



**MINISTRY OF TRANSPORT AND PUBLIC WORKS
SOUTHERN AFRICA TRADE AND CONNECTIVITY PROJECT**

**ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN FOR
INSTALLATION OF SOLAR POWER BACKUP SYSTEMS FOR SELECTED OFFICES
FOR MALAWI BUREAU OF STANDARDS (MBS), DEPARTMENT OF
AGRICULTURAL RESEARCH SERVICES (DARS) AND DEPARTMENT OF ANIMAL
AND LIVESTOCK HEALTH DEVELOPMENT (DALHD)**

Contact Details

The Project Manager
Southern Africa Trade and Connectivity Project
Private Bag 322
Lilongwe

17 JUNE , 2026

TABLE OF CONTENTS

LIST OF ACRONYMS	1
CHAPTER 1: INTRODUCTION.....	2
CHAPTER 2: PROJECT DESCRIPTION	6
2.2 Nature of the Project.....	6
2.3 Main activities and processes	20
2.3.1 Pre-installation Phase	20
2.3.2 Solar Power Backup Installation Phase	20
2.3.4 Operation Phase.....	20
2.4 Types of Materials to be used.....	20
CHAPTER 3:.....	23
DESCRIPTION AND ASSESSMENT OF ENVIRONMENTAL AND SOCIAL SETTING OF THE POWER BACKUP INSTALLATION SITES	23
CHAPTER 4:.....	29
DESCRIPTION AND ASSESSMENT OF IDENTIFIED ENVIRONMENTAL AND SOCIAL RISKS AND IMPACTS AND PROPOSED MITIGATION MEASURES.....	29
4. Brief description of environmental and social impacts and risks.....	29
4.1 Positive Impacts.....	29
4.2 Potential negative impacts and mitigation measures during installation Phase	29
4.3 Potential negative impacts and mitigation measures during operation Phase	32
4.4.1 Rating criteria on risk of impact occurrence	Error! Bookmark not defined.
4.4.2 Rating criteria on impact duration of occurrence	Error! Bookmark not defined.
4.4.3 Criteria of impact rating based on magnitude	Error! Bookmark not defined.
4.4.4 Criteria on assessment of significance of impacts.....	Error! Bookmark not defined.
5.0 Summarized mitigation plans for environmental and social risks and impacts	34

LIST OF ACRONYMS

CoC	Code of Conduct
DAHLD	Department of Animal Health and Livestock Development
DARS	Department of Agriculture Research Services
ESMMP	Environmental and Social Management and Monitoring Plan
ESS	Environmental Safeguards Specialist
FMS	Financial Management Specialist
ICTS	Information Communication Technology Specialist
MBS	Malawi Bureau of Standards
MEPA	Malawi Environment Protection Authority
MRA	Malawi Revenue Authority
OHSS	Occupational Health and Safety Specialist
PIU	Project Implementation Unit
PS	Procurement Specialist
SATCP	Southern Africa Trade and Connectivity Project
SPS	Sanitary Phyto Sanitary
SSS	Social Safeguards Specialist

CHAPTER 1: INTRODUCTION

1.1 Background Information

The Government of Malawi (GoM) has obtained a credit and grant from the International Development Association (IDA) under the Southern African Connectivity and Trade Project (SATCP) to support efforts to reduce trade costs and time, increase access to improved infrastructure, and increase value chain development in targeted corridors of Malawi and Mozambique.

The Government of Malawi intends to apply part of SATC project funds to promote trade facilitation, and pursuant to the decision of the Malawi Bureau of Standards, Department of Agricultural Research Services (DARS) and Department of Animal Health and Livestock Development (DAHLD) will install fully functional and modern information management systems to improve processes associated with the management of import and export of agricultural products. To enable these systems to function efficiently there is need for stable power supply, and power supply whenever the national grid is not functioning. In view of the foregoing MBS, DARS and DAHLD with support from the project intend to hire a contractor to supply and install solar power systems to selected offices of the aforementioned agencies. The list of the selected offices is presented in Table 1.

Table 1- List of selected offices for Installation of solar power (solutions) systems

MBS Sites	DAHLD Sites	DARS Sites
Muloza border MBS office	DAHLD head office (Lilongwe, area 3)	Chitedze Research Station
Lilongwe regional office (Area 14)	Likuni DAHLD office	Kanengo DARS office
Kamuzu International Airport office	DAHLD Blantyre veterinary office	Bvumbwe Research Station
Mzuzu regional Office	DAHLD Mikolongwe	Lunyangwa Research Station
Songwe Office	Mzuzu veterinary	Baka Research Station
Chitipa Office		Makoka Research Station
Mwanza office		Blantyre ADD office
		Karonga ADD office

1.2 Objectives of the ESMMP

The underlying objective of this Environmental and Social Management and Monitoring Plan (ESMMP) is to ensure that potential environmental and social impacts associated with the installation and operation of the proposed solar power backup system are identified, mitigated, and monitored throughout the project lifecycle.

The specific objectives of the ESMMP are to:

- Identify and assess potential environmental and social impacts associated with the installation and operation phases of the project;
- Propose practical mitigation measures to avoid, minimize, mitigate, manage, compensate or offset adverse environmental and social including occupational health and safety impacts arising from project activities;

- provide environmental and social monitoring measures to ensure effective implementation of mitigation actions during project implementation;
- Define roles and responsibilities for implementation and monitoring environmental and social mitigation measures during the project lifecycle; and
- Comply with the applicable national legislation, World Bank safeguard operational policies governing the SATCP project, in particular OP/BP 4.01 on Environmental Assessment, and the World Bank Environmental, Health and Safety (EHS) Guidelines.

1.3 Justification of the ESMMP

The PIU conducted an environmental and social screening for the proposed installation of a solar power backup system across all the 20 sites, in accordance with the requirements of the World Bank Safeguards Operational Policy 4.01 on Environmental Assessment and the SATCP ESMF. Following the screening, the recommendation was to prepare a single ESMMP covering all the 20 proposed sites on the basis that the works are of similar and limited nature, confined to existing buildings and involve no land acquisition or community displacement

To meet the requirements of Section 31 of Malawi's Environment Management Act (EMA), 2017, and the Environmental Impact Assessment (EIA) Guidelines of 2025, the PIU submitted a Project Brief to the Malawi Environmental Protection Authority (MEPA). A Project Brief was considered the appropriate instrument given the limited scale of the proposed works, which are confined to existing buildings and involve no significant land disturbance, habitat clearance, or community displacement. MEPA reviewed the Project Brief and granted environmental clearance by letter dated 10th October, 2025. A copy of the MEPA clearance letter is provided in Annex 3 this ESMMP.

1.4 Approach and Methodology

To accomplish the objectives of the assignment the following methodologies were used:

1.4.1 Desk study and Literature review

A desk study was conducted to review existing documentation relevant to the sub-projects, including the SATCP Environmental and Social Management Framework (ESMF), applicable World Bank safeguard policies, the World Bank Environmental, Health and Safety (EHS) Guidelines, Malawi's Environment Management Act (2017), the EIA Guidelines (2025), the National E-Waste Management Policy (2024), and technical specifications for the proposed solar power systems. Review of available maps and satellite imagery was also undertaken to characterise the environmental and social setting of each of the 20 proposed sites prior to field visits.

Preparation of the ESMMP involved review of literature related to the sub-project i.e. proposed solar system specifications in order to establish the policy and legislative framework within which the project operates, understand the technical nature and scope of the proposed works and to characterize the environmental and social setting of the 20 proposed sites before field visits were made. This review of literature helped to gain a deeper understanding of the project and setting of the proposed project sites. A desk study and literature review was conducted as the first step in the preparation of this ESMMP.

1.4.2 Field Investigation

Field investigation were carried out by PIU's Environmental Safeguards and Social Safeguards Specialists guided by Controlling Officers of the sites. Site visits and field investigations were conducted from 23 to 30 March 2026. The objective of the field visits was to familiarize the project team with the existing conditions and setup of the proposed project sites.

The visits also enabled the team to: (i) assess the structural integrity of the existing buildings intended to host the solar panels; and (ii) review the existing fire-safety and firefighting arrangements in those buildings where the solar backup systems will be installed. As part of the structural and roof assessment, visual inspection was conducted by the Environmental Safeguards Specialist on each site to screen for the presence of asbestos containing materials on the roofs and walls where drilling is proposed. This method involved observing the material's physical characteristics, such as color, texture, and durability, taking into account the age of the building, to determine if it potentially contains asbestos. No suspected asbestos materials were identified at any of the 20 sites. Should any suspected asbestos material be encountered during works, the contractor shall immediately stop work, isolate the area and notify PIU before proceeding. Works shall not recommence until the material has been assessed by a qualified person and appropriate management procedures are in place.

In addition, the site visits provided an opportunity to observe the natural and socioeconomic environment surrounding the proposed buildings in order to identify and predict potential impacts of the project.

1.4.3 Stakeholder consultations

Consultations were done in parallel with the site investigations. The target stakeholders were the office users and agencies that share the same building with the SPS agencies. The underlying objective of stakeholder consultations was to solicit their views, concerns and suggestions on how negative impacts can be mitigated and how benefits can be enhanced. Consultations also included relevant regulatory authorities, specifically the Department of Occupational Safety and Health and the Environmental Affairs Department (Ministry of Natural Resources and Climate Change), whose input has been incorporated into the mitigation measures presented in Chapter 4.

Specifically, the following were achieved through stakeholder consultations:

- Inform stakeholders about the project,
- Provide opportunity for stakeholders to discuss their views, opinions and concerns,
- Verifying significance of identified environmental, health, safety and social impacts, and
- Managing their expectations and misconceptions on the project.

The main methods used during consultations was interviews. The full list and summary of stakeholder consultations outcome have been included in this report as Appendix 1.

Site visits also included a screening for the presence of physical cultural resources in accordance with OP/BP 4.11. No physical cultural resources were identified at any of the proposed sites.

1.5 Project Duration and Estimated Cost

The project will be implemented over a period of 6 months, including supply and installation. The work will be carried out in phases across the sites, but under one overall contractor. Each site is expected to take no more than ten (10) working days to complete installation and commissioning. The contractor will deploy four key experts (The project Manager to oversee installation, ensuring that all aspects of the project are completed according to the plan; Renewable Energy Engineer; Electrical Engineer; Environmental Specialist, Health and Safety (EHS Specialist), together with 5 technicians. The estimated cost for the project is 600,000 USD covering both supply contract (procurement of lithium batteries, solar panels and associated accessories) and installation contract.

1.6 Potential Users of the ESMMP

The ESMMP has been prepared for use by different stakeholders involved in the project. The users will include:

- Project Implementation Unit (PIU),
- MBS,
- DAHLD,
- DARS,
- Contractor,
- Oversight and Regulatory Institutions (Ministry of Labour, MERA, MEPA),
- World Bank; and
- General public.

CHAPTER 2: PROJECT DESCRIPTION

2.2 Nature of the Project

The power backup installation will be done in 20 sites which have been selected by users namely MBS, DARS and DAHLD, based on institutional needs. The installation activities will include:

- Mounting mono-crystalline solar panels on roof with use of a rack;
- Installation of Inverter Transformers Based Hybrid Inverters and some voltage regulators;
- Mounting on walls different sizes of Lithium Batteries and,
- Installation of all necessary wirings for power distribution.

These works will be done in and on already existing buildings owned by the user agencies. The solar system's capacity ranges from 5KVA to 10 KVA. The details for each site are presented in Table 2.1.

Table 2.1 – Nature of works for each proposed site.

No	Site	Location	Proposed System Specifications	Batteries Location
1	Muloza Border MBS office	Mulanje District on the following coordinates Latitude - 16.07412, Longitude 35.67739.	There is no existing solar power system at the moment at Muloza Border. The proposed solar system will connect Printers, Computers, lights bulbs, and Network Equipment. Activities will include; • Mounting (12) 400-Watt solar Panel (mono-crystalline solar panel) on roof with use of a rack; • Installation of 5 KVA, 48V Inverter Transformer Based Hybrid Inverter and a voltage regulator; • 5.1 Kwh Lithium 48V Battery wall mounted • Install all necessary wiring for power distribution. Wires will pass through trunking. Limited chiseling and drilling is envisaged. • Inverter, voltage regulator and batteries shall be mounted at height (1.5m) considering Muloza is flood prone zone.	The batteries shall be installed in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage. The storage area shall be fitted with appropriate fire protection equipment (CO₂ or dry powder extinguisher), smoke detection, warning signage, surge protection and battery management systems. Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained within manufacturer-recommended limits to preserve battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice.

2	Lilongwe Regional Office (MBS)	Lilongwe City, Area 14. Located on the following coordinates, 13°57'17.4" and 33°46'37.6"	There is a 10 KVA inverter at the Lilongwe Office, there is need to install an additional 10KVA inverter system at this site to supply the MSD Block which currently does not have backup power. The solar system will connect Printers, Computers, lights bulbs, and Network Equipment. The activities will include; • 5.1 Kwh Lithium 48V Battery wall mounted (4). The office has a room with adequate space and suitable for keeping batteries. The room also has a working AC to regulate temperature. • Mounting (12) 400-Watt solar panel (mono-crystalline solar panel) on roof with use of a rack. Assessment of the roof noted that the roof was suitable for the proposed activity.. • Install all necessary wiring for power distribution. Wires will pass through trunking. There will be wall drilling due to the design of the building which provides space where wires may pass.	The batteries shall be installed in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage. The storage area shall be fitted with appropriate fire protection equipment (CO₂ or dry powder extinguisher), smoke detection, warning signage, surge protection and battery management systems. Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained within manufacturer-recommended limits to preserve battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice.
3	Kamuzu International Airport MBS Office	Lilongwe Latitude - 13° 47' 21" S, and Longitude 33° 46' 51" E.	Key activities will include; installation of a new solar back up system with a capacity of 5 KVA, 48V Inverter Transformer Based Hybrid. The systems will have Lithium 48V Battery wall mounted and 400-Watt solar Panel Watts's mono-crystalline solar panel (12). Assessment of the offices identified adequate space for battery storage. And the roof was conducive for mounting of solar panels.	The batteries shall be installed in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage. The storage area shall be fitted with appropriate fire protection equipment (CO₂ or dry powder extinguisher), smoke detection, warning signage, surge protection and battery management systems. Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained

				within manufacturer-recommended limits to preserve battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice.
4	Mzuzu MBS Regional Office	Located with Mzuzu city coordinates 11.4641degrees, S, 34.0242 degrees E. The office building is bordered by the department of geological survey	There is a 5KVA Solar backup system at the site which will be replaced with a10 KVA Solar solar backup system. The system will power Printers, Computers, lights, Network Equipment. This will involve installation of 24 solar panels on the building roof and mounting 4 lithium batteries including an inverter and voltage regulator. The old 5KVA backup system will be decommissioned thereby generating e-waste. The e-waste disposal will be done in accordance with the e-waste management plan in annex 1.	The batteries shall be installed in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage. The storage area shall be fitted with appropriate fire protection equipment (CO ₂ or dry powder extinguisher), smoke detection, warning signage, surge protection and battery management systems. Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained within manufacturer-recommended limits to preserve battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice. The room for the Decommissioned system will be used and the E-waste will be disposed in accordance with annex 2
5	Songwe border MBS office	Located at Songwe border in Karonga on the following coordinates coordinate	There is a 3KVA Solar backup system at the site, that needs to be replaced with 5KVA solar backup system. The 3KVA system will be decommissioned thereby generating e-waste. The e-waste will be disposed in accordance with the e-waste management plan in annex 1. MBS is operating from a container and has limited	The batteries shall be installed in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage. The storage area shall be fitted with appropriate fire protection equipment (CO ₂ or dry powder extinguisher), smoke detection, warning signage,

		33°16'12.3S and 9°42' 13.5E.	space for battery storage. A total of 12, 400- Watt solar Panel Watts's mono-crystalline solar Panel will be mounted including a 5 KVA 48V Inverter Transformer Based Hybrid Inverter and 2 lithium batteries. There will be no chiseling or drilling.	surge protection and battery management systems. Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained within manufacturer-recommended limits to preserve battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice.
6	Chitipa MBS office	Located at Chitipa boma on the following coordinates S15.34'41 and E34.28'39.	There is a defective 5KVA Solar backup system at the site which needs replacement with new 5KVA Solar backup system. The old system will be decommissioned accordingly. A total of 12, 400 -Watt solar Panel Watts's mono-crystalline solar Panel will be mounted including a 5 KVA 48V Inverter Transformer Based Hybrid Inverter and 2 lithium batteries.	The room is used to keep batteries for MRA power Backup. The batteries shall be installed in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage. The storage area shall be fitted with appropriate fire protection equipment (CO ₂ or dry powder extinguisher), smoke detection, warning signage, surge protection and battery management systems. Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained within manufacturer-recommended limits to preserve battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice.

				The room where the decommissioned batteries were will be used. The E-waste will be disposed in accordance with annex 2
7	MBS Mwanza Office	At Mwanza border on GPS coordinates S15°40'52.7" and E34°58'18.2"	There is a defective 5KVA Solar backup system at the site, which will be replaced with new 5KVA Solar backup system. The old system will therefore be decommissioned. The system will power Printers, Computers, lights, Network Equipment. A total of 12, 400Watt solar Panel Watts's mono-crystalline solar Panel will be mounted including a 5 KVA 48V Inverter Transformer Based Hybrid Inverter and 2 lithium batteries.	The room is used to keep batteries for MRA power Backup. The batteries shall be installed in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage. The storage area shall be fitted with appropriate fire protection equipment (CO₂ or dry powder extinguisher), smoke detection, warning signage, surge protection and battery management systems. Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained within manufacturer-recommended limits to preserve battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice. The room where the decommissioned batteries were will be used. The E-waste will be disposed in accordance with annex 2
8	Chitedze Research Station	Located in Lilongwe along the M12 road on the following coordinates;	There is no existing solar power system. The new solar power system will connect Printers, Computers, Lights bulbs, Network Equipment. 3 There are 3 separate buildings to be powered by the solar system. As such a total of 48 solar	The batteries shall be installed in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage. The storage area shall be fitted with appropriate fire protection equipment (CO ₂ or dry powder

		13059'00.7" 33038,28.2".	panels will be mounted (16) on each building. Inverter and voltage regulator will also be connected in each building minimal chiseling and drilling are envisage. One of the buildings where the solar panels will be installed is surrounded by tall trees which may have a shielding effect on the solar efficiency.	extinguisher), smoke detection, warning signage, surge protection and battery management systems. Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained within manufacturer-recommended limits to preserve battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice.
9	DAHLD HQs Office	Lilongwe, area 3 on the following coordinates; - 11.464052 and 34.025573	There is no existing solar power system. The new solar power system will connect Printers, Computers, Lights bulbs, Network Equipment. A room was identified where batteries and other accessories will be housed. However, considering the security status of the area. The room security needs to be enhanced by putting burglar bars on the windows. The whole system will involve mounting a total of 24 (400 watts) solar panel. All wires will go through trunkings. The building is roofed with 26-gauge IBR iron sheets.	The batteries shall be installed in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage. The storage area shall be fitted with appropriate fire protection equipment (CO ₂ or dry powder extinguisher), smoke detection, warning signage, surge protection and battery management systems. Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained within manufacturer-recommended limits to preserve battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice. . The room is used as a stores room for obsolete computers which will be disposed in accordance with the E-waste management plan in annex 2

10	Karonga ADD office	Karonga Boma. On the following coordinates: 9.9333° S 33.9333° E	This will be a completely new system. The proposed system is a 5KVA which will power Printers, Computers, Lights bulbs, Network Equipment. The whole system will involve mounting a total of 12 (400 watts) solar panel. 2 Lithium 48V Battery wall mounted and electrical connections. The building is roofed with 26-gauge IBR iron sheets.	There is a secure unoccupied room where batteries will be installed, in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage. The storage area shall be fitted with appropriate fire protection equipment (CO₂ or dry powder extinguisher), smoke detection, warning signage, surge protection and battery management systems. Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained within manufacturer-recommended limits to preserve battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice
11	Kanengo DARS Office	Kanengo DARS office is located in Lilongwe City within the Tobacco Control Commission Building close to the Auction floors. The building is on the following coordinates; 13053'28.3"330 47'39.7"	This will be a completely new system. The proposed system is a 5KVA which will power Printers, Computers, Lights bulbs, Network Equipment. A 12 (400 watts) solar panel will be installed. It was noted that this is among the busy offices as it processes SPS certificates for tobacco companies among others. The DARS office is small but space is available to keep batteries.	A separate unoccupied room has already been identified which is secure. The batteries shall be installed in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage. The storage area shall be fitted with appropriate fire protection equipment (CO₂ or dry powder extinguisher), smoke detection, warning signage, surge protection and battery management systems. Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained within manufacturer-recommended limits to preserve battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient

				space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice.
12	Likuni DAHLD Office	Lilongwe along the Likuni road on the following coordinates; 14000'77.9" 33074'69.6"	This will be a completely new system. The proposed system is a 5KVA which will power Printers, Computers, Lights bulbs, Network Equipment. A total of 12 (400 watts) solar panel will be installed. The buildings at the site are surrounded by tall trees that may shield the solar panels and affect the performance of the system. 2 Lithium 48V Battery wall mounted and electrical connections will form part of the scope	The batteries shall be installed in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage. The storage area shall be fitted with appropriate fire protection equipment (CO ₂ or dry powder extinguisher), smoke detection, warning signage, surge protection and battery management systems. Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained within manufacturer-recommended limits to preserve battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice.
13	Bvumbwe Research Station	It lies on coordinates - 15.924 and 35.070	New system will be installed with a capacity of 5KVA. A total of 12 (400 watts) solar panel will be installed. 2 Lithium 48V Battery wall mounted and electrical connections. There was no suspected asbestos material during roof assessment.	The batteries shall be installed in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage. The storage area shall be fitted with appropriate fire protection equipment (CO ₂ or dry powder extinguisher), smoke detection, warning signage, surge protection and battery management systems. Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained within manufacturer-recommended limits to preserve

				battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice.
14	DAHLD Blantyre Veterinary Office	Blantyre City It lies on coordinates - 15.795 and 35.024.	New system will be installed with a capacity of 5KVA. A total of 12 (400 watts) solar panel will be installed. 2 Lithium 48V Battery wall mounted and electrical connections. There was no suspected asbestos material during roof assessment.	The batteries shall be installed in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage. The storage area shall be fitted with appropriate fire protection equipment (CO ₂ or dry powder extinguisher), smoke detection, warning signage, surge protection and battery management systems. Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained within manufacturer-recommended limits to preserve battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice. The room is being used for E-waste storage which will be disposed in accordance with E-waste Management Plan in annex 2
15	DAHLD Mikolong we Office	Chiradzulu along M2 Midima road. It lies on coordinates- 15.841 and 35.195.	New system will be installed with a capacity of 5KVA. A total of 12 (400 watts) solar panel will be installed. 2 Lithium 48V Battery wall mounted and electrical connections. This is an old building which is strong enough but no suspected asbestos.	The batteries shall be installed in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage. The storage area shall be fitted with appropriate fire protection equipment (CO ₂ or dry powder extinguisher), smoke detection, warning signage, surge protection and battery management systems.

				Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained within manufacturer-recommended limits to preserve battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice.
16	DARS Lunyangwa	Mzuzu City on the following coordinates: 11°42'49.5" 34°04'53.7"	New system will be installed with a capacity of 5KVA. A total of 12 (400 watts) solar panel will be installed. 2 Lithium 48V Battery wall mounted and electrical connections. This is an old building but no suspected asbestos.	The batteries shall be installed in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage. The storage area shall be fitted with appropriate fire protection equipment (CO ₂ or dry powder extinguisher), smoke detection, warning signage, surge protection and battery management systems. Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained within manufacturer-recommended limits to preserve battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice.
17	BAKA Research Station Office	Karonga Coordinates - 9.937 S and 33.929 E	This site will require completely new system installed with a capacity of 5KVA. A total of 12 (400 watts) solar panel. Each will require 2 Lithium 48V Battery wall mounted and electrical connections. The buildings are old but iron roofed.	The batteries shall be installed in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage. The storage area shall be fitted with appropriate fire protection equipment (CO ₂ or dry powder

				extinguisher), smoke detection, warning signage, surge protection and battery management systems. Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained within manufacturer-recommended limits to preserve battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice.
18	Blantyre ADD Office	Blantyre It lies on coordinates - 15.795 and 35.024	The ADD buildings are in Blantyre City near the Malawi Electoral Commission Offices. The buildings are old and iron roofed but in good condition. This site will require completely new system installed with a capacity of 5KVA. A total of 12 (400 watts) solar panel. Each will require 2 Lithium 48V Battery wall mounted and electrical connections.	The batteries shall be installed in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage. The storage area shall be fitted with appropriate fire protection equipment (CO ₂ or dry powder extinguisher), smoke detection, warning signage, surge protection and battery management systems. Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained within manufacturer-recommended limits to preserve battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice.
19	Makoka Research Station	Zomba located 15032' South and 35011' East	The site will require completely new system installed with a capacity of 5KVA. A total of 12 (400 watts) solar panel will be installed for all the sites. Each will require 2 Lithium 48V Battery	The batteries shall be installed in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage.

	(DARS) Office		wall mounted and electrical connections. The site is an old building but iron roofed.	The storage area shall be fitted with appropriate fire protection equipment (CO ₂ or dry powder extinguisher), smoke detection, warning signage, surge protection and battery management systems. Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained within manufacturer-recommended limits to preserve battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice.
20	Mzuzu ADD and Veterinary (DAHLD Offices)	Mzuzu Coordinates 11.4641degrees, S, 34.0242 degrees E.	The site will require completely new system installed with a capacity of 5KVA. A total of 12 (400 watts) solar panel will be installed for all the sites. Each will require 2 Lithium 48V Battery wall mounted and electrical connections. The site an old building but iron roofed.	The batteries shall be installed in a dedicated, secure, dry, well-ventilated and access-controlled room or fire-resistant enclosure, protected from direct sunlight, moisture, flooding and physical damage. The storage area shall be fitted with appropriate fire protection equipment (CO ₂ or dry powder extinguisher), smoke detection, warning signage, surge protection and battery management systems. Access shall be restricted to authorized personnel only, with adequate security measures such as lockable doors, burglar bars and CCTV where necessary. Room temperature shall be maintained within manufacturer-recommended limits to preserve battery health, prevent overheating and reduce the risk of thermal runaway, while ensuring sufficient space for inspection, maintenance and emergency response in accordance with World Bank EHS Guidelines and Good International Industry Practice.

2.3 Main activities and processes

The project activities have been categorised into three phases as presented in the proceeding sections.

2.3.1 Pre-installation Phase

The following activities will be done during pre-installation phase

Activities

- **Site investigation and assessment:** confirm roof condition, roof load capacity, access routes, cable routes, and available space for inverters, battery cabinets/containers, and disconnects.
- **Electrical Assessment:** Check existing electrical distribution (main board, critical loads, earthing system, lighting, and existing back up interfaces if any). This activity helped determine system capacity for each of the proposed sites. The assessment also helped in defining mounting points, cable trench/route options, conduit sizes, cable lengths, and allowable penetrations.
- **Fire and safety assessment:** verify requirements for battery location (clearances, ventilation, segregation), safe cable routing, and applicable fire-fighting mechanisms.

2.3.2 Solar Power Backup Installation Phase

The first step during installation phase shall be confirmation of room and structure conditions as provided in the procurement documents. The key activities in this phase are presented below;

- Roof works for mounting which will include installation of solar panels mounting racks which will be fabricated off site. The contractor will apply sealants around anchors that penetrate the roof to ensure no leakage;
- Battery room/cabinet readiness- Clearing rooms designated for installation of lithium batteries, ensuring proper ventilation and temperature, providing fire-resistant battery enclosures. The selected rooms will ensure safety of the workers by isolating them for that purpose only.
- Decommissioning of old backup systems. This will involve removal of non-functional batteries and solar panels at some selected sites. A dedicated temporary storage area will be allocated for e-waste storage prior to removal from site.
- PV panels mounting on roof tops and mounting of battery cages in designated battery rooms in line with specifications provided to the contractor;
- Routing of cables in plastic trunks. Chiseling will be very limited. Wires will cross to the next room through the ceiling to avoid wall drilling. All proposed buildings have ceiling;
- Electrical connections i.e., PV to inverter and Connect inverter output to the building backup distribution.
- The contractor will carry out electrical test prior to handover of the system to the end users.

2.3.4 Operation Phase

The operation phase will involve the following;

- Use of the solar power backups
- Maintenance of power backup systems

2.4 Types of Materials to be used

The following are materials that will be used during Power Backup Installation:

Table 2.2: Summary Table of Power backup materials and their sources

Name Of Material	Source	Permit Requirements
Solar Panels	Imported from China/ Malaysia	No
Lithium Batteries	Imported from China/ Malaysia	No
Power distribution wires	Blantyre (Cable Manufactures)	No
Trunkings	Lilongwe/Blantyre/Mzuzu	No
Ladders/ Scaffolds	Lilongwe/Blantyre/Mzuzu	No
Electrical accessories i.e. power regulator, inverter etc.	Imported from China/ Malaysia	No

Implementation of this sub-project is likely going to lead to increased generation of e-waste during both installation and operation phase. To that, the project will develop e-waste management plan which has been provided in this document as annex 1. The contractor for this solar installation project is expected to follow all the provisions in the e-waste management plan.

Additionally, the sub-project poses significant risks for OHS as it will involve working at height and contact with live electrical components. To that, the Project has an already approved OHS framework which all contractors under the SATCP project are required to follow and implement. The OHS framework for SATCP can be accessed on www.satcp.mw.

CHAPTER 3:

DESCRIPTION AND ASSESSMENT OF ENVIRONMENTAL AND SOCIAL SETTING OF THE POWER BACKUP INSTALLATION SITES

The purpose of this chapter is to highlight and assess the existing environmental situations and conditions. This will be a way of providing concise description of main physical, biological and socio-economic conditions/activities around the 20 sites. This information is important and will be the basis for measuring changes and environmental impacts in the sites due to implementation and for identification of potential risks from the environmental and social factors on the proposed project.

Table 3: Site Description of the proposed Sites for SPS Power Backup Installation

No	Name of Site	Site Description
1	Muloza Border MBS office	The site is located approximately 50 metres from the MRA Border Office. The building previously served the customs department and, prior to the construction of new offices, was handed over to MBS for use and management. The building is shared with Veterinary, Agriculture, and Port Health units. The proposed solar power backup system will supply electricity only to the MBS section, which includes one room, a strong room, kitchen, corridor, lobby area, toilets, and stores. The building is bordered by a clearing agent to the south, M2 road to the east, the Immigration house to the north, and a residential house to the east. The residential house is more than 50 metres away. Muloza has 2 officers and two toilets one for male and another one for female. During stakeholder consultation with MBS at the border, it was confirmed that the site is not busy, and several operations are conducted online, which provides an opportunity for the contractor to manage installation activities with minimal disruption. The building currently does not have firefighting equipment. Since Muloza is flood-prone, the batteries will be mounted at height in the lobby area to reduce flood-related risks. The lobby area is also well ventilated with an Air conditioner. The site is secure, and there have been no recorded theft incidents.
2	Lilongwe Regional Office (MBS)	The office is located in Area 14 within Lilongwe City. The site is bordered by residential houses. The building is owned by MBS. Within the project site there are two buildings the main building and an annex. The main building host administration and quality assurance departments. While the annex hosts the standards department. The main building

		already has a working solar system. The proposed system will be installed in the annex building. Inspection of the building identified a safe and secure room which initially it was used as stores for confiscated weigh scales. The proposed room already have a working air conditioner which can be used to regulate temperature in the room. The building is roofed with 26-gauge IBR iron sheets and does not have ceiling. The building is owned by the Malawi Bureau of Standard. The site has a total of 26 officers with four toilets 2 for each gender. However, there are only 10 women at Lilongwe MBS office.
3	Kamuzu International Airport MBS Office	The office is located at Kamuzu International Airport. The site is bordered by trees and open space. The building is owned by Airport Development Limited. The MBS offices are within a complex of other Offices such as MRA. The proposed system will be installed in the MBS office. Inspection of the building identified a safe and secure room which initially was used as stores for confiscated weigh scales. The proposed room already have a working air conditioner which can be used to regulate temperature in the room. The building is roofed with 26-gauge IBR iron sheets.
4	Mzuzu MBS regional office	The Site is located in Luwanga Area within the City of Mzuzu. The Office complex is old but in a good condition and serves as a key hub for standardizing local and imported goods to protect consumers. The building is iron roofed and has also ceramic tiles. The Controlling officer at the office preferred reachable batteries than the complete system with solar panels as they had experienced dysfunction of the panels before. The system will power printers, computers, lights, and network equipment. This will involve installation of 24 solar panels and a mounting 4 lithium batteries including an inverter and voltage regulator
5	Songwe border MBS office	The MBS office is located at Songwe Boarder in the office building which are owned by MRA. The current building is old but strong. However, there is also an ongoing project (construction of Songwe One Stop Boarder Post). There is a 3KVA Solar backup system at the site, there is need to be replaced with 5KVA solar backup system. MBS is operating from a container and has limited space for battery storage. A total of 12, 400 -Watt solar Panel Watts's mono-crystalline solar Panel will be mounted including a 5 KVA 48V Inverter Transformer Based Hybrid Inverter and 2 lithium batteries. The batteries will be located in a nearby MRA office waiting for the completion of the One Stop Boarder Post ongoing construction. There will be no chiseling or drilling.
6	Chitipa MBS office	The site is located at Chitipa Boma closer to the MRA offices. There is a defective 5KVA Solar backup system at the site which needs replacement with new 5KVA Solar backup system. A total of 12, 400-Watt solar Panel Watts's mono-crystalline solar Panel will be mounted including a 5 KVA 48V Inverter Transformer Based Hybrid Inverter and 2 lithium batteries. The building is strong to withstand the installation works
7	MBS Mwanza Office	The office is located to the west of old border terminal. The office is an old government building which belonged to customs department now

		MRA. It was transferred to MBS for use. The building is bordered by standard and national banks, and Border Police offices. Standard Bank and National Bank already have working solar power back up systems. The roof has adequate space and capacity to install the proposed number of panels. There is a safe room which was designed to be used as a store room but it is not in use now as some activities for the office were moved to the new OSBP terminal. The door and window for the room already have burglar bars. Mwanza MBS office is a busy office especially during week days considering that Mwanza is among the major borders in Malawi. To that the office users will be informed well in advance of the installation dates to prepare them for any disturbance this may cause. The office has 9 officers with one flush toilet and another pit latrine located within the border perimeter. There is only one female officer.
8	Chitedze Research Station	The system will be installed in crop protection buildings within the Chitedze research station. The crop protection department is at the old offices which were constructed in early 2000's with support from the World Bank. There are 3 separate buildings to be powered by the solar system. As such a total of 48 solar panels will be mounted 16 on each building. Inverter and voltage regulator will also be connected in each building. The buildings are in good conditions and roofed with 26-gauge IBR iron sheets which are also in good state. One of the buildings where the solar panels will be installed is surrounded by tall mibawa trees which may have a shielding effect on the solar efficiency. The plan is to prune the trees. However, tree pruning shall be limited to the minimum necessary to reduce shading of the solar panels, and shall not involve removal of whole trees. The PIU EHS Officer shall approve the pruning scope before works commence and a risk assessment conducted to make sure the activity is carried out safely.
9	DAHLD HQs Office	The site is located in Area 3 within Lilongwe city. The site is opposite the Lilongwe City Town Hall. The solar panels will be installed on the Accounts department building. The building is in condition with capacity to support all proposed panels. Since the site is within town, the site experience incidences of theft although it is in a wire fence. The proposed room for batteries installation does not have security features. To that, the room security needs to be enhanced by putting burglar bars on the windows. All wires will go through trunkings. The building is roofed with 26-gauge IBR iron sheets. During installation there will be risks to do with works at heights due to the height of the buildings. The site has enough sanitary facilities for both men and women.
10	Karonga ADD office	The buildings are roofed with 26-gauge IBR iron sheets. The offices are located within the town of Karonga at about 500 meters from the Karonga round out along the Karonga- Chitipa Road. The site has many buildings and easily accessible by service seekers. However, the solar panels will be installed on top of the ICT building which is close to the entrance of the site. The building is

		ideal since it also host the server and computers for processing SPS certificates. The batteries will also be located in the server room which is secure and well ventilated with an AC. Fire extinguishers were also seen placed at some strategic points around the office complex. The ADD has enough sanitary facilities for both regular female and male workers as well as those who will install the power back up.
11	Kanengo DARS Office	It is located at Kanengo within Lilongwe City in the Tobacco Control Commission Building located close to Auction floors. This will be a completely new system. The proposed system is a 5KVA which will power printers, computers, light bulbs, and network equipment. A 12 (400 watts) solar panel will be installed. It was noted that this is among the busy offices as it processes SPS certificates for tobacco companies among others. The DARS office is small but space is available to keep the batteries. The building is in good condition for the installation and operation of the power backup system
12	Likuni DAHLD Office	This site is located at Bwemba along the Lilongwe Likuni Road. There are 4 buildings on the site but only one building with host the proposed solar system. The building has a capacity to host the proposed 12 panels on top of the roof. A dedicated room for battery storage was identified and is fit for purpose. Site inspection of the buildings no fire extinguishers were visible but fire hydrants were available. As such there will be need to enhance firefighting equipment. will be a completely new system. The room for battery storage has a strong door and the window already have burglar bars. The site also has a perimeter fence. Likuni DAHLD offices is usually not a busy site as such minimal disturbance is anticipated during installation.
13	Bvumbwe Research Station	The site is within Bvumbwe research station premises which is 13 Kilometres east of Limbe township. The solar panels will be installed on the ICT building which is close to the entrance of the site. The building is ideal since it also host the server and computers for processing SPS certificates. The proposed room for placement of batteries and safe and secure. However, during consultation stakeholders raised concern on the status of security for the site as there has been a number of theft incidents for computers in the past few months. To that, the stakeholders proposed enhancing the ICT building with stronger burglar bars on the doors and windows. The building has fire hydrants but no fire extinguishers were available. The building room has the capacity to host the proposed number of solar panels.
14	DAHLD Blantyre Veterinary Office	The site is located in Chichiri along the Scott Road within Blantyre City on coordinates 15079'52.38" and 35002'42". It is bordered by Pharmaceuticals company to the east, Mudi river to the North and Times Media Group Offices to the south. Although the offices are old but the proposed panels will properly fit on the roof. A room to place the batteries was also available. There is no existing firefighting equipment as such the project will install appropriate firefighting equipment. The Blantyre Vet office is not a busy office but it has a lab with equipment that require power supply at all times for the safety of samples and storage of

		medicines. In view of this the contractor will be required to engage the stakeholders to properly plan installation activities while ensuring continued power supply to the Lab.
15	DAHLD Mikolongwe Office	Mikolongwe is located in Chiradzulu off the M2 Limbe – Mulanje Midima road. The site has one building that host the administration block, and is an old building. The building is roofed by 26-gauge IBR iron sheets and very strong wall made of brick and mortar. Although the building is old but the roof is strong to accommodate the anticipated number of solar panels. The building has a very secure and well-ventilated room which was proposed for the battery storage.
16	DARS Lunyangwa	The DARS offices are located at Lunyangwa Research Station on the outskirts of Mzuzu City. Lunyangwa conducts research activities on livestock, coffee, and tuber crops, temperate and tropical fruits, entomology, produce inspection and cereals. The buildings are old and strong. The solar panels will be mounted on the botany building which is relatively new compared to the others. The batteries will also be installed in the same building which is not frequently used by people but well secured. Lunyangwa is responsible for Mkondezi Experimental Research Station, Bolero, Mbawa and Nchenachena substations in Mzuzu Agricultural Development Division, and Baka and Meru substations in Karonga ADD. The biggest challenge is for ordinary people to access the services as it is about 6.7 kilometers from Mzuzu City Centre.
17	BAKA Research Station Office	Baka research station is located at Karonga Town about 1 kilometer west of Karonga round about. The site requires completely new system installed with a capacity of 5KVA. A total of 12 (400 watts) solar panel will be installed for all the sites. Each will require 2 Lithium 48V Battery wall mounted and electrical connections. The building is old but iron roofed and strong for the installation and operation of the Power Backup. Dedicated room for storage of the batteries have been provided at the site and are well secured and ventilated.
18	Blantyre ADD Office	Blantyre ADD is located within Blantyre city along the Clock tower to Chileka, Magalasi Highway on coordinates S15077'811.9" and E35002'020.988" The Site is bordered by Ministry of Transport and Public Works Offices. The building is a 3-story government building that host all Agriculture Departments at ADD level. However, the system is expected to power the crop protection department only. This department is allocated 3 offices only. Due to limited space, it was agreed that the batteries will be installed in the office of the Chief Crops Officer which is very big and will be partition to ensure safety of the occupant. A fire resistant battery cage will be used for this purpose. The room was selected as it is not used by many people compared to the other two rooms that were available. Considering the height of the building it poses significant fall from height risks. As such a risk assessment will be done by the Contractor and the plan approved by the OHSS

19	Makoka Research Station(DAR S) Office	Makoka Research is situated about 20 Kilometres South of Zomba City, off the M3 road. The site has 7 separate buildings but the system will be installed at the administration block where the server for the SPS ICT system is located. The building is roofed with 28-gauge normal iron sheets. A spacious and secure room for placement of batteries is available. Makoka is not a busy office as such installation exercise with pose minimal office operations disruptions.
20	Mzuzu Regional Veterinary (DAHLD Offices)	Mzuzu Regional Veterinary Offices are located along the Sunbird Hotel Road and adjacent to Mzuzu High Court on coordinates 11°46'430.7" and 34.0255.54". The site has one sprawling building which houses the regional office. The building is an old one and iron sheets roofed and in good condition. The building is on an open place without any trees. The backup system will be installed with a capacity of 5KVA. A total of 12 (400 watts) solar panel will be installed on the roof and 2 Lithium 48V Battery wall mounted and electrical connections. The authorities have selected one secure room where the batteries will be installed. The room has also a working AC.

NB: Considering that the sub-projects will not attract significant labour force. The contractor will utilise the existing toilets within the project sites. An assessment indicated that each site has adequate number of toilets for both men and women.

CHAPTER 4:

DESCRIPTION AND ASSESSMENT OF IDENTIFIED ENVIRONMENTAL AND SOCIAL RISKS AND IMPACTS AND PROPOSED MITIGATION MEASURES

4. Brief description of environmental and social impacts and risks

4.1 Positive Impacts

Implementation of the proposed sub-projects will facilitate improvement in SPS agencies service delivery to the community and cross boarder traders by reducing the distance covered and time taken to go to the nearest provider. Significant positive impacts to be realized will include the following:

- a. **Reduction in SPS certificate processing time.** SPS service seekers will no longer be delayed as a result of power outages
- b. **Availability of job opportunities:** The project will employ people to work as technicians, engineers etc. for the project sites which in turn will enhance their incomes.
- c. **Creation of business opportunities:** the project will require power backup materials of various types which in turn will enhance businesses from where the materials will be sourced. Transporters will also benefit for transporting the materials to the final sites.

4.2 Potential negative impacts and mitigation measures during installation Phase

The assessment identified the following potential negative environmental and social impacts due to the nature and scope of the project activities:

1. Occupational health and safety risks

Fall-from-height risks during rooftop installation and maintenance of solar panels. Additionally, Inhalation of dust, and human error from inability of the workforce to detect and comprehend feedback provided by machines and equipment could potentially pose occupational health and safety hazards to workers on site.

Recommended mitigation measures

- Conduct risk assessment prior to commence of work;
- Use harnesses and edge protection features for workers working at heights;
- Provide adequate and appropriate PPE
- Orient workers on safety and correct use of PPE
- Provide first Aid box and train worker first aiders
- Develop and implement an emergency response plan (ref annex 7)

2. **Increased generation of E-waste.** Cable offcuts, packaging, electronic components and decommissioning of non-functional backup systems will lead to increased generation of e-waste.

Recommended mitigation measures

- Implement the e-waste management plan; and
- Re-use generated waste where possible

- Collaborate with MEPA on E-waste disposal before decommissioning

3. Increased risks of community health and safety - proximity of installation works to staff areas pose health and safety risks to the host community (Host agency staff and clients).

Recommended mitigations measures;

- Develop method statement for each activity to be approved by PIU OHS specialist;
- Use controlled entry points to keep installation works separated from staff/client walkways and waiting areas;
- Install signage for electrical hazard;
- Proper storage of materials to prevent trip hazard and
- Conduct daily briefing to staff on works schedule.

4. Dust and noise emissions – Minor dust emission and noise will be generated from chiseling and drilling wall.

Recommended mitigations measures;

- Inform office user well in advance on the installation works dates to make them prepare;
- Remove or cover office equipment and materials
- Provide appropriate PPE to workers; and
- Communicate works to staff in advance to reduce disturbance.

5. Disturbance of office operations during installation – Temporally changes to electrical systems and movement of installation workers within the building may disturb office operations. Additionally, dust and noise from installation activities may disturb office operations.

Mitigation measures:

- Inform office users (staff and clients) in advance of possible disturbances
- Provide alternative offices for service delivery continuation including alternative power supply if power outage will last more than 24 hours;
- Put up measures for protecting office visitors especially during installation phase

6. Risks of electrocution – Contact with live electrical components during connection of wires and other accessories in the process of solar power back up installation as installation will be done in buildings which are already connected to electricity.

Recommended Mitigation measures

- Use qualified and certified electrical installers;
- Provide adequate and appropriate PPE (insulated gloves and shoes);
- Enforce use of PPEs among workers;
- Conduct pre- installation tool box talks for technicians on safety;
- Stop work during rain/lightning or when equipment becomes wet; and
- Improve housekeeping by ensuring that work area is free of debris, cut-off cable ends, and loose connectors.

7. Increased risks of labour abuse and exploitation – Technicians may work more than recommended working hours per day without overtime or poor working conditions in order to meet strict and hard deadlines and as a source of cheap labour for the contractor.

Recommended Mitigation measures:

- Orient contractor to follow labour management procedures and SATCP OHS framework;
- Provide mechanism for reporting grievances; and
- Contractor adhere to employment Act, and related Laws,
- All workers should have binding contracts;
- Provide worker induction and labour rights information during recruitment; and
- Conduct labour inspections periodically.
- Site specific Grievance Redress Mechanism (GRM) shall be established prior to commencement of works, consistent with the requirements of OP 4.01 and the SATCP ESMF. The GRM shall provide workers, host agency staff, clients, and community members with an accessible, transparent, and responsive means of raising concerns in accordance with the GRM framework in annex 6

8. Increased risks of Gender Based Violence including Sexual Exploitation and Abuse –

The deployment of an external male workforce across 20 sites creates potential risks of sexual exploitation, abuse, and harassment (SEA/SH) at all project locations. Women among the host agency staff, cleaners, guards, and clients may be particularly vulnerable. These risks shall be managed through the measures below, which apply to all 20 sites.

- Develop a ‘Code of Conduct’ which should be signed by all workers and contractor in line with the A project-level Grievance Redress Mechanism (GRM) shall be established prior to commencement of works, consistent with the requirements of OP 4.01 and the SATCP ESMF. The GRM shall provide workers, host agency staff, clients, and community members with an accessible, transparent, and responsive means of raising concerns in annex 6
- Sensitize workers against SEA/SH,
- Provide grievance redress mechanism,
- Mandatory SEAH induction for all workers, and
- Provide awareness to potentially affected persons (Host institution guards, messengers and cleaners).
-

9 Fire risk during battery handling and commissioning

Lithium batteries are susceptible to thermal runaway (a dangerous chain reaction where a system generates heat faster than it can dissipate it, causing temperatures to rise uncontrollably) if damaged, short-circuited, or improperly handled during unpacking, installation, and initial charging. Several sites currently have no firefighting equipment.

Recommended mitigation measures:

- (i) A serviceable dry-powder or CO₂ fire extinguisher (minimum 4.5kg) shall be present on-site before any battery is brought into the building;
- (ii) Batteries shall be inspected for physical damage upon delivery and any damaged units returned immediately to the supplier;
- (iii) Initial charging shall be supervised by the Renewable Energy Engineer;
- (iv) No smoking or open flames within 5 metres of battery storage area during installation;
- (v) The contractor's EHS Officer shall be present during all battery installation and commissioning activities.

4.3 Potential negative impacts and mitigation measures during operation Phase

The assessment identified the following potential negative environmental and social impacts due to the nature and scope of the project activities during operation phase.

- 1. Risks of fire accidents** - Battery thermal-runaway may lead to fire if the lithium batteries are damaged, or exposed to unsafe conditions. Over heating or poor ventilation may trigger thermal battery runaway.

Recommended mitigation measures;

- Provide fire-resistant battery enclosures,
- Install fire extinguishers, smoke detectors, and surge protection devices,
- Safe spacing and proper cabling,
- Install batteries in well ventilation rooms,
- Where possible install air conditioners to control temperature control,
- Train operators (user agencies) in fire prevention and response, and
- Identify and put signage for fire assembly point.

- 2. Risks of flooding impacts** – This risk is only applicable to the Muloza MBS office located within a flood-prone area. As such, the solar power system (batteries, regulator, inverter and associated electrical components) is at risk of damage during flooding.

Recommended Mitigation measures;

- Mount batteries, regulator and inverter at height; and
- Follow weather forecast conditions and follow flood advisories.

- 3. Increased risks of theft** (Bvumbwe, Lilongwe DAHLD, Baka DARs) – Theft risk is high at the identified sites due to challenges related to the security of the proposed lithium battery storage rooms. This risk was validated through stakeholder consultations.

Recommended mitigation measures;

- Enhance security of the storage rooms through installation of burglar bars on the windows and doors
- Restrict Access to the battery storage room to authorized personnel only;
- Where possible install security cameras; and
- Conduct regular security checks.

4. Increased generation of e-waste – Use of the system will generate e-waste from damaged equipment including lithium batteries which are also hazardous.

Recommended mitigation measures

- Implement e-waste and hazardous waste management plans
- Use original equipment with long usage life

CHAPTER 5 SUMMARIZED MITIGATION PLANS FOR ENVIRONMENTAL AND SOCIAL RISKS AND IMPACTS

The summarized Environmental and Social Mitigation and Monitoring Plan (ESMMP) has been prepared to highlight the potential negative impacts of the project and provide mitigation measures to address these impacts. These mitigation measures will be implemented for the respective negative environmental and social impacts that have been identified.

Lastly, the ESMP also includes a monitoring plan for tracking the progress of implementation of the mitigation measures. It also spells out the responsible entities for implementation and monitoring the plan.

The ESMMP is supported by the following:

Annex 2: E-Waste Management Framework and waste Management procedures:

Annex 4: Workers Codes of conduct

Annex 5 OHS guidelines

Annex 6: GRM procedures

Annex 7: Emergency Response Plan

Table 4-3 Environmental and Social Mitigation and Monitoring Plan for SPS Power Back Installations

REF.	Impacts & Risks	Impact and Risk Enhancement Measures	Responsible Institution	Implementation Cost (USD)	Performance Indicator	Target	Frequency	Means of Verification	Responsible for Monitoring	Monitoring Cost (USD)
Positive Impacts Installation Phase										
1	Creation of employment opportunities	Prioritize recruitment of Malawi Nationals	Contractor	Part of project cost	Percentage of Malawians employed	70%	Monthly	Review of employment records	PIU-SSS	N/A
2	Creation of business opportunities	Where possible procure raw material from local vendors	Contractor	Part of project cost	Percentage of local supplier engaged	40%	Monthly	Review of contracts	PIU-FMS/PS	N/A
Operation phase										
3	Reduce SPS certificate processing time	- Carry out routine inspection and maintenance of the power backup system - Train staff in trouble shooting of the system	DARS, DAHLD, MBS	2000	Number of inspections conducted Number of Staff trained	4 per year 3 per site	Quarterly annually	Review of inspection and training records	PIU-ICTS	N/A
Negative Impacts and Mitigation Measures										
Installation Phase										
1	Occupational health and safety risks	- Conduct risk assessment prior to commence of work; - Use harnesses	Contractor	1000	Availability of approved RA Availability of harness and edge	100% (For daily activities)	Daily	Review of records Physical observation	Contractor EHSS, PIU-OHSS	200

		and edge protection features for workers working at heights; • Provide adequate and appropriate PPE • Orient workers on safety and correct use of PPE • Provide first aid box and train worker first aiders. • A serviceable dry-powder or CO₂ fire extinguisher (minimum 4.5kg) shall be present on-site before any battery is brought into the building; • Batteries shall be inspected for physical damage upon			protection features Number of workers with PPE No. of orientation session done Availability of First boxes	100% (All workers) One per site 1 per site		Observation and random interviews Review of records Physical observation		
--	--	--	--	--	--	---	--	---	--	--

		delivery and any damaged units returned immediately to the supplier; - Initial charging shall be supervised by the Renewable Energy Engineer; - No smoking or open flames within 5 metres of battery storage area during installation; - The contractor's EHS Officer shall be present during all battery installation and commissioning activities.								
2	Increased generation of e-waste	- Implement the e-waste management plan; - Re-use generated waste where possible; - Provide waste receptors/bins for	Contractor	500	Availability of approved e-waste management plan Availability of waste receptors Disposal records	One	Once-prior to commencement of works	Review of records	PIU-ESS	100

		each category of waste Engage MEPA on disposal of decommissioned and disposal of E waste such as batteries and solar panels in line with the E-waste framework in annex 1		1000		At least 3 3 sites	Prior to new installations	Records review	PIU ESS	500
3	Increased risks of community health	- Develop method statement for each activity to be approved by PIU OHS specialist; - Use controlled entry points to keep installation works separated from staff/client walkways and waiting areas; - Install signage for electrical hazard; - Proper storage of materials to	Contractor	200	Availability of Method statements Availability of proper signage	100% for every activity	Daily Daily	Review of records Physical Observation	Contractor-EHSS, PIU-ESS, SSS, O HSS	500

		prevent strip hazard and • Conduct daily briefing to staff on works schedule.			No of briefings done		Weekly			
4	Dust and noise emissions	• Inform the users two days before actual installations • Remove or cover office equipment and materials • Provide appropriate PPE to workers. • Communicate works to staff in advance to reduce disturbance. • Provide mechanism for submitting grievances and ensure GRM is functional throughout the duration of the works	Contractor	500	Availability of work schedule plan Number of complaints received Availability of PPE Conduct awareness on GRM Availability of grievance submission channels	Once prior to commencement of works	Daily	Physical observations Random interviews	EHSS, PIU-ESS, SSS, O HSS	50

5	Disturbance of office operations	• Inform office users (staff and clients) in advance of possible disturbances • Install in a phased approach to ensure service delivery continuation	Contractor	Include d in the project	Availability installation Plan	One	Once prior to commencement of works	Review of records	PIU-SSS	N/A
6	Risks of electrocution	• Use qualified and certified electrical installers; • Provide adequate and appropriate PPE (insulated gloves and shoes); • Enforce use of PPEs among workers; • Conduct pre-installation tool box talks for technicians on safety; • Stop work during rain/lightning or when equipment becomes wet; and	Contractor	500	Availability of qualified and certified personnel Availability of PPE No. of people with PPE No. of tool box talks conducted	100% For all workers 100% 1 per site	Once prior to start of works Daily	Review of records Physical observation Review of records	SATC P-PIU	N/A

		Improve housekeeping by ensuring that work area is free of debris, cut-off cable ends, and loose connectors.			Housekeeping compliance	90%				
7	Increased risks of labour abuse and exploitation	- Develop and Orient contractor to follow labour management procedures and OHS requirements in line with the SATCP OHS framework - Provide mechanism for reporting grievances; - Contractor adhere to employment Act, and related Laws, - All workers should have binding contracts; - Provide worker induction and labour rights information during recruitment; and	Contractor	1,000	No. of orientations done Availability of grievance uptake channels and No. of complaints received Compliance to labour laws Availability of signed contracts No of inductions done	1 once per site At least 2 channels 80% 100% At least 1 for each worker	Once prior to start of works Once Once Once Once	Review of records	PIU-OHSS &SSS	N/A

		Conduct labour inspections periodically.			No. of inspections done	Once per site	Once			
8	Increased risks of GBV/SEA/SH	- Develop a 'Code of Conduct' which should be signed by all workers and contractor as in Annex 4. This will include consequences for non-adherence and associated penalties - Provide grievance redress mechanism, - Mandatory SEAH induction for all workers, and - Provide awareness to workers and potentially affected persons (Host institution guards, messengers and cleaners).	Contractor	50	Availability of signed CoC for Workers Availability of grievance uptake channels No. of inductions done No. of sensitization session done	100% One/worker At least 2 One One at each site	Once prior to start of work	Review of signed copies Review of records Review of induction and sensitization records	PIU-SSS	N/A
Negative impacts during operation phase										

1	Risks of fire accidents	• Provide fire-resistant battery enclosures, • Install fire extinguishers, smoke detectors, and surge protection devices, • Install batteries in well ventilation rooms, • Where possible install air conditioners to control temperature control, • Train operators (user agencies) in fire prevention and response, and • Identify and put signage for fire assembly point.	MBS, DARS, DAHLD	10,000	Availability of fire resistant battery enclosures Availability of fire extinguishers Availability of extraction fans or air conditioners or ventilated windows No of MBS/DARS/DAHLD officers trained	1 At least 2 per site At 2 staff per site	annually Once every 3 months Annually	Observation and review of records	PIU-OHSS during project period and Department of Occupational Safety and health after project closure	500
2	Risks of flooding impacts	• Mount batteries, regulator and inverter at height; and • Follow weather forecast conditions and	MBS	Part of project cost	Location of batteries, regulator and inverter at height Hear weather forecast	At 1.5 metres high Daily	Once Daily	Physical observation Review of records	MBS border officers	N/A

		follow flood adversaries.								
3	Increased risks of theft	- Enhance security of the storage rooms through installation of burglar bars on the windows and doors - Restrict Access to the battery storage room to authorized personnel only; - Where possible install security cameras; and - Conduct regular security checks.	MBS, DAHLD, DARS	10,000	Availability of rooms and doors with burglar bars No of people with access to battery room Availability of functional security cameras No of checks done	100% doors and windows Utmost 5 One per site Once in a quarter	Once Quarterly Quarterly Quarterly	Physical observation	SPS agencies	N/A
4	Increased generation of e-waste	- Develop and implement waste Management plan from the framework in annex 2. - Dispose of used batteries in line with best practices for hazardous	MBS, DARS, DAHLD	.	- Availability of e-waste management plan and - Rate of Compliance to e-waste plan	One	Half decade	Physical observation /inspection	SPS agencies	500

		waste management								
--	--	---------------------	--	--	--	--	--	--	--	--

6.0 CONCLUSION AND RECOMMENDATIONS

In conclusion the sub-project will generate both positive and negative impacts during both installation and operation phase. Most identified negative impacts are moderately significant and localised. This entails that the project may proceed for installation while following measures proposed in this ESMMP.

It is recommended that management of the proposed project should implement mitigation measures that have been proposed in this ESMMP so that the sub-project is implemented in an environmentally sustainable manner and socially sound. The monitoring plan should also be implemented so that modifications to the mitigation measures can be made in cases where they are not working. It will also help in ensuring that the PIU in collaboration with SPS agencies is complying with the proposals that have been put forward in this ESMMP. Stakeholders given the responsibility of implementing and monitoring the implementation of the mitigation measures should fully understand this ESMMP for its successful implementation. To that, the PIU, will be responsible for orientation and training of stakeholders responsible for implementation of the measures proposed in this ESMMP.

Annex 1 – Stakeholder Consultations

No	List of stakeholders consulted	Comments Issues raised	PIU Response
1	Chaona Chatepa Muloza border MBS office	- The site is flood-prone; it would be prudent to install the equipment at an elevated height and ensure adequate protection against water ingress and runoff. - MBS advised that the office is shared with DARS and Port Health. They asked whether the system will supply power to the entire building.	The system is designed to cover only the electricity requirements for MBS appliances, as specified in the design.
2	Raphael Mpingo Lilongwe regional office (Area 14)	- The contractor must inform MBS at least two before start of works so that appropriate arrangements are done in order to create space for the contractor to work without disturbance - MBS is likely going to move to Mgoni close to SeedCo Offices was the solar systems also provided to the new proposed offices	This system was designed with energy requirement for Area 14 office. Otherwise, MBS must write PIU on the proposal to install solar to the new offices.
3	Juvesio Chitsonga Kamuzu International Airport MBS office	There is need for proper coordination with all stakeholder to ensure uninterrupted provision of services to the MBS client at the airport	PIU will continue to engage all stakeholders on the power backup installation issues
4	Eunice Nkungula Benala Mzuzu regional MBS Office	- It would be important for the installer to provide training to the staff on simple trouble shooting techniques for sustainability - Training on safe management of batteries is important to ensure longer life of the system	PIU will ensure that all the staff are trained on usage before operation phase
5	Blessings Gama Songwe MBS office	The office will be moved once the construction of the border is completed. Are there arrangements to ensure that the system is also transferred to the new offices?	Arrangements will be done is relocation is done within the installation period, otherwise MBS will

		•	• have to foot cost of relocating the system.
6	Maloto Nyirenda SATCP- PIU	•	• The system will be on performance warrant to avoid suppliers installing sub-standard products that should become obsolete very soon.
7	Mr G. Maruwo DAHLD Blantyre veterinary office	• The building has a well-ventilated and secure room for battery storage. However, DAHLD's main concern is that the site also hosts a laboratory with vaccines and samples that require continuous refrigeration. • Therefore, the power supply to the building should be switched off only when it is unavoidable i.e., when the work cannot be performed with power on. •	• The contractor under PIU supervision will be responsible for ensuring the safety of their employees during installation and maintenance activities, while also implementing measures to protect the building and laboratory operations.
8	Mr. Makondi DAHLD Mikolongwe	• Management welcomes the project and will be waiting when the project installation will commence. • Room for battery storage is available. This office is not a busy office as such with proper coordination works can even be done during weekdays.	• This was a complement and PIU agreed
9	Dr S. Mvula Mzuzu DAHLD veterinary office	• The contractor must ensure safety of their employees as well as the safety of staff and clients. • The contractor must ensure proper work scheduling and communicate the schedule in good time for proper planning by management. • Contractor must respond with speed to electrical incidents • Due to nature of work, the office cannot run without electricity for 48 hours thus the contractor must	• The contractor will make an assessment prior to commencement of work

		provide alternative if works will lead to power outage for more than 48 hours	
10	Mr Mboma Blantyre ADD office	- This is a 3-storey building as such proper safety measures must be considered by the contractor. - If possible, the proposed system must also supply power to the administration block as in the current design the focus is crops department only.	An assessment of the requirement was jointly made between PIU and Blantyre ADD Management
11	Raphael Banda Chitedze research station	Ensure availability of a proper fire-fighting equipment for each of the project.	This will be incorporated in the ESMMP
12	Chikondi Maere Kanengo DARS office	Kanengo DARS office is a very busy office as it processes SPS certificates for tobacco. Therefore, there is need to ensure that installation works have minimal disruption on the delivery of services as it can have effects on national level. To that we propose works are done at night or over the weekend.	An assessment will be done by the contractor but working at night may pose a risk to workers and also considering the proposed number of days to be taken per installation, the proposal may be problematic to implement
13	Moses Phiri Bvumbwe Research Station	- Implement strong theft/tampering prevention measures (secure mounting, lockable cabinets, and visible warnings) - The contractor should also consider installing burglar bars as Bvumbwe records high incidents of theft. As two months ago some wanted to steal computers in the computer lab. Lithium batteries are expensive as such can be a target by these thieves.	PIU will look into this proposal as the current scope of work ends at Installation only
14	Goodluck Kayange Director of Occupational Safety and Health	Lithium batteries pose fire risks as such ensure firefighting equipment are provided in all the sites where the systems will be installed. Additionally, train the staff in detection, prevention and response to fire	PIU will work hand in hand with the office to achieve that

		• Ensure procured contractors use certified and qualified personnel	
15	Cathy Mussa Senior Environmental Officer Environmental Affairs Department	• E & S risks are localized as the proposed systems are small. However, appropriate measures for disposal of lithium battery must be considered especially during operation phase. • Also engage Ministry of labour on occupational safety and health consideration during installation phase of the project	• SATCP will engage MEPA on e-waste storage and disposal before end of the project and link it to users

ANNEX 2. E- WASTE MANAGEMENT FRAMEWORK

1. Introduction

This Waste Management Framework (WMF) has been prepared for the Southern Africa Trade and Connectivity Project (SATCP) – Power Backup subprojects. These sub-projects are will increase generation of e-waste as determined during environmental and social assessment. The Framework provides guidance for the implementation of site-specific e-waste management by Contractors and other relevant stakeholders.

The framework aims to ensure waste minimization, safe handling, sustainable storage, transportation, and disposal, in compliance with:

- National e-waste management policy (2024);
- Environment Management Act (2017);
- Environmental Management (Waste management and Sanitation) Regulations; and
- SATCP ESMF

2. Definitions of key terms used in this framework

The key terms used in this framework are defined as below;

- E-waste: Discarded or unwanted electrical/electronic components and assemblies.
- Hazardous waste: Components that contain hazardous materials (e.g., lithium batteries).
- Rejected waste: Items removed from service due to damage, defects, or non-compliance.
- End-of-life waste: Items disposed at the end of useful life (often during operation/maintenance phase).

3. Purpose and objectives of the e-waste management framework

This E-Waste Management Plan sets out measures to prevent, minimize, collect, handle, store, transport, and dispose of electrical and electronic waste generated during:

- **Installation phase** (packaging, cabling offcuts, rejected/defective electrical components, used wiring, damaged inverters/regulators/batteries); and
- **Operation phase** (replacement of faulty components, end-of-life handling of lithium batteries and other electronics)

Specifically, the framework aims to:

- Avoid waste where feasible and reduce waste generation;
- Ensure safe segregation of waste streams, especially hazardous e-waste (**Lithium batteries**);
- Prevent pollution of soil, surface water, and air due to poor disposal of electronic waste;
- Prevent community health and safety risks; and
- Ensure safe disposal of e-waste.

3. Scope

This frame shall be applicable to sub-projects under SATCP that will generate electrical and electronic waste including the all project sites (**20 sites**) listed in this ESMMP. This framework scope covers both installation phase, and operation and maintenance phase.

4. Sources of e-waste

The likely sources of e-waste from the project are as follows;

- Solar panels (PV modules);
- Inverters / hybrid inverter transformer-based units;
- Voltage regulators;
- Lithium batteries (wall mounted / in enclosures);
- Cables, trunking, connectors, electrical accessories;
- Packaging and protective materials;
- Power backup UPS;
- Scanners;
- Laptops and desktop computers;
- Printers; and
- Replacement, malfunctioning parts, and end-of-life components

5 Risks and impacts from e-waste.

Poor handling, transporting, storage and disposal of electrical and electronic waste poses a significant environmental and social risks and impacts. Some risks/impacts are direct to environmental and social receptors while some of the risks and impacts are indirect. Table 1 present risks and impacts from e-waste and mitigation measures.

Table 1. risks and impacts from e-waste and mitigation measures

E-Waste risks/impacts and mitigation measures	
Likely Impact/risks	Generic mitigation measures
Air Pollution through improper disposal leads to release of toxic, hazardous, carcinogenic gases. Especially for expired batteries Open-air burning practices & scavenging Open air burning of e-waste (e.g., cables to extract copper) leads to spread of hazardous fumes through a wide radius	• Procure Electronic devices from credible manufactures to avoid purchasing second hand, refurbished or obsolete devices with a short shelf life or already categorized as e-Waste. • Instituting good housekeeping and operating practices, including inverter control to reduce the amount of e-waste resulting from materials that are out-of-date, off specification, contaminated, damaged, or excess to operational needs; • Implement stringent e-waste separation to prevent the mixing of non-hazardous and hazardous e-waste. • Identify and recycle some of the ICT products that can be reintroduced into the operational processes, in collaboration with the solid waste management service providers (municipalities, councils and any other entity such as MEPA)
Occupational Health and Safety and Human Health impact due to poor disposal of Electrical and electronic equipment containing different hazardous materials, which are harmful to human health and the environment if not disposed of carefully.	
Pollution of land resources including landfills Electrical and electronic equipment contain different hazardous materials, which are harmful to human health and the environment if not disposed of carefully.	
Pollution of water bodies due to Electrical and electronic equipment contain different	

hazardous materials, which are harmful to human health and the environment if not disposed of carefully.	• Link waste generators with E-waste collector/recycler • Use licensed e-waste collection companies • Conduct awareness sessions for the users of electronic devices to ensure that they engage in best practices for management.
Risks of Child Labor due to unregulated recycling and scavenging workshops which could employ children for cheaper labour and more profit margins.	

5. Roles and responsibilities

The table 2 presents the key roles, responsibilities, and expectations for each stakeholder involved in the implementation of the sub-projects that will generate e-waste.

Table 2: Key roles and responsibilities

Roles and responsibilities for key stakeholders			
Contractors/Sub-contractors	Project Implementation Unit	User Agencies/IAs	Malawi Environment Protection Authority
• Prepare site-specific e-waste management plan and procedures • Train workers in e-waste handling, storage, transportation and disposal • Provide PPE to workers exposed to hazardous e-waste • Provide receptors for e-waste on site • Maintain e-waste registers (quantities, type, disposal site and date) • Use licensed transporters and waste recyclers • Submit weekly reports to PIU	• Review and approve site-specific e-waste management plan implementation • Inspect and monitor/Audit compliance to proposed measures in management • Verify transport and disposal documentation.	• Provide up to date specifications for e-products to avoid procuring obsolete devices with a short shelf life • Conduct awareness sessions for the users of electronic devices to ensure that they engage in best practices for management. • Hire licensed recyclers after installation or supply • Procure Electronic devices from credible manufactures through stringent procurement evaluation criteria • Request warranty arrangements for suppliers to take back products with defects	• Offer policy guidance on handling storage and transportation and disposal of e-waste.

6. Waste management procedures

6.1 Waste minimization procedures

All waste management activities will be carried out in line with the **3R principle (Reduce, Reuse, and Recycle)**. The measures below are intended to reduce, prevent, or minimize the generation of e-waste:

- **Accurate ordering and staging:** Order materials in correct quantities and avoid over-ordering of spares to prevent unnecessary waste.
- **Quality control at receipt:** Inspect PV modules, inverters, regulators, and batteries or any electronic product upon delivery. Immediately segregate any defective or non-conforming items for return or replacement.

- **Use correct handling tools and qualified personnel to prevent damage:**
Use appropriate tools and safe handling practices to avoid damage, with particular care when handling batteries. Additionally, use qualified subject matter specialist to minimize damage related to installation or operation of the e-products.
- Reuse cable trunking where allowed and safe, and where it remains compliant with the installation design requirements.
- **Reduce offcuts and material wastage:** Measure cable routes carefully before cutting.

All agencies must ensure that waste is segregated at source and disposed in clearly marked receptors, stored in a separate dedicated area.. Rejected items must be returned to the suppliers.

6.2. Collection and handling procedures

The general handling procedures for e-waste is as follows

- Wear appropriate and fit for purpose PPE: cut-resistant gloves, safety boots, eye protection;
- Use insulated tools for electrical components;
- Keep waste dry and protected from rain and direct sunlight;
- For damaged items, apply “DO NOT USE” tag immediately.

Hazardous e-waste such as lithium batteries are a serious cause of risks and impacts defined in table 1. The following procedures shall apply;

- Treat **all removed batteries** as hazardous even if they appear intact;
- Do not puncture, crush, or short-circuit batteries;
- Keep terminals protected (use tape/caps if compatible with manufacturer guidance).
- Prevent metal contact and avoid water ingress;
- Do not burn;
- Store the waste away from regular materials and public access areas;
- Engage MEPA for safe disposal;
- Keep away from ignition sources and direct sunlight where possible;
- Provide signage hazardous material, prohibit smoking; and
- Follow fire safety and safe battery storage measures proposed in the ESMPs.

6.3 Transportation of e-waste

1. Transport e-waste **only in closed, labeled, covered vehicles/containers** to prevent spillage and exposure.
2. Use **licensed waste transporters** where required by Malawi regulations and MEPA guidance.
3. Maintain a **chain-of-custody record** for hazardous e-waste:
 - Waste description
 - Quantity (number of units and/or weight if available)
 - Date and site
 - Sender (Contractor)
 - Transporter
 - Receiving facility
 - Receipts/disposal certificates

7.0 Mandatory prohibitions by all stakeholders

- No open dumping.
- No open burning.
- No handling of waste by unlicensed persons/firm.
- No mixing hazardous and non-hazardous waste.

8. Training and awareness

Before mobilization and during installation, the contractor and PIU shall arrange trainings on the following thematic areas:

- Battery safe handling and isolation practices of e-waste
- OHS (PPE use, electrical safety)
- Incident reporting and emergency response

9. Monitoring and Reporting

PIU will be responsible for monitoring implementation of this plan. To that PIU shall conduct inspections when deemed necessary. The contractor, shall be required to submit weekly report to PIU. The PIU shall consolidate contractors's weekly reports and submit to the World Bank as part of regular reporting of E and S to the Bank. A near miss or incident shall be reported to PIU immediately together with applied corrective actions.

Inspections shall identify areas of non-compliance and propose corrective actions. This shall ensure continuous improvement of this framework and site-specific plans.

Annex 3: MEPA Clearance letter for SPS Sites

Our Reference No: MEPA / 34/ 02/01 /
Your Reference No:
Communications should be addressed to:
The Director General



Malawi Environment Protection Authority
P/ Bag 317
Lilongwe 3
Tel: +265 986 184 292/ 882 425 163
Email: information@mepa.mw
Website: www.mepa.mw

Protecting the environment, Protecting life

10th October, 2025

The Project Manager
Southern Africa Trade and Connectivity Project
Ministry of Transport and Public Works
Private Bag 322
Lilongwe

Dear Sir,

**ENVIRONMENTAL CLEARANCE FOR INSTALLATION OF POWER BACKUP
SYSTEMS IN STANDARDS, SANITARY AND PHYTOSANITARY (SPS) AGENCIES'
ESTABLISHMENTS ACROSS MALAWI**

Reference is made to the project brief on the above captioned subject which was submitted to the Authority for review and guidance. I wish to advise that you can proceed with the proposed project on condition that you shall develop and submit to the Authority a Waste Management Plan to ensure proper management and disposal of e-waste.

Should you require any further information or clarification on the foregoing, please do not hesitate to contact us.

Yours faithfully,

MALAWI ENVIRONMENT PROTECTION AUTHORITY

Wilfred Kadewa, PhD
DIRECTOR GENERAL

Annex 4: Sample Code of Conduct for Contractors

1. Purpose and Scope

This Sample Code of Conduct (CoC) provides the minimum mandatory standards of behaviour for all personnel engaged in implementation of SPS power Backup subprojects, including Managers, suppliers, and all categories of workers (permanent, temporary and day workers). The annex serves as a framework and template for preparation of a project-specific Contractor's Code of Conduct, which shall be adapted by each Contractor to reflect the scope, risks, workforce composition and community context of the subproject, and submitted to the Supervising Consultant and the PIU for review and approval prior to mobilisation.

The project-specific CoC shall apply to all personnel working on or in connection with the subproject and shall be communicated in a language and format that workers understand. Each worker shall sign the approved Code of Conduct as a condition of employment and shall receive induction and periodic refresher training on its requirements, including sanctions for non-compliance.

The Code addresses risks associated with the following:

- Environmental and social management.
- Occupational health and safety (OHS).
- Labour influx and labour relations.
- Spread of communicable diseases, including HIV and AIDS.
- Sexual harassment (SH), sexual exploitation and abuse (SEA), and gender-based violence (GBV).
- Child labour and child protection.
- Illicit behaviour, crime and corruption.
- Community health, safety and road safety.

Compliance with the approved Code of Conduct is a contractual obligation for the Contractor and all associated personnel, and a condition of employment on the project. The Contractor shall be responsible for enforcement of the Code at worksites, worker accommodation areas, haul routes and all other project-related locations, while the PIU shall monitor compliance as part of ESMMP and contract implementation.

2. General Obligations

The PIU shall ensure that the Contractor and all associated personnel:

a) Legal Compliance

Comply at all times with the laws, regulations, and standards of the Republic of Malawi, including the Environment Management Act (2017), labour laws, occupational safety legislation, and applicable World Bank safeguard requirements.

b) ESHS Planning Instruments

Prepare, implement, and maintain site-specific instruments prior to commencement of works, including:

- *Risk assessment plan*;
- Health and Safety Management Plan (HSMP);
- HIV and AIDS Awareness Programme;
- Occupational Health and Safety Awareness Programme;
- GRM Management Plan.

c) Occupational Health and Safety

Provide a safe and healthy working environment, including:

- Provision and compulsory use of appropriate Personal Protective Equipment (PPE);
- Prevention of avoidable accidents and injuries;
- Immediate reporting and correction of unsafe acts or hazardous conditions.

d) GRM plan

Implement GRM measures, including:

- Workers committee formation;
- Establish grievance reporting and recording mechanisms
- Grievance resolutions etc

e) Environmental Protection

Avoid poor waste and e-waste disposal:

f) Pollution Prevention

Take all reasonable measures to prevent pollution of air, water, and soil, land degradation, and environmental damage, and ensure compliance with good international industry practice.

g) Worker and Public Safety

Install standard safety signs, barricades, during power back installations.

h) Sanitation and Welfare Facilities

Provide adequate sanitation facilities, including:

- Safe drinking water;
- Decent toilets for both men and women
- Prohibition of open defecation.

i) Site Rehabilitation and Restoration

Restore all disturbed areas after installation such stockpiles and waste storage sites through disposal

3. Labour, Ethics, and Social Conduct

j) Non-Discrimination

Prohibit all forms of discrimination in recruitment, employment, and working conditions on the basis of gender, age, ethnicity, disability, religion, marital status, political affiliation, or other protected characteristics.

k) Fair Labour Practices

Adhere to Malawi labour laws by issuing written contracts to skilled and unskilled workers, respecting working hours, wages, and conditions of employment.

l) Prevention of Sexual Harassment

Strictly prohibit sexual harassment, including abusive language, inappropriate gestures, sexually suggestive behaviour, or culturally offensive conduct, particularly towards women and children.

m) Prevention of SEA/GBV

Prohibit any form of sexual exploitation, abuse, or violence, including:

- Exchange of money, goods, services, or employment for sex;
- Exploitative or degrading behaviour;
- Any sexual activity with minors (persons under 18), regardless of consent.

n) Child Protection and Child Labour

Prohibit child labour and all forms of child abuse, exploitation, or endangerment, and ensure children's safety in and around project areas.

o) Conflict of Interest and Corruption

Avoid conflicts of interest and prohibit bribery, favouritism, or preferential treatment based on personal, financial, or family relationships.

p) Protection of Property and Assets

Safeguard project equipment, materials, and property; prohibit theft, vandalism, misuse, or waste of resources.

q) Grievance Reporting and Non-Retaliation

Ensure that workers and community members can report violations of this Code through established grievance mechanisms without fear of retaliation, provided the report is made in good faith.

4. Enforcement and Accountability

r) Acknowledgement and Sanctions

All workers and contractor personnel shall:

- Read, understand, accept, and sign this Code of Conduct as a condition of employment;
- Attend mandatory induction and refresher training on ESHS and SEA/GBV prevention.

Any violation of this Code of Conduct may result in disciplinary action, including:

- Verbal or written warnings;
- Suspension or dismissal;
- Termination of contract; and/or
- Referral to relevant legal authorities.

5. Contractor Certification

I, the undersigned, confirm that I have read and understood this Code of Conduct and commit to ensuring full compliance by all personnel engaged under this contract.

I Agree /

Name of Authorized Representative: _____

Signature: _____

Name of Company: _____

Physical Address: _____

Company Stamp: _____

Date: _____

Annex 5: OHS Guidance:

1. The contractor will develop an OHS plan based on site specific risk assessments and in line with the SATCP OHS Framework.
2. The contractor will conduct worker's induction and training based on the topics below:
 - National OH&S policy statement
 - Brief of safety rules and regulation
 - Permit to work systems
 - Emergency response procedures, emergency telephones numbers assembly points.
 - First aider's telephone numbers, egress routes, first aid fire-fighting procedures.
 - Reporting procedure.
 - Reporting system for unsafe working conditions and practices
 - Proper usage of PPE's at site.
 - Hand tools and its usages.
 - Unauthorized jobs or tasks (RWP)
 - Fire safety rules and warning signs 1
 - Location of fire alarm points and extinguishers
 - House Keeping and waste identification.
 - Warning signs and cautions displayed on site.
 - Scaffold tagging system, capacities and primary inspection.
 - Chemical handling procedure and usage of material Safety Data Sheets
 - Transport, vehicle and equipment movement. Traffic safety
 - Smoking policy at site.
 - Drug and alcohol policy.
 - Occupational health and hygiene.
 - Accident, incident and Near Miss Reporting procedures
 - Heat stress, dehydration and remedies (Heat related abnormalities).
 - Working on heights, standards and safety aspects.
 - Explanation of project and employee duties and responsibilities.
 - Electrical hazards.
 - Protection of environment, pollution to Air, Water and Soil
 - Waste handling and disposal procedures.
 - Basic site safety rules.
 - Recent Similar field incidents.

Annex 6: GRM procedures

SATCP SPS Grievance Redress Mechanism (GRM) Protocol

1. Introduction

This Grievance Redress Mechanism (GRM) Protocol has been developed for the Southern Africa Trade and Connectivity Project (SATCP) – SPS power backup installation subprojects. The GRM provides a structured, project-wide system for receiving, recording, assessing and resolving concerns, queries and complaints from communities, workers and other stakeholders.

The GRM serves as the **first line of response** to stakeholder concerns, complementing statutory and other grievance channels (e.g. courts, police, labour authorities). It aims to resolve issues as close as possible to the point of impact, using dialogue and collaborative problem-solving, and thereby maintain constructive relations between the project, affected communities and workers.

Installation activities under SPS power Backup are expected to generate grievances related to, among others labour and working conditions, occupational and community health and safety, environmental impacts, and gender-based violence / sexual exploitation and abuse / sexual harassment (GBV/SEA/SH) and trafficking in persons (TIP).

2.0 Grievance Redress Mechanism:

A project-level Grievance Redress Mechanism (GRM) shall be established prior to commencement of works, consistent with the requirements of OP 4.01 and the SATCP ESMF. The GRM shall provide workers, host agency staff, clients, and community members with an accessible, transparent, and responsive means of raising concerns about project activities.

The GRM shall operate as follows:

- (i) Grievances may be submitted verbally or in writing to the contractor's EHS Officer at site level, or directly to the PIU Social Safeguards Specialist;
- (ii) The PIU shall acknowledge receipt of all grievances within 5 working days;
- (iii) The PIU shall investigate and respond within 15 working days;
- (iv) If the complainant is unsatisfied, the grievance shall be escalated to the PIU Project Manager within a further 10 working days;

- (v) Unresolved grievances may be referred to the World Bank. A grievance register shall be maintained by the PIU and reported monthly to the World Bank. The GRM shall be communicated to all workers during induction and to host agency staff before works commence at each site. A separate workers' grievance channel shall be maintained by the contractor in accordance with Annex 4.

Annex 7: Emergency Response Plan

Emergency response and evacuation plan deals with any kind of emergency that can arise at any time and described below.

1.1 Most probable emergency situations determined by risk assessment

The below listed are probable emergency situations:

- Machine caused injury,
- Material handling time injury
- Fall of material on person from height,
- Fall of person from height, collapse of pit,
- Fire case from batteries,
- Electrocution case
- Confined place

2.1 Responsibilities

a. Contractor

- The contractor will be responsible to prepare, arrange signage of emergency exits, fire extinguishers, fire alarm switch, assembly point and evacuation route and will ensure that signage displayed at appropriate places are maintained.
- Evacuation routes will be marked in buildings displaying EXIT and map to the effect will be placed at prominent place so that all visitors can notice it.
- The contractor will provide Emergency Personnel and Phone Numbers
- Monitoring induction and implementation of the plan
- Carry out induction training, first aid training and evacuation training.

b. SATCP PIU

PIU OHS will be responsible for:

- Approval of ERP for contractors
- Monitor implementation
- Periodic review of work methods

c. Employees

Employees will be responsible for:

- Reporting emergency incidences
- Implementation of the plan

3.1 Action Plan for Each Emergency

3.1.1 Fire and / or Explosion –

- Switch on fire alarm, shout out for help, rush at assembly point, know the kind of fire and use appropriate extinguisher. In case of large fire, quickly vacate the place immediately and take attendance at assembly point, simultaneously call for external help. Make attempt to take out any person trapped in fire but not by putting life of self/ or any other person in danger.
- The attempt of firefighting shall be made by using fire buckets, extinguishers and any available source of water near to fire spot.

3.1.2 Serious work accident / sudden illness –

- In case of serious accident or serious illness at sudden. Immediately inform key persons and act as their advice/ assessing situation.
- The injured victim or ill person to be shifted to nearest health center after providing first aid.
- The Contractor's H & S Manager and Project Manager will act to facilitate medical relief and inform police and other authorities for further necessary steps both legal and medical assistance. In unavailability of any of these, any other member of team will assist to do so by keeping in loop to SATCP OHSS

3.1.3 Chemical Spill-In case of acid spillage on person

- Adequate water to be poured on affected area for continuous ten to fifteen minutes.
- In case eyes are affected, keep face down and slowly splash clean with cold water for said period.
- Do not wipe eyes or acid affected area.
- Put cotton gauze on eyes after ample washing and protect with bandage.

- Send victim to nearest hospital for further treatment. Inform SATCP OHSS and follow the directives.

3.1.4 Confined Space Rescue –

- If person is working inside room and in spite of all care the collapse occurred arrange to remove falling materials manually and quickly if his body parts is visible, clear head at first to ensure breathing and avoid suffocation,
- Immediately call for emergency vehicle to hospital evacuation

3.1.5 Other –

- In case of any site injury either fall of person from height or fall of material on person from height arrange first aid to stop bleeding,
- Arrange first aid to support and broken bones
- In case major back bone injury wait for doctor not disturbing victim,
- In case of other injury arrange to shift victim to nearest hospital.
- Immediately inform SATCP OHSS and follow the directives.
- Stop the work immediate ensuring necessary stop process.