nurse ( <b>large</b> , backstrap preferred)	For outdoor pursuits by first aid nurse	First aid room		1
Evacuation and rescue	Spine board	A patient handling device used in primary pre-hospital care. Are ideal for carrying patients and persons after sustaining injuries requiring spinal immobilization. Additionally, the board is PE material with no discharge	Ambulance		1

		contaminator and as a result are firm to wear			
Head immobilizer		Fixes a patient in one place to prevent further injury after suffering trauma	Ambulance		1
Splints		immobilize broken bones and sprain injuries	Ambulance		1
Dressing trolley		Keeps medical supplies readily available and easily accessible	Treatment room		1
Pedal bin		Stainless steel with inner plastic bin for easy disposal	Treatment room		2
Treatment couch		Easy to clean, adjustable, robust	Treatment room		1
First Aid room Furniture					



	Storage cabinet	For storing first aid supplies safely and securely	First aid room		0
	Weight measuring machine	With low profile foot plate	First aid room		1
	Anti-splash face shield	Protect from OPIM splashes	First aiders Ambulance Treatment room		20
	Surgical Face mask N95	Prevent splashing of OPIM i.e. saliva	Emergency response team		50*2 boxes
PPE	Disposable nitrile gloves	Prevent cross contamination and contact with OPIM	Emergency response team		50*4 boxes
	Plastic Apron	Prevent contact with OPIM (reusable/ disposable)	Treatment room		1

Resuscitator	Reusable adult resuscitator	In case of labored breathing	Ambulance		1
	Panadol 500mg	Fever and pain	First aid room & First Aid Kit		20 Strips
	Brufen 200mg	Pain relief	First aid room & First Aid Kit		20 Strips
	Diclofenac 100mg		First aid room & First Aid Kit		20 Strips
	Diclofenac 50mg		First aid room & First Aid Kit		20 Strips
	Indocid 25mg		First aid room & First Aid Kit		20 Strips
	Prednisalone 5mg		First aid room & First Aid Kit		20 Strips
	Eusol 100ml		First aid room & First Aid Kit		20
	Iodine 100ml		First aid room & First Aid Kit		25
	Silver sulphadiazine 30g		First aid room & First Aid Kit		20 Strips
	Magnesium Trisilicate		First aid room & First Aid Kit		1000
	Scissors 13cm		First aid room & First Aid Kit		20
	Iodine 15g		First aid room & First Aid Kit		40
	Cotton wool 500g		First aid room & First Aid Kit		10
Medication					



GOLOMOTI JCM SOLAR  
CORPORATION LIMITED  
**Malawi**

**JCM MALAWI**

7th Floor, West Wing  
Kang'ombe House  
City Centre  
Lilongwe

**CONTACT:**

Phylip Leferink (Director)  
[pleferink@jcmpower.ca](mailto:pleferink@jcmpower.ca)

**HEAD OFFICE**

21 St. Clair Avenue East  
Suite 700  
Toronto  
Ontario  
M4T 1L9  
Canada

Alan Cochran (ESG Director)  
[acochran@jcmpower.ca](mailto:acochran@jcmpower.ca)

## APPENDIX B: FINANCIAL PROVISIONS



Golomoti JCM Solar Corporation Limited  
7th Floor, West Wing  
Kang'ombe House, City Centre  
Lilongwe  
Malawi

Malawi Environmental Affairs Department  
Lingadzi House, Robert Mugabe Crescent  
Private Bag 394  
Lilongwe 3  
Malawi

**Attention: Directorate Malawi Environmental Affairs Department**

**Re: Financial provisions for the end-of-life disposal of the proposed Battery Energy Storage System for the Golomoti Solar PV Plant**

Dear Sir/Madam,

The estimated lifespan lithium-ion batteries are 10-15 years. Golomoti JCM Solar Corporation Limited (JCM), assumes responsibility for the associated financial provisions for the BESS disposal at the end of life-cycle.

Regards,

A blue ink handwritten signature, appearing to read 'Philip Leferink', with a stylized flourish at the end.

**Phylip Leferink**  
*Director, Malawi*

7<sup>th</sup> Floor, West Wing, Kang'ombe House, City Centre  
Lilongwe  
Malawi  
**Phone:** +265 99 595 9310 / +31 6 1268 1322 (WhatsApp)  
**Email:** [pleferink@jcmpower.ca](mailto:pleferink@jcmpower.ca)



## APPENDIX C: LAND LEASE AGREEMENT

**ORIGINAL**

93406  
**DEED REGISTRY No:...**

DATED THIS *1<sup>st</sup>* DAY OF *November*, 2020

**THE MINISTER OF THE MALAWI  
GOVERNMENT RESPONSIBLE FOR  
LAND MATTERS**

TO

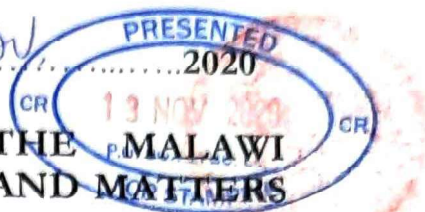
**GOLOMOTI JCM SOLAR CORPORATION LIMITED**

LEASE OF

**105.027 HECTARES OF CUSTOMARY LAND AT  
GOLOMOTI VILLAGE, TRADITIONAL AUTHORITY  
KACHINDAMOTO IN DEDZA DISTRICT/CENTRAL  
REGION**

TERM	: 50 Years
DATE OF COMMENCEMENT	: 1 <sup>st</sup> March, 2020.
RENT	: K2,037,400.00 per Annum
REFERENCE	: CR/DZ/2020/01

THIS LEASE made the 13th day of Nov



BETWEEN THE MINISTER OF THE GOVERNMENT RESPONSIBLE FOR LAND MATTERS (hereinafter called "the Minister") of the one part and GOLOMOTI JCM SOLAR CORPORATION LIMITED of Post Office Box 31218, Lilongwe, (hereinafter called "the Lessees") of the other part-

WITNESSETH as follows:

THE MINISTER HEREBY DEMISES unto the Lessee ALL THAT piece or parcel of land and premises more particularly described in the First Schedule hereto EXCEPT AND RESERVING unto the Minister as is herein and in the Land Act (Cap. 57:01) excepted and reserved TO HOLD the same unto the Lessee for the term of 99 (Ninety- Nine) years from First day of March, 2020 (Two Thousand and Twenty) YIELDING AND PAYING therefore yearly and proportionately for any of a year the rent of K2,037,400.00 (Two Million and Thirty Seven Thousand Four Hundred Kwacha) (subject to adjustment under the provisions of clause 3 hereof or letter M of the special conditions set out in the Second Schedule hereto and/or revision under the said Act) the said yearly rent (or adjusted or revised rent as the case may be) to be paid in advance (whether formally demanded or not) clear of all deductions on the first day of July in every year.

THE LESSEE to the intent that these obligations may continue throughout the term hereby created hereby covenants with the Minister as follows:

- (a) To perform and observe the covenants implied by the Regulations made by the Minister under the Land Act and any amendments or additions thereto which may from time to time be made by the Minister (hereinafter called "the Regulations");
- (b) To perform and observe the terms and conditions set out in the Second Schedule hereto.



**THE PARTIES HERETO HEREBY DECLARE AS FOLLOWS:-**

- (a) That if at any time hereafter a new scale of rents for Commercial purposes at Golomoti, Village in Dedza District shall come into use by the Minister then and so often as the same shall happen he shall be entitled to adjust and re-fix the yearly rent in accordance with such new scale with effect from 1<sup>st</sup> day of July next following its introduction the adjusted rent to be payable at the time and in the manner at and in which the original rent is hereby made payable;
- (b) That the foregoing powers of the Minister are in addition to his statutory power to revise the yearly rent under the Land Act.

In this lease unless the context otherwise requires the singular shall include the plural the masculine shall include the feminine and the neuter the expressions 'the Minister' and 'the Lessee' shall include the persons or corporations deriving title under them respectively and where there two or more persons jointly and severally and such persons shall be deemed to hold the demised premises as joint tenants.

**IN WITNESS** whereof **EUPHEMIA CHAWELERACHI BOTA,**  
Acting Commissioner for Lands for and on behalf of the Minister  
has set his hand and seal and the Lessees have set their hands and  
seal the day and year first above written.

## **FIRST SCHEDULE**

**ALL THAT** piece or parcel of land containing One Hundred Five decimal Point Naught Two Seven (**105.027**) hectares of customary land or thereabouts known as Lot No. **19** situated at Golomoti Village in Dedza District, Central Region the boundaries whereof being more particularly described and delineated on Survey Department Deed Plan No. **506/2020** hereunto annexed and thereon edged red.

## **SECOND SCHEDULE**

### **PURPOSE FOR WHICH THE LEASE IS GRANTED:**

Solar Power Generation

### **2. SUM TO BE EXPENDED ON DEVELOPMENT**

\$45,000,000.00

### **3. DATE BY WHICH DEVELOPMENTS TO BE COMPLETED**

28<sup>th</sup> February, 2022

### **4. SPECIAL CONDITIONS**

- a) In the making of any alterations or additions to the existing buildings on the demised premises the Lessees shall do all acts and things required by and perform the works conformably in all respects with planning approval and permissions and the provisions are statute rule or order or statutory instrument applicable thereto and the bylaws and regulations or any local authority having authority in that behalf in the district wherein the demised premises and situate.
- (b) The Lessees shall observe all statutory provisions and all provisions contained in any regulations made by a competent authority with regard to the carrying on of a trade or business on the demised premises.

- (c) The Lessees shall comply at once and give sufficient effect to every order direction or notice relating to the demised premises duly made by a competent authority.
  - (d) If required by the Minister the Lessees shall at all times during the said term keep the buildings for the time being upon the demised premises insured from loss, damage by fire and other usual risks to the full replacement value thereof including cost of debris removal, Architects, Surveyors and Legal fees in some insurance office of repute and will produce the policy and the receipt for the current year's premium when requested so to do AND if and whenever the said buildings shall be damages the Lessee will immediately thereafter apply all moneys received under any such insurance as aforesaid in or towards reinstating the said buildings and if the same moneys shall be insufficient for the purpose will provide out of his own moneys such further sums as may be required and will with all convenient speed the same for the purposes aforesaid.
  - (e) In its application to this lease No. 2 (A) of the Regulations shall be construed as if the words 'including replacement' were added in brackets after the words 'maintenance'.
5. In addition to the covenants implied herein by No. 2(1) of the Regulations and on his part to be performed the Lessee shall not share the possession of the demised premises or any part thereof without first obtaining the written consent of the Minister.

**SIGNED** by **KEUPHEMIA CHAWELERACHI BOTA**  
Acting Commissioner for Lands for and on behalf  
of the Minister of the Malawi Government  
Responsible for Land Matters  
in the presence of:-

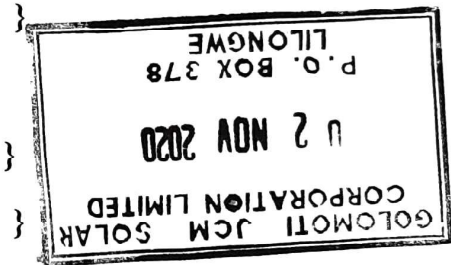
**WITNESS:** Patricia Mawasa Shumawasa

**ADDRESS:** P/Bag 811, LL3

**OCCUPATION:** Civil Servant

**THE COMMON SEAL** of  
**GOLOMOTI JCM SOLAR CORPORATION**  
**LIMITED**

was hereunto affixed  
in the presence of:



**Director:** John J.

**Secretary:** Monica Manda

Dated this 16 day of November 2020



**MALAWI  
DEED PLAN  
No. 506/2020...  
SCALE 1/10000**

COORDINATES (U.T.M.)

E 671 820.61 N 8 402 737.85

Department of Surveys  
Archive Reference

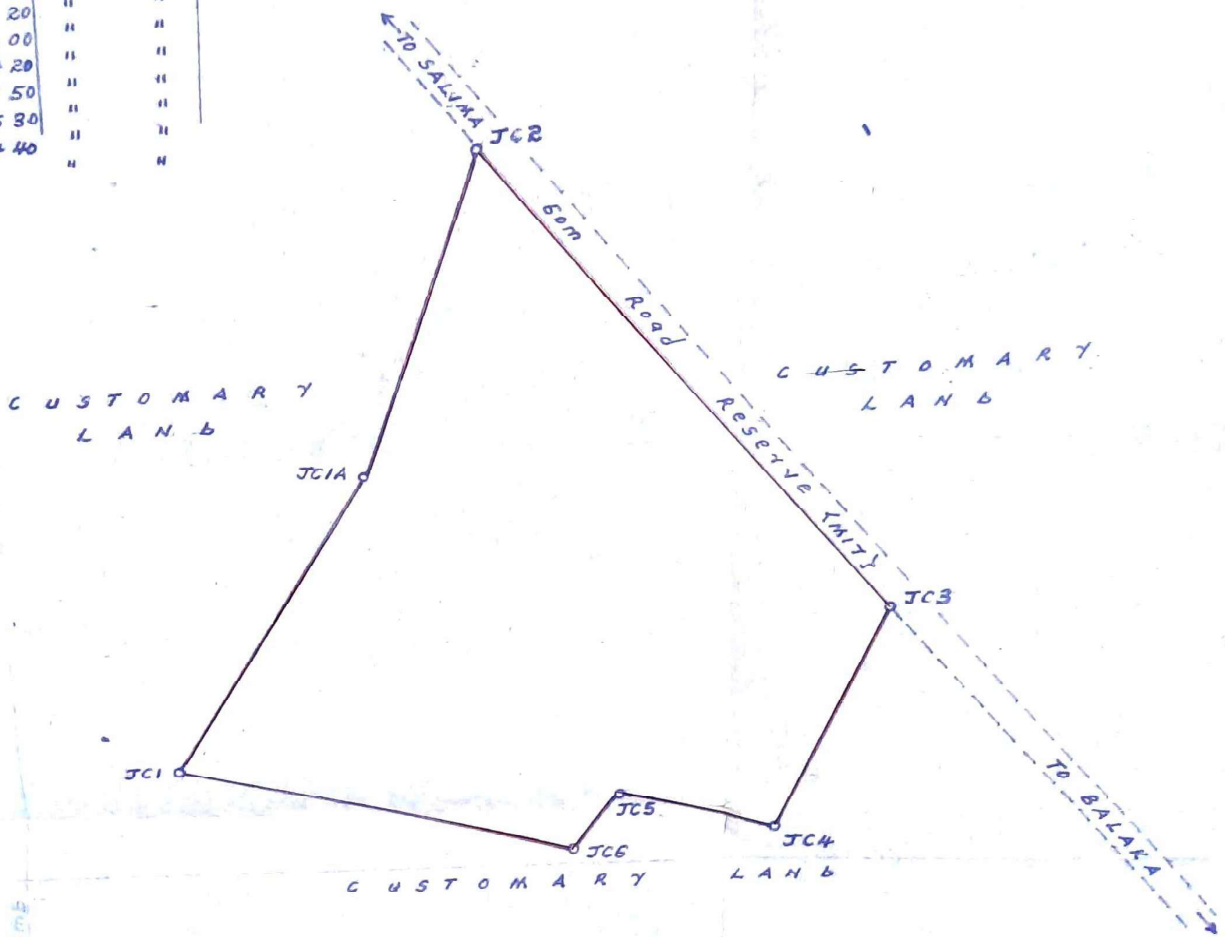
Original Plan No. SD/23030

of LOT 19  
Surveyed IN JANUARY, 2020  
by H.C. KANYANGALA

CENTRAL Region  
BEZA District  
MOLOMOTI Locality  
LOT 19  
Property Map 143483

**SIDES AND BEARINGS**

Beacon	Distance m	Bearing	Beacon Description
JC1	717.72	32 01 20	12mm I.R.C.
JC1A	699.01	18 41 20	" "
JC2	1238.60	141 32 00	" "
JC3	515.16	204 44 20	" "
JC4	309.44	284 09 50	" "
JC5	148.22	216 45 30	" "
JC6	798.80	285 14 40	" "
JC1			" "



The above figure marked JC1 - JC1A - JC2 - JC3 - JC4 - JC5 - JC6 - JC1 and edged red represents 105.027 Hectares of Land  
Drawn by J.B. KASIMBA I certify that this deed plan conforms with the Original Plan No. SD. 23030

Checked by S. MWANDAWIRE approved by the Surveyor General and that numerical data shown above are mutually consistent

*[Signature]*

Surveyor General  
Lilongwe 27/04/2020

DEED REGISTER, MALAWI  
Registered 17th November  
2020 at 09:00 AM  
Stamp duty K30,560.00  
Registration fees K5000  
Drawing fees K5000  
Receipt No. K10,000

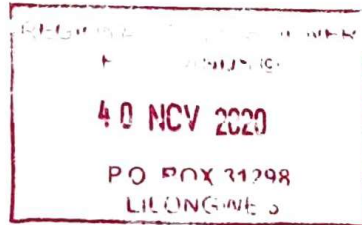
**CERTIFICATE OF PREPARATION**

*This is to certify that this document was prepared by Malawi Government and presented for registration by the undersigned*

93406  
Mphande  
Washington I.S. Mphande  
Land Registrar

Signature:   
Name: Philip Mwanza  
Post: ARCI

**Date Stamp:**



REFERENCE FILE NO. CR/DZ/2020/01

## APPENDIX D: CVS OF PROJECT TEAM

## APPENDIX D: CVS OF PROJECT TEAM

SLR is a specialist Environmental Consultancy with considerable experience in the Power sector and a proven track record in the delivery of project authorisations and technical reports compliant with African regulations, current best practice, and appropriate rehabilitation, closure and environmental management plans. SLR's Environmental Team works closely with in-house engineering teams to provide an integrated multi-disciplinary approach to project delivery.

The SLR project team is comprised of the following key staff members

Stuart Heather-Clark Project Director ESIA	Qualifications	Experience Relevant to this Assignment
 <p>Stuart has 24 years of experience in international ESIA's. He has worked on over 100 development projects in 13 sub-Saharan African countries. More recently Stuart has been involved in ESIA's, ESDD's and Gap Analyses for a variety of renewable energy project across Sub-Saharan Africa including HFO hybrids, gas, wind, solar PV and hydropower projects. Stuart has acted as an environmental advisor to various development agencies and lenders and he has an integral understanding of the Equator Principles and IFC Performance Standards.</p>	<p>BSc (Hons) Civil Engineering and Masters Environ. Science</p> <p>Member of IAIA International</p> <p>Certified Environmental Practitioner in South Africa</p>	<p>Stuart has the following relevant project experience in the Power Sector across Sub-Saharan Africa including the following countries: South Africa, Mozambique, Namibia, Angola, Kenya, Ethiopia, Zambia, Zimbabwe, Ghana, Malawi, Liberia and Gabon.</p> <ul style="list-style-type: none"> <li>• ESIA for a 20MW solar PV plant, Gigawatt Global, Liberia, 2020</li> <li>• ESIA for a 250MW wind farm, Mphepo Power, Zambia, 2019-2020</li> <li>• ESDD for a 20MW solar PV plant, Confidential, Zimbabwe, 2018.</li> <li>• ESIA for 2 x 20MW solar PV plant for Globeleq's investment in the GETFIT Programme in Zambia, 2018</li> <li>• ESIA for a 40MW solar PV farm, Enel Green Power, South Africa, 2017</li> <li>• ESIA for a 100MW to 250MW solar PV Plant, Globeleq, Zambia, 2016-17</li> <li>• E&amp;S Screening and Site Selection Study for a solar PV Plant, Confidential client, Zambia, 2016</li> <li>• Environmental and Social Due Diligence (ESDD) of a 140 MW wind farm in South Africa, Confidential Client, South Africa, 2016</li> <li>• Strategic Environmental Assessment for the supporting infrastructure for the Baynes Hydropower Project, Baynes PJTC, Namibia/Angola, 2014-15</li> <li>• ESDD of six solar PV projects across South Africa, Confidential Client, South Africa, 2016</li> <li>• Environmental Advisor ESIA for the Mphanda Nkuwa Hydropower Project in Mozambique, 2010</li> <li>• Environmental and Social Management Plans, Wind Farm Development, Confidential Client, Kenya, 2016</li> <li>• ESDD for a 98 MW wind farm in South Africa, Confidential Client, South Africa, 2015</li> <li>• ESDD for a 2 x 75 MW solar PV farm in South Africa, Confidential Client, South Africa, 2015</li> <li>• ESDD for a 74 MW wind farm in South Africa, Confidential Client, 2015</li> <li>• ESDD for a Wind Farm Development in Coega, Electrawinds, South Africa, 2011.</li> </ul>



Amishka Mothilal	Qualifications	Experience Relevant to this Assignment
	<p>BSc Environmental Science and BSc (Hons) Environmental Management</p> <p>Member of IAIA International</p>	<p>She has a wide range of experience in environmental audits and environmental legislative risk screening in the oil and gas and infrastructure sectors. Recent key project experience includes an environmental and social feasibility assessment for Engie as well as a part two amendment report for the Rheboksfontein Wind Farm facility on behalf of Engie.</p> <ul style="list-style-type: none"> <li>• IFC Performance Standards Legislative Gap Analysis - Anglo American South Africa (Pty) Ltd, (2019)</li> <li>• Part Two Environmental Authorisation Amendment Report - ENGIE Southern Africa (Pty) Ltd, Rheboksfontein Wind Farm Development, (2020)</li> <li>• Environmental and Social Screening Assessment - ENGIE Southern Africa (Pty) Ltd, Greenfield Wind Farm Development (2020)</li> <li>• ESIA for ION Geophysical Corporation - Seismic Surveys, Angola, (2019)</li> <li>• ESIA for the Eni South Africa B.V South Africa –Exploration Drilling within Block ER236, off the East Coast of South Africa, (2018 - 2019)</li> <li>• ESIA for the Alcatel Submarine Networks UK Ltd, METISS Subsea Cable System Project, Amanzimtoti, KwaZulu-Natal, South Africa, (2019)</li> <li>• Legislative compliance risk assessment - Confidential Client – Legislative compliance risk assessment of 407 retail service stations, South Africa, (2019)</li> <li>• Environmental Audits - Total South Africa (Pty) Ltd, Audits of Fuel Infrastructure at 40 commercial portfolio sites in KwaZulu-Natal, South Africa, (2020)</li> </ul>
<p>Amishka is an Environmental Consultant at SLR with over 5 years of experience in environmental consulting, project management and community engagement. Her primary focus has been in the execution of environmental management, planning and approval tasks.</p> <p>Amishka’s key areas of involvement are the oil and gas, infrastructure and power sectors. She has been involved in project authorisations and permitting processes of renewable energy facilities for new developments, expansions as well as site feasibility assessments.</p>		

## Curriculum Vitae

**Position Title:** Malawi Manager  
**Name of Expert:** Kent Kafatia  
**Country of Citizenship/ Residence:** Malawi

### Education:

- 1) Loughborough University of Technology, England. *MSc in Water and Waste Engineering*. (1986 – 1987).
- 2) Syracuse University, New York. *BSc. Chemical Engineering (Environmental)*. (1974 – 1978).
- 3) SUNY, College of Environmental Science & Forestry, New York. *BSc in Forestry (Pulp and Paper Engineering)*. (1974 -1977).
- 4) VKI, Denmark. *Post graduate Diploma in Water and Environment Management*. (2000)
- 5) University of the North, RSA. *Postgraduate Certificate in Water and Environmental Management*. (1998)

### Membership of Professional Associations:

- 1) Registered Engineer, 1987, Malawi Board of Engineers
- 2) Chairman of the Technical Committee on Environment for Malawi, 1994 to date
- 3) Member of National Committee on Environment (NCE)
- 4) Have been a member of several professional organizations (American Institute of Chemical Engineers, American Society of Mechanical Engineers, American Accredited Safety Auditors, and the Institute of Environmental Managers, UK)

### Languages:

Language	Speaking	Reading	Writing
English	Excellent	Excellent	Excellent
Chichewa	Native	Native	Native

### Adequacy for the Assignment:

Detailed Task Assigned	Reference to prior work/Assignments that Best Illustrate Capability to Handle the Assigned Task
<ul style="list-style-type: none"> <li>• Deployment of a well-qualified and experienced team.</li> <li>• Taking part in training of deployed research assistants for assisting with the baseline surveys and consultations.</li> <li>• Planning all the activities and liaising with the Client</li> <li>• Coordinating the whole assignment.</li> <li>• Providing quality assurance and document control</li> <li>• Ensuring that outputs are delivered according to the Terms of Reference and on time.</li> </ul>	<p><b>Name of assignment or project:</b> Environmental and Social Impact Assessment (ESIA) for the proposed Kanengo Solar Project  <b>Year:</b> 2019  <b>Location:</b> Kanengo, Lilongwe  <b>Client:</b> JCM Kenya  <b>Positions held:</b> Team leader (Sub consultant)</p>
	<p><b>Name of assignment or project:</b> Environmental and Social Impact Assessment (ESIA) for the proposed 20 to 40 megawatt (MW) solar power plant-Dedza  <b>Year:</b> 2019  <b>Location:</b> Golomoti, Dedza  <b>Client:</b> JCM USA  <b>Positions held:</b> Team leader (Sub consultant)</p>
	<p><b>Name of assignment or project:</b> Environmental and Social Impact Assessment (ESIA) for the proposed 20 to 40 megawatt (MW) solar power plant-Salima  <b>Year:</b> 2018  <b>Location:</b> Salima  <b>Client:</b> JCM Kenya  <b>Positions held:</b> Team leader (Sub consultant)</p>
	<p><b>Name of assignment or project:</b> Resettlement Action Plan for Mozambique-Malawi 400 Kv Power Interconnection Project</p>

<ul style="list-style-type: none"> <li>• Leading in the conducting of the Reconnaissance survey</li> <li>• Leading in the conducting of Literature gathering and review as well as design of data collection tools</li> <li>• Analysing and presenting alternatives</li> <li>• Identification of Impacts</li> <li>• Evaluation of Impacts</li> <li>• Determination of Enhancement and Mitigation Measures for the Impacts</li> <li>• Preparation of the Environmental and Social Management Plan and the Monitoring Plan</li> <li>• Leading in the Preparation of the ESIA Report.</li> </ul>	<p><b>Year:</b> 2019  <b>Location:</b> Mwanza, Neno, Balaka  <b>Client:</b> ESCOM  <b>Positions held:</b> RAP Team Leader (Sub-Consultant)</p>
	<p><b>Name of assignment or project:</b> Consultancy Services for Chimgonda &amp; Mpatamanga Hydropower Plants Environmental and Social Impact Assessment Study  <b>Year:</b> January 2015 – June 2015  <b>Location:</b> Malawi  <b>Client:</b> Ministry of Natural Resources, Energy and Mining  <b>Positions held:</b> Team Leader and ESIA Expert</p>
	<p><b>Name of assignment or project:</b> Environmental and Social Management Plan for the Construction of a new 132 kV Overhead Transmission Power Line from Chintheche to New Bwengu via Luwinga (Mzuzu) in Malawi  <b>Year:</b> May 2014 – November 2014  <b>Location:</b> Mzuzu, Mzimba and Nkhata Bay  <b>Client:</b> Fichtner (for Millennium Challenge Account (MCA) – Malawi and The Malawi Government  <b>Positions held:</b> Team Leader and ESIA Expert</p>
	<p><b>Name of assignment or project:</b> Assessing environmental and social impacts for 10 potential sites for wind power generation as well as ranking the sites  <b>Year:</b> June 2010  <b>Location:</b> Malawi  <b>Client:</b> Ministry of Energy and Mining  <b>Positions held:</b> ESIA expert.</p>

**Expert's contact information:**

Email: <a href="mailto:Kentkafatia@gmail.com">Kentkafatia@gmail.com</a> <a href="mailto:kentkafatia@yahoo.com">kentkafatia@yahoo.com</a>		Phone: <u>265 999 831 595</u>
--	--	-------------------------------

**Certification:**

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience, and I am available, as and when necessary, to undertake the assignment in case of an award. I understand that any misstatement or misrepresentation described herein may lead to my disqualification or dismissal by the Client, and/or sanctions by the Client.



24 February 2020

Kent Kafatia  
 Name of expert  
 Signature

Date:

## **ANNEXURE B: CORRESPONDENCE FROM THE EAD AND MINUTES OF MEETING WITH THE EAD**

Telephone: 01 771 111  
Telefax No.: 01 773 379  
Our Reference No.: EAD/99/07/05.  
Your Reference No.....



ENVIRONMENTAL AFFAIRS DEPARTMENT  
LINGADZI HOUSE  
CITY CENTRE  
PRIVATE BAG 394  
LILONGWE 3  
MALAWI

Communications should be addressed to:  
The Director of Environmental Affairs

14<sup>th</sup> December, 2020

The Managing Director  
JCM Solar Corporation Limited  
Kang'ombe House  
City Centre  
Lilongwe

Dear Sir,

**RE: PROPOSED BATTERY STORAGE ENERGY SYSTEM FOR THE GOLOMOTI SOLAR PV PLANT**

Reference is made to your project brief on the above-captioned subject which was submitted to the Department for review and guidance.

Considering that an Environmental and Social Impact Assessment (ESIA) for proposed Golomoti Solar PV Plant project was approved in February 2020 and that the Battery Storage System will be installed within the proposed project site therefore you are not required to conduct further assessment. However, you are requested to provide an addendum to the ESIA report explaining the details of the proposed Battery Storage System including the following:

- Safety and stability;
- Transportation;
- Maintenance; and
- Battery disposal after shelf life.

No objection to implement the proposed additional activities can only be granted after the addendum has been submitted and approved by the Department.

Should you have any questions on the matter do not hesitate to contact the Department. I look forward to your full cooperation on this matter.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'Tawonga G. Mbale-Luka'.

Tawonga G. Mbale-Luka  
**DIRECTOR OF ENVIRONMENTAL AFFAIRS**

## Meeting Notes

To: SLR Consulting Africa (Pty) Ltd      Venue: \_\_\_\_\_  
Water Waste and Environment  
From: Consultants      Ref: JCM Power ESIA Addendum - 710.07078.00001  
Date: 09/12/2020      Time: 10h00 am (CAT)  
Subject: JCM Power Golomoti Solar PV Plant BESS – Meeting with Malawi Environmental Affair Department  
Attendees: Kent Kafatia (KK); Jonas Sani (JS); Mrs Catherine Katambo

### 1. INTRODUCTION

The meeting started at 10.30am with self-introduction by the members present. Thereafter, Mr. Jonas Sani presented JCM as an independent power producer, currently developing two solar power projects at Salima and Golomoti in Malawi.

### 2. REMARKS BY JONAS SANI (JCM)

Mr. Jonas Sani said that while the Salima Solar project is at an advanced stage of construction, the Environmental and Social Impact Assessment report for the Golomoti Solar Project was approved by the Environmental Affairs Department (EAD) and awaiting issue of the Environmental Certificate. Extensive consultations have already been undertaken and some are under way. Compensations have already been paid to the Project Affected Persons (PAPs) and construction works are anticipated to start soon.

Mr. Jonas Sani explained that JCM has engaged SLR Consulting (Africa) (Pty) Ltd, with local support from Water, Waste and Environment Consultants (WVEC), to prepare the Project Brief and to seek direction from the EAD on what environmental work, if any, would be needed for the installation of a Battery Energy Storage System (BESS); within the project footprint of the Golomoti solar power project. The proposed BESS would store up to 8MW/10MWh, which will facilitate stable and consistent supply of power and feed into the national energy grid during power outages. Mr Sani also showed a brief video presentation of the BESS.

### 3. PRESENTATION BY KENT KAFATIA (WVEC)

WVEC on behalf of SLR presented the Project Brief, highlighting that the proposed activities for installation of the BESS to involve:

1. installing up to up to 6 x 40ft shipping containers within the substation site in the existing Solar PV Plant footprint, north-west area of the site, in proximity to the on-site substation;



SLR Consulting (South Africa) Proprietary Limited

Registered Address: Suite 1 - Building D, Monte Circle, 178 Montecasino Boulevard,  
Fourways, Johannesburg, Gauteng, 2191  
Postal Address: PO Box 1596, Cramerview, 2060, South Africa

Reg. No: 2007/005517/07

Vat No: 4630242198

Directors: R Hounsome, F Fredericks, D Junak

Johannesburg Office: Physical Address: Suite 1 - Building D, Monte Circle,  
178 Montecasino Boulevard, Fourways, Johannesburg, Gauteng, 2191  
Postal Address: PO Box 1596, Cramerview, 2060 Tel: +27 11 467 0945

Cape Town Office: Physical Address: 5th Floor, Letterstedt House, Newlands on Main,  
Cnr Main and Campground Roads, Newlands, Cape Town, Western Cape, 7700  
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2. stacking lithium-ion batteries in the shipping containers; and
3. no additional operational requirements except keeping the grounds clean and secure as already planned for the entire solar power generation facility.

The proposed BESS will not result in additional waste generation during operation. However, after the estimated lifespan of approximately 10-15 years, the envisaged BESS disposal methods will be either to return it to the original equipment manufacturer or to dispose it at a dedicated lithium recycling facility, depending on the availability of the disposal facility at that time.

JCM have an existing community liaison team that conducts regular engagement with stakeholders. The team maintains a list of potentially interested and affected parties who will receive updates on the project through the JCM community liaison process.

The potential positive impact associated with the proposed BESS include “storage of excess electricity and releasing it during periods of high electricity demand; ensuring a steady and safe electricity supply, stable and consistent supply of power, as well as enabling the power to be released into the national grid during power deficiency. The BESS will also reduce dependence on hydroelectric power and diesel-powered emergency generation sets. This may lower costs to the consumer and reduce the impact on climate change. The impacts associated with the storage of electricity by the BESS will further add to the original positive impact significance of the Solar PV Plant ESIA.

The potential negative impacts from the BESS will be insignificant and may be due to dust and emissions, noise, water contamination and heat which can potentially occur at any point en-route to the facility, during construction or operation / maintenance at the facility or during decommissioning and safe-making for disposal. These impacts will be the same as those to be generated by the Solar PV plant and will be mitigated together with those for the Solar PV project.

#### **4. REMARKS BY EAD**

In response to the presentation, the EAD acknowledged receipt of the electronic version of the Project Brief and the hard copy from JCM. However, the EAD requested for two additional hard copies and advised that they would provide their response early the week of 14th December 2020.

#### **5. CLOSING REMARKS BY JONAS SANI (JCM)**

In closing, JCM thanked the EAD for accepting to meet at short notice and stressed the urgency of the project so as to timely respond to the country’s critical national energy demands and unreliability.

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