ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED HYBRID POWER PLANT FOR GAALKACYO ELECTRIC COMPANY (GECO), GAALKACYO, SOMALIA

PROJECT
Somali Electricity Sector Recovery Project (SESRP) (P173088)

ELECTRICITY SERVICE PROVIDER

Gaalkacyo Electric Company (GECO)

JANUARY 2025

DRAFT ESIA REPORT

DISCLAIMER:

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Acronyms and Abbreviations

AC	:	Alternating Current
ADR	:	Alternative Dispute Resolution
AfDB	:	African Development Bank
ALARP	:	As-low-as-reasonably-possible
AM	:	Accountability Mechanism
BESS	:	Battery Energy Storage Systems
CBD	:	Convention on Biological Diversity
CBO	:	Community-based Organization
CCTV	:	Closed Circuit Television
CO	:	Carbon Monoxide
CO2	:	Carbon Dioxide
CSO	:	Civil Society Organization
dBA	:	decibels A
DC	:	Direct Current
DIN	:	German Institute for Standardization
DOD	:	Depth of Discharge
DoECC	:	Directorate of the Environment and Climate Change
DPF	:	Diesel Particulate Filters
DRE	:	Distributed Renewable Energy
DRS	:	Dispute Resolution Service
E&S	:	Environment and Safety
EHS	:	Environment, Health and Safety
EHSG	:	Environment, Health and Safety Guidelines
ELV	:	Extra-low voltage
EPHS	:	Essential Package of Health Services
ESF	:	Environmental and Social Framework
ESIA	:	Environmental and Social Impact Assessment
ESMF	:	Environmental and Social Management Framework
ESMP	:	Environmental and Social Management Plan
ESP	:	Electricity Services Provider
ESS	:	Environmental and Social Standards
FGM	:	Female Genital Mutilation
FGS	:	Federal Government of Somalia
FMoH	:	Federal Ministry of Health
FMS	:	Federal Member State
FRS	:	Federal Republic of Somalia
GBV	:	Gender-based Violence
GDP	:	Gross Domestic Project
GECO	:	Gaalkacyo Electric Company
GHG	:	Greenhouse Gas
GN	:	Guidance Notes
GPE	:	Global Partnership on Education
GRC	:	Grievance Redress Committee
GRM	:	Grievance Redress Mechanism
GRS	:	Grievance Redress Services
GSDP	:	Galmudug State Development Plan
HD	:	Horizon Development
HIV/AIDS	:	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
HV	:	High Voltage
ICP	:	Informed Consultation and Participation
ICT	:	Information and Communication Technology
IDO	:	Industrial Diesel Oil
IDP	:	Internally Displaced Persons
IDP	:	Internally Displaced Persons
IEC	:	International Electro technical Commission
ILO	:	International Labour Organization
INDCs	:	Intended Nationally Determined Contributions
IPV	:	Intimate Partner Violence
ITCZ	:	Intertropical Convergence Zone
ITF	:	Intertropical Front
JTC	:	Joint Technical Committee

ITCZ	:	Inter-Tropical Convergence Zone
kV	:	Kilovolt
LED	:	Light Emitting Diode
LMP	:	Labour Management Plan
LV	:	Low Voltage
MoEWR	:	Ministry of Energy and Water Resources
MV	:	Medium Voltage
MW	:	Megawatt
NAPA	:	National Adaptation Program of Action on Climate Change
NDP	:	National Development Plan
NGO	:	Non-Governmental Organization
NO2	:	Nitrogen Oxide
NT	:	Near-threatened
OHS	:	Occupational Health and Safety
OP	:	Operational Policy
OSH	:	Occupational Safety and Health
PAP	:	Project Affected Persons
PC	:	Public Consultations
PIU	:	Project Implementation Unit
PM	:	Particulate Matter
PMP	:	Power Master Plan
PPE	:	Personal Protective Equipment
PV	:	Photovoltaic
PWD	:	People with Disability
RAP	:	Resettlement Action Plan
REF	:	Renewable Energy Factor
RPF	:	Resettlement Policy Framework
SCADA	:	Supervisory Control and Data Acquisition
SCR	:	Selective Catalytic Reduction
SDG	:	Sustainable Development Goal
SEA/SH	:	Sexual Exploitation and Abuse and Sexual Harassment
SEP	:	Stakeholder Engagement Plan
SESRP	:	Somali Electricity Sector Recovery Project
SGD	:	Sustainable Development Goals
SME	:	Small and Medium Enterprise
SO2	:	Sulphur Dioxide
SRP	:	Social Responsibility Programmes
TMP	:	Traffic Management Plan
TV	:	Television
UNCCD	:	UN Convention to Combat Desertification
UNFCC	:	United Nations Framework Convention on Climate Change
UNFPA	:	United Nations Fund for Population Activities
UNHSP	:	United Nations Human Settlements Programme
USAID	:	United States Agency for International Development
USD	:	United States Dollars
UV	:	Ultraviolet
VMG	:	Vulnerable and Marginalized Groups
VOC	:	Volatile Organic Compound
VU	:	Vulnerable
WASH	:	Water, Sanitation, and Hygiene
WB-ESS	:	World Bank Environmental and Social Standards
WBG	:	World Bank Gr

Executive Summary

(i) Somalia's electricity sector is fragmented and inefficient, ranking among the world's worst for affordability. The Federal Government of Somalia has received World Bank funding to support the SESRP project, aiming to increase access to cleaner energy. Horizon Development (Consulting firm) is assisting the PIU in managing environmental and social risks, implementing mitigation measures, and overseeing the implementation of SESRP in Somalia, ensuring compliance with national and World Bank policies.

(ii) The SESRP has the following components:

Component 1	Sub-transmission and distribution network reconstruction, reinforcement, and operations efficiency in the major load centers of Mogadishu and Hargeisa.
Component 2	Hybridization and battery storage systems for mini grids.
Component 3	Stand-alone solar off-grid access to public institutions (Health and Education).
Component 4	Institutional Development and Capacity Building.

(iii) Gaalkacyo Electric Company (GECO) is one of the electricity in services providers in the Galmudug Sector of Gaalkacyo City participating the SESRP project, especially in implementing component 2 on hybridization and battery storage systems for mini-grids. GECO currently has an installed capacity of 2.4MW consisting of 2MW (diesel genset) and 0.4MW (solar PV). Under the proposed arrangement, GECO will establish a new and modern hybrid power plant while the MoEWR will provide overall coordination of the project and oversight during planning and implementation of the project, including overall coordination and oversight for safeguards due diligence, and implementation. The joint technical committee (GECO and MoEWR) will be responsible for the implementation of the project during construction and operation phases.

(iv) The main objective of this ESIA was to examine both positive and negative effects of the proposed hybrid power plant on the environmental and social spheres, and the proposed measures to mitigate the negative impacts, and measures to enhance positive impacts during the construction, operation and decommissioning phases of the project.

(v) This ESIA study followed World Bank's environmental and social standards (ESS) guidelines, national legislations, and international best practices. It focused on understanding the project background, preliminary designs, and implementation plan. Data was collected through both qualitative and quantitative methods, including literature reviews and physical observations, photography, check lists, interviews, and stakeholder consultations. Primary data was collected through interviews, discussions, photography, observations, and checklists to understand the environmental, socio-economic, and cultural setting of the project site and surrounding area.

Project Description and Context

(i) The proposed Hybrid Power Plant ($6^{O}43'54.3''N$, $47^{O}26'10.8''E$) is located in the southern sector of Gaalkacyo City, Galmudug State, Somalia. It is on roughly 12.5 acres of land adjacent to the current GECO Power Plant in the outskirts of the city. The project site's surroundings is sparsely populated, with a few settlement around the planned site. The site is connected via an all-weather road from the central business district of Gaalkacyo City.

(ii) The feasibility study for the proposed project has recommended scenario 2 of 50% Renewable Energy Factor (REF) for detailed design. Under this scenario, the hybrid power plant with a 7MW capacity is proposed. The proposed plant will comprise of solar PV modules and lithium-ion battery energy storage system (BESS). The plant is expected to operate for 25 years with a BESS lifetime of 6000 cycles (approximately 17.5 years), and shall be decommissioned thereafter. Given that the lifetime of a lithium-ion battery is expected to expire after 17 years, a replacement plan for battery will be implemented to ensure continued functionality for the expected period of 25 years. This shall include procuring and installing new batteries or upgraded storage technologies, safely recycling or disposing of expired batteries in line with environmental regulations, and allocating funds for the replacement. Battery replacement shall be coordinated with routine maintenance to minimize downtime. Additionally, this shall present an opportunity to adopt newer, more efficient technologies that could enhance the plant's performance for the remainder of its operational life.

Legal and Regulatory Framework

(i) The Federal Government of Somalia (FGS) has been struggling with lack of well-developed environmental laws due to political instability. However, the Provisional Constitution of Somalia is explicit on safe and clean environment for the citizens. Additionally, a new Environmental Protection and Management Act (2020) has been enacted to spearhead environmental management in the Federal Republic of Somalia (FRS). Additionally, the FRS is in the process of developing several other regulations under the environmental protection law. At State level, the legal and regulatory framework of the Galmudug State shall apply because the proposed project is located in the southern sector of Gaalkacyo City that falls within the Galmudug State. Overall, the proposed project did not conflict with any of the existing national or regional (Galmudug State) legislations or regulatory frameworks. However, the need for prudent implementation of the ESMP is strongly advised during all the project phases.

(ii) The World Bank's latest environmental and social standards (ESS) and guidance notes were analyzed to determine if a proposed project triggered any of the ESS. Overall, the ESIA aimed to provide guidance for environmental and social assessment for a WB-financed project, improve decision-making, ensure sustainable options, and properly consult potentially affected people. The ESIA revealed that the proposed project would have both negative and positive impacts on the environment and social spheres, highlighting the importance of sound and sustainable project options.

(iii) The FRS is a signatory to a number of international treaties, conventions and agreements that include legally binding commitments to protect the environment and to ensure the sustainable management of natural resources. For this ESIA, several multilateral agreements to which FRS is a signatory were reviewed. These included: The United Nations Convention on biological diversity (CBD); The UN Framework Convention on Climate Change (UNFCCC); The UN Convention to Combat Desertification (UNCCD). Convention on the Conservation of Migratory Species of Wild Animals (ratified 1985); Protocol concerning Regional cooperation in Combating Pollution by Oil and other Harmful Substances in Cases of Emergency; Sustainable Development goals and Agenda 2063 in Africa; and International Labour Organization Agreements. Overall, the proposed project did not conflict with any of the multilateral environmental agreements or conventions for which the FRS is a signatory.

Analysis of Alternatives

(i) Two potential sites for the project were considered - the existing power plant and the proposed new site, which is adjacent to the existing power plant. The analysis of alternatives compared the existing power plant location, which lacks adequate space for the new hybrid power infrastructure, with an adjacent site that offers sufficient space for expansion. While maintaining the current location would leverage existing infrastructure and minimize any relocation costs, space constraints could limit future growth and operational efficiency. On the other hand, the adjacent site provided ample room for investment, allowing for optimized layout and future scalability. Careful consideration of long-term benefits, costs, and operational efficiency were crucial in determining the best option for sustainable power generation. It is in this regard that the adjacent site was selected for the proposed project. Additionally, the proposed project site was chosen based on a number of factors. These included geophysical factors such as an open and expansive area with maximum solar irradiance, a location that is not prone to soil erosion and flooding, and an area with good drainage, among others. The proposed site is free of any ownership disputes or other encumbrances; and there were no squatters, encroachers, or other land claims.

(ii) The No Project Option was deemed least preferred due to socio-economic and environmental factors. It would continue diesel generator-based electricity generation, causing even more GHG emissions. The No Project Option would further affect the local economy by limiting the supply of affordable, clean, and reliable electricity supply. This would also hinder creation of employment opportunities and slow the Galmudug State and FRS efforts in meeting energy demands. This would negatively affects the overall socio-economic development, especially of Galmudug State.

Environmental and Social Baseline

(i) Gaalkacyo City's southern sector is categorized as arid to semi-arid, with longer periods of drought and low rainfall. Like the rest of the Galmudug State of FRS, Gaalkacyo City has mainly with calcareous soils. Additionally, the City's foundation is based on ancient Precambrian basement rocks. Overall, there is paucity of data on biophysical parameters owing to little targeted studies and environmental monitoring for parameters such as quality and greenhouse gas emissions.

(ii) The flora of southern Gaalkacyo City is dominated by species adapted to the arid climate, with thorny shrubs and bushes providing shade and grazing for livestock. Some herbaceous plants and grasses thrive during short rainy seasons. The southern sector of the City is not endowed with fauna owing, and only a few resident birds, mammals and herpetofauna are known for the area. However, no species of conservation concern as per the IUCN Criteria is known to occur the southern sector of the city's surroundings, including the proposed project site.

(iii) The Galmudug State's socioeconomic environment is shaped by historical background, cultural diversity, economic activities, infrastructure development, and governance dynamics. The state invests in road infrastructure, improves access to clean water and sanitation, and provides education and healthcare services. However, the socio-economic infrastructure development is still poor owing to low investment in many sectors. Lack of reliable electricity provision has been cited as one of the key factors impinging the economic development, especially in the southern sector of the City.

Assessment of Impacts

The project aims to positively influence the Galmudug State and FRS economy in general by providing employment opportunities and boosting economic growth. The provision of reliable and affordable electricity as proposed under the project can be considered a game-changer. However, the proposed project will also have negative impacts on the biophysical environment, infrastructure, utilities, and various aspects of the social environment.

Impacts, mitigation, monitoring and reporting

The proposed power plant project will have both positive and negative impacts. All phases of the project area expected to provide local employment and boosts businesses. The operation phase will offer reliable power supply, improved living standards, and to a great enhanced socio-economic development. Overall, the construction phase will have minor to moderate impacts like vegetation clearance, dust emissions, noise disturbance, waste generation and occupational health and safety concerns for the workers and even the local communities. The operation phase will have negative impacts like waste generation, increased oil consumption, occupational health and safety concerns, and other public health issues. The decommissioning phase has impacts revolving mainly around waste management and noise generation.

Summary of impacts during construction, operation and decommissioning phases

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES
CONSTRUCTION	Impacts on biophysical environment	Landscape and visuals	• Erect a fence around the power plant.
		Soil, ground/surface water contamination	• Scoop and correctly dispose contaminated soil. • Care must be exercised not to spill any fossil fuels • Construction vehicles must be maintained in good state. • Contractor to develop an oil-spill containment plan. • Ensure wastewater generated is discharged into approved drainages.
		Air quality (Dust)	• Suppress dust during dry periods by use of water sprays; • Stockpiles of excavated soil should be covered/palliated • Burning of woody debris & construction waste to be prohibited • Ensure all the personnel use PPEs. • Restrict speed on loose surface roads during dry or dusty conditions • Trucks moving materials to site to be covered to prevent dust emissions.
		Air quality (Vehicle exhaust emissions)	• All drivers vehicles must be sensitized not leave vehicles idling. • Maintain all machinery in good to minimize GHG emissions and PM.
		Noise & vibration	• Use modern equipment fitted with noise-reduction technologies • Ensure regular maintenance of machinery to reduce noise emissions. • Establish a GRM for community to report noise or vibration disturbances. • Establish a monitoring to regularly measure noise and vibration levels. • Inform nearby communities in advance about and scheduled high-noise. • Provide appropriate PPEs to workers during construction activities. • Restrict construction activities to daylight hours (e.g., 7:00 AM to 6:00 PM).

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES
		Biodiversity (Fauna)	• Site clearing work/earthwork to be done during the dry season to minimize impacts on fauna. • Vehicle movements shall be limited to designated paved/unpaved roads and maintained at 15-20 km/h. • Site preparation shall minimize clearing of vegetation and topsoil. • Ensure wildlife-friendly designs for infrastructures. • Temporary-use areas shall be restored and revegetated • An ecologist shall be hired to coordinate the fauna monitoring.
		Biodiversity (Flora)	• Ensure proper demarcation and delineation of the project site to be affected by construction works. • Designate access routes and parking areas • Re-vegetation including planting of trees around the plant/facility
		Soil erosion	• Avoid groundbreaking during the seasons of high rainfall to avoid erosion. • Monitoring of areas of exposed soil during rainy seasons to ensure that any incidents of erosion are quickly controlled. • Construction related impacts like erosion and cut slope destabilizing should be addressed through landscaping and grassing, carting away and proper disposal of construction materials • Use silt traps where necessary • Monitoring of areas of exposed soil during rainy seasons to ensure that any incidents of erosion are quickly controlled. • Ensure spoil from excavations is arranged according to the various soil layers. This soil can then be returned during landscaping and then rehabilitation, in the correct order which they were removed that is top soil last
		Wastes (Solid wastes)	• All hazardous products and waste should be labelled and handled properly to avoid contact with the ground • Dispose hazardous waste through an approved waste handler • Segregate waste • Provide litter collection facilities such as bins • Contractor to put in place and comply with a site waste management plan • Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of waste generated over time • Recovery of materials remains and return to stores • Re-use of materials where possible • Proper budgeting to avoid waste generation • Proper disposal of waste in line with solid waste regulation • Construction wastes to be managed in accordance with internationally accepted construction standards of a hybrid power plant
		Wastes (Liquid wastes)	• All chemicals should be stored within the bunded areas and clearly labelled detailing the nature and quantity of chemicals within individual containers. • Create awareness for the employees on site on procedures of dealing with spills and leaks • Develop and implement a detailed Spill Prevention Plan (SPP) • Disposal of waste through septic tanks • Ensure secure storage of all hazardous materials, including fuel and oil, in compliance with local regulations. • Frequent inspection and maintenance of the generator to minimize leakages. • In case of spillage, the contractor should isolate the source of oil spill and contain the spillage using sandbags, sawdust, absorbent materials and/or other materials approved by materials. • In the event of accidental leaks, contaminated top soil should be scooped and disposed of appropriately. • Install oil-water separators in drainage systems to capture and remove oil or fuel from stormwater. • Keep accurate documentation of fuel and oil storage volumes, transfer activities, and inspection results to aid in compliance reporting and performance reviews. • Proper training for the handling and use of fuels for the operators of the power plant. • Provide sanitary waste facilities for both genders clearly marked • Refuelling and maintenance of vehicles will not take place at the construction site. • The waste oil or used oil must be disposed-off appropriately. • Vehicles and equipment must be serviced regularly and kept in good state to avoid leaks.
	Impacts on infrastructure and utilities	Water consumption	• Ensure prudent use of available water • Consultations with the project local committee on water use to avoid conflicts with the community • Source and utilize a sustainable and reliable water supply for both

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES
			construction and operation phase.
		Energy Consumption	• Ensure responsible electricity use at the construction site through sensitization of staff to conserve electricity. • Proper planning of transportation of materials will ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts. • Complementary to these measures, they monitor energy use during construction and set targets for reduction of energy use.
	Impacts on social environment	Archaeology and cultural heritage	• Develop and implement a Chance Finds Procedure and ensure protocols are followed. • Engage a qualified archaeologist to monitor all ground-disturbing activities to ensure early identification. • Establish a clear protocol for halting construction activities immediately if any archaeological or cultural materials are found. • If archaeological artefacts or sites are discovered, establish temporary buffer zones around these areas to protect them from further disturbance. • If chance finds are made, ensure proper documentation, including detailed records, photography, and GPS coordinates, before any further action is taken.
		Trespassing of unauthorized personnel	• Controlled access to the site only with prior approval • Fencing off the construction site to keep of unauthorized personnel • Hazard communication • Maintain records of any person who comes to site • Ensure proper barricading
		Worker influx – incoming workforce	• Tap into the local workforce to the extent possible to reduce labour influx. • Recruit local workforce to the extent possible especially for unskilled and semi-skilled jobs. • Raise awareness among local community and workers on the need to have a good /cordial working relation • Sensitize workers regarding engagement with local community. • Establish and operationalize an effective GRM accessible to community members. • The contractor and the project/community grievance redress committee to work closely address complains raised on time. • Respect for community values/culture. • Prompt payment of workers as per the contractual agreements/terms.
		Gender-based violence	• Update the existing SEA/SH Prevention and Response Action Plan, to manage the SEA/SH risks that are relevant to the subproject. • Implement a code of conduct signed by all those with physical presence on site. • Establish Workers GRM with multiple channels including SEA/H channels. • Ensure that Code conducts are singed by all employers or incorporated in the employment contracts.
		Labour disputes	• Ensure full compliance with local labor laws. • Ensure that all workers receive clear, written contracts outlining their rights, responsibilities, wages, benefits, working hours, and terms of employment. • Establish mechanisms to guarantee fair and timely payment of wages and benefits. • Establish worker welfare committees to represent labor concerns, promote dialogue, and facilitate the resolution of potential issues. • Implement and enforce non-discrimination policies to ensure equal treatment of all workers regardless of gender and clan. • Set up a formal, transparent grievance redress mechanism to handle worker complaints and disputes in a timely manner.
		Child and forced labour	• Implement and monitor the employment register regularly. • Compliance with the national labor laws and labour management practices. • Put visible signage on site “No Jobs for children” • Do not allow children at the project site. • Adhere to the ESS 2 provisions and FRS Employment Act, which outlaws any form of forced labour. • Report any form of forced labour at the site.
		Security risks	• Conduct a comprehensive risk assessment to identify security threats. • Engage local stakeholders (government, law enforcement, and communities) to understand local security concerns. • Collaborate with local law enforcement and security agencies to provide support and enhance security measures. • Hire licensed security personnel familiar with the area to provide 24/7 site surveillance, patrols, and monitoring. • Use surveillance systems, such as CCTV cameras and motion sensors, to monitor critical areas in real-time.

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES
			• Implement strict access control protocols, including identity verification and sign-in procedures for workers. • Provide workers with ID badges and restrict entry to authorized personnel only. • Develop a security incident response plan that includes procedures for evacuation, medical emergencies, and reporting incidents. • Provide workers with security training, and protocols for responding to security threats. • Maintain constant communication and coordination with local authorities regarding security updates and developments in the region. • Prepare contingency plans for potential security scenarios, including kidnappings, armed attacks, and civil unrest. • Have security response teams on standby to address urgent security breaches or emergencies.
		Occupational Health and safety	• Develop and implement a comprehensive OHS plan before the commencement of the project • Use skilled personnel for activities which demand skills/technical tasks • Workers coming to the site should be knowledgeable on safety precautions to take • Provide appropriate PPE to all workers. • Undertake risk assessment by contractor of the construction activities and implement mitigation measures appropriately • Availability of equipped first aid box on site • Provide safe drinking water for workers • Engagement of trained first aider on site • Establish safety committees
		Community health and safety risks	• Allowing migrant workers time to be with their families • Awareness creation and consultations with local communities prior and during construction on the dangers of these diseases • Ensure equal treatment of workers • Informing workers on local cultural values and health matters. • The contractor is impressed upon not to set a construction camp on site. • The contractor will provide public education/information about HIV/AIDS transmission and prevention measures.
		Fire Hazards	• 'No smoking' signs shall be posted at the construction site • A fire risk assessment and evacuation plan should be prepared and must be posted in various points of the construction site including procedures to take when a fire is reported. • Create awareness to the construction workers on potential fire hazards • Designate an assembly point • No smoking shall be done on construction site • Provision of firefighting equipment on site during construction.
		Traffic risks	• Develop and implement a Traffic Management Plan (TMP). • Use traffic signs, barriers, and cones to guide and direct both construction and local traffic. • Enforce strict speed limits for construction vehicles within the construction site and along designated transport routes. • Install speed bumps or other traffic-calming measures on roads near the construction site. • Engage with local communities to raise awareness about increased construction traffic and safety measures. • Erect temporary road signs warning local road users of construction activities and increased traffic. • Designate safe parking and loading zones for construction vehicles away from main roads and community spaces.
		Risks related to Inadequate stakeholder engagement	• Update the existing SEP and make it more relevant to the subproject and the identified stakeholders. • In line with the SEP, undertake adequate consultations prior to construction and throughout the project cycle with all segments of the community and other relevant stakeholders. • Prepare and implement a GRM to deal with grievances. • The grievance redress committee to include representatives from the community. • Sensitize stakeholders on SEP and GRM.
		Inadequate grievances management	• Constitute a Local Grievances Committee is in consultation with all community segments, and incorporates the existing local dispute resolution mechanism. • Implement a worker's grievances mechanism. • Awareness on the culturally appropriate and accessible GRM to all community segments including VMGs, vulnerable individuals and households and CSOs • All reported grievances are logged, dated, processed, resolved

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES
			and closed out in a timely manner. • Proportionate representation of VMGs and vulnerable individuals in the local grievances committee. • GRM provides for confidential reporting of particularly sensitive social aspects such as GBV, as well as anonymity.
OPERATION	Impacts on biophysical environment	Landscape and visual	• Fence off the power plant.
		Soil, ground/surface water contamination	• Infrastructure shall be designed to ensure that contaminated run-off does not reach water source i.e., earth dam. • Contractor to develop an oil-spill containment plan as part of the emergency response plan. • No vehicle maintenance and service shall be done at project site • Ensure that potential sources of petro-chemical pollution are handled in such a way to reduce chances of spills and leaks.
		Air quality (Dust)	• Trees can be planted around the plant/facility provided they do not cast shadows to the solar panels to act as wind breakers and hence decrease dust pollution • Ensure planting of grass around and within the facility compound
		Air quality (Vehicle fumes emissions)	*Vehicles* • Maintain all machinery and equipment in good working order to ensure minimum emissions of carbon monoxide, NO2, SO2 and suspended particulate matter. *Generators* • Use of diesel which is Sulphur- free to run the power producing generators to be encouraged • The stack chimney of the generators will be increased from its normal height of 3 meters to 6 meters • Invest in modern diesel generators with advanced combustion systems. • Install Diesel Particulate Filters (DPF) in each generator to trap particulate matter. • Use Selective Catalytic Reduction (SCR) to significantly reduce NOx emissions by injecting ammonia or urea into the exhaust stream. • Install Oxidation Catalysts: these catalysts to reduce carbon monoxide (CO) and volatile organic compound (VOC) emissions. • Ensure regular maintenance of diesel generators to maintain optimal efficiency, minimize fuel consumption, and reduce emissions. • Regularly monitor emissions and adjust generator performance to ensure compliance with environmental standards. • Implement strategies to reduce idling time when diesel generators are not needed or can be supplemented by the hybrid system. • Regularly report emissions data to local regulatory authorities as part of environmental compliance.
		Noise & vibration	*Genset* • Install soundproof enclosures around the diesel generators • Construct barriers or walls around the generators to block or deflect sound away from sensitive areas. • Use anti-vibration mounts or isolators under the generator to minimize the transmission of vibrations • Ensure regular servicing of the diesel generator to maintain its optimal function. • Install high-performance silencers on the generator's exhaust system to reduce noise emissions • Use flexible connectors on the exhaust system to reduce vibrations that can amplify noise. *BESS* • Install soundproof or acoustically treated enclosures around noisy inverters and transformers. • Use quieter, high-efficiency fans and cooling systems, or design them with lower noise outputs. • Equip the BESS unit with vibration isolators or mounts to reduce noise generated by vibrations • Install sound barriers or walls around the BESS unit to deflect or absorb noise. • Use sound-absorbing materials within the BESS unit's housing to absorb sound before it escapes. • Regularly service and maintain fans, inverters, and other equipment to ensure they operate smoothly
		Biodiversity (Fauna)	• Ensure wildlife-friendly designs for infrastructures. • An ecologist shall be hired to coordinate the fauna monitoring. • Bird deterrents will be installed to prevent collisions with solar panels.

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES
			• Post-construction monitoring will be undertaken to assess the impacts on local fauna and adapt mitigation strategies.
		Biodiversity (Flora)	• Re-vegetation including planting of trees around the plant/facility
		Soil erosion	• Monitoring of areas of exposed soil during rainy seasons to ensure that any incidents of erosion are quickly controlled. • Landscaping with grass on areas without electrical installation (lower areas) • Construct the drainage system in a way to follow natural drain of the water • Concrete only the required area and leave the rest of the land with vegetation like grass • Construct rain water harvesting system on the control buildings/office and harness into storage tanks for use
		Wastes (Solid wastes)	• Provide waste handling facilities such as labelled waste bins • Emphasis on prudent waste generation and give priority to reduction at source • Undertake solid waste management awareness to operators • Operator to contract a licensed waste handler to collect and dispose solid waste *Damaged solar panels and hazardous wastes* • Ensure segregation from other waste streams • All hazardous products and waste should be labelled and handled properly to avoid contact with the ground • Dispose hazardous waste through an approved waste handler
		Wastes (Liquid wastes)	*Sanitary wastes* • Provide sanitary waste facilities for both genders clearly marked • Disposal of waste through septic tanks *Oils from vehicles* • Refuelling and maintenance of vehicles will not take place at the construction site. • Create awareness for the employees on site on procedures of dealing with spills and leaks • Vehicles and equipment must be serviced regularly and kept in good state to avoid leaks. *Chemicals* • All chemicals should be stored within the bunded areas and clearly labelled detailing the nature and quantity of chemicals within individual containers. *Generators* • Proper storage of the oil is required to ensure no leakages • Frequent inspection and maintenance of the generator to minimize leakages. • No vehicles should be serviced or maintained at the project site. • The waste oil or used oil must be disposed-off appropriately. • Proper training for the handling and use of fuels for the operators of the power plant. • In the event of accidental leaks, contaminated top soil should be scooped and disposed of appropriately. *Accidental fuel and oil spill* • Develop and implement a detailed Spill Prevention Plan (SPP) • Ensure that secondary containment systems are in place for all fuel storage tanks, oil storage areas, and transformers. • Conduct regular maintenance checks on fuel tanks, pipelines, transformers, generators, and other oil equipment. • Install spill and leak detection systems on fuel storage tanks, transformers, and pipelines. • Implement safe fuel handling protocols to reduce the risk of spills during fuel transfers. • Set up a routine for monitoring fuel and oil storage areas, and other fuel-handling equipment for leaks or wear. • Ensure quick clean-up of spills by designated response teams trained in handling hazardous materials. • Install oil-water separators in drainage systems to capture and remove oil or fuel from stormwater. • Establish proper waste management protocols for the disposal of used oil, fuel, and filters from equipment maintenance activities. • Implement a regular environmental monitoring program to check for any signs of contamination in soil, groundwater, and surface water near the plant. • Ensure secure storage of all hazardous materials, including fuel and oil, in compliance with local regulations. • Keep accurate documentation of fuel and oil storage volumes,

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES
			transfer activities, and inspection results to aid in compliance reporting and performance reviews.
	Impacts on infrastructure and utilities	Water consumption	• Ensure prudent use of water. • Install water-conserving automatic taps. • Any water leaks through damaged pipes and faulty taps should be fixed promptly.
		Energy consumption	*Lightings* • Install an energy-efficient lighting system • Replace conventional lighting with energy-efficient LED bulbs • Utilize daylight sensors to adjust indoor lighting levels based on the amount of natural light, reducing the need for artificial lighting during the day. • Integrate lighting controls into the plant's energy management system to monitor and optimize energy use in real-time. • Conduct periodic energy audits to evaluate lighting energy consumption and identify areas for further improvement. *Diesel generators* • Implement energy-efficient technologies and practices in plant operations. • Conduct scheduled maintenance and servicing of diesel generators. • Regularly review and adjust the hybrid power system's configuration to optimize the balance between solar, BESS, and diesel power, reducing diesel generator runtime. • Ensure high quality, low-sulphur diesel is used to improve generator efficiency and reduce fuel consumption and emissions. • Implement measures to reduce unnecessary idling of diesel generators. • Provide training to operational staff on energy-efficient practices and optimal use of the hybrid system to minimize diesel reliance. • Install technologies such as diesel particulate filters (DPF) or catalytic converters to reduce the environmental impact of diesel consumption and improve overall generator efficiency.
	Impacts on social environment	Trespassing of unauthorized personnel	• Fencing off the facility to keep of community members, children and livestock from entering into the facility • Controlled access to the site only with prior approval • Maintain records of any person who comes to site
		Gender-based violence	*GBV- SEA and SH* • Update the existing SEA/SH Prevention and Response Action Plan, to manage the SEA/SH risks that are relevant to the subproject. • The Action Plan to be proportionate to potential SEA/SH risks, and includes measures such as awareness creation for communities and workers; identification of referral services for survivors and a GRM that ensures confidential reporting of GBV cases. • Implement a code of conduct signed by all those with physical presence on site. • Establish Workers GRM with multiple channels including SEA/H channels. • Ensure that Code conducts are singed by all employers or incorporated in the employment contracts. *Inaccessibility of project benefits to VMGs and other vulnerable individuals due to affordability challenges* • Consult VMGs and Vulnerable individuals and households on charges for sub project services and put in place specific interventions to ensure the vulnerable equally access project benefits.
		Labour disputes	• Ensure all employees have clear and legally binding employment contracts that outline their rights, responsibilities, wages, and benefits to prevent misunderstandings. • Establish an accessible, transparent grievance mechanism for workers to voice their concerns or disputes. • Maintain open communication between management and workers. • Ensure full compliance with national labour laws. • Implement fair and transparent disciplinary procedures. • Promote equal opportunities and non-discriminatory practices in hiring, promotion, and compensation to avoid conflicts. • Set up a monitoring system to track and evaluate labour relations, allowing for early detection of potential disputes and timely intervention. • Conduct regular worker feedback surveys to gauge satisfaction and identify any emerging concerns that could lead to disputes.
		Child and forced labour	• Compliance with the national labor laws and labour management practices. • Put visible signage on site "No Jobs for children" • -Do not allow children at the project site.

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES
			• Adhere to the ESS 2 provisions and FRS Employment Act, which outlaws any form of forced labour. • Report any form of forced labour at the site.
		Security risks	• Monitor local security developments and adjust security protocols accordingly. • Maintain a secure perimeter with robust fencing of the site • Use remote monitoring where feasible, with a centralized control room for real-time surveillance and immediate response. • Enforce strict access control measures, ensuring that only authorized personnel can enter the facility. • Deploy trained security personnel to guard the site 24/7. • Continue engaging local communities to foster positive relationships and minimize hostility. • Maintain and regularly update a comprehensive security incident response plan • Maintain close coordination with local law enforcement and security agencies • Implement a rigorous vetting process for all employees to minimize the risk of insider threats. • Develop and periodically review contingency plans for worst-case scenarios, such as armed attacks, civil unrest, or natural disasters.
		Risks related to poor or inadequate stakeholder engagement (Conflict)	*Risks related to Inadequate stakeholder engagement* • Update the existing SEP to make it more relevant to the subproject and the identified stakeholders. • Timely and prior disclosure of project all project information, including project instruments, the full rights and entitlements of project affected persons, sub-project positive and negative impacts and opportunities, proposed subproject budget. • In line with the SEP, undertake adequate consultations prior to construction and throughout the project cycle with all segments of the community and other relevant stakeholders. • Prepare and implement a grievance redress mechanism to deal with grievances. • The grievance redress committee to include representatives from the community. • Sensitize stakeholders on SEP and GRM. *Inadequate grievances management* • Employ from the community to the extent possible • Engage the community members and other stakeholders in a timely manner • Work closely with the GRM committee members in solving the conflicts • Solve all conflicts/grievances at the earliest time possible • Ensure all grievances are logged and closed • Monitoring the pattern of grievances to come up will long term measures
		Occupational health and Safety	• Ensure only qualified staff are employed to work in the facility • All workers operating the project site must be equipped with appropriate and adequate personal protective equipment (PPE) such as; safety footwear, helmet among others. • Operators must be skilled on firefighting management • Annual EHS audits should be done
		Community health and safety risks	*Public Health Impacts* • Informing workers on local cultural values and health matters. • Allowing migrant workers time to be with their families • Ensure equal treatment of workers. *Shocks and electrocutions* • Inspect the wiring of the houses before connecting power • Safety awareness campaigns to the community before connection of power on safety precautions such as: • Require community to engage a certified technician to do wiring in the premises • Use of quality materials while wiring • Refraining from individual illegal extensions of power lines to other houses • Observing safety measures while using electricity such as not touching sockets and switches with wet hands or wiping with wet cloths • Keeping off all electricity infrastructure e.g., not tying livestock on electric poles, no cutting earth wires that run along some electric poles, not interfering with sockets or switches • Reporting any electric wire/conductors if found fallen on the ground • Report any incident regarding electricity at the local office –staff in charge of operating the power plant.

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES
			Public Health Impacts –HIV/AIDs • Sensitize workers and the community on prevention and mitigation of HIV/AIDS and other sexually transmitted diseases, through staff awareness and awareness campaigns for the community • Allowing migrant workers time to be with their families
		Fire hazards	• The power plant must contain firefighting equipment (Portable fire extinguishers) of recommended standards and in key strategic points, including diesel generators, fuel storage areas, BESS locations, etc. • Detection/alarm systems that can detect fire should be and installed • A fire evacuation plan should be prepared and posted at strategic points and should include procedures to take when a fire is reported. • Workers especially operators of the plant must be trained on fire management • 'No smoking' signs shall be posted within the power plant area • A fire Assembly point should be identified and marked
DECOMMISSIONING	Impacts on biophysical environment	Landscape and visual	• Create a comprehensive decommissioning plan that includes strategies for minimizing visual impacts on the landscape. • Implement a revegetation plan using native plants and vegetation to restore the natural landscape and improve visual aesthetics. • Ensure proper management and disposal of all debris and waste materials to prevent visual pollution in the surrounding landscape. • Conduct regular clean-up and maintenance of the site to remove any debris or unsightly materials, ensuring a tidy landscape. • Install informational signs explaining the decommissioning process and future land use plans, promoting transparency and community understanding. • Provide regular updates to stakeholders on decommissioning progress and visual impacts, ensuring ongoing communication and involvement.
		Biological environment	• Develop habitat protection plans that outline specific measures to protect sensitive habitats, such as wetlands, flora, and fauna during decommissioning. • Implement erosion and sediment control measures to protect soil and water quality, preventing sediment runoff into adjacent habitats. • Plan for revegetation and habitat restoration using native plant species after decommissioning to promote biodiversity and ecosystem recovery. • Monitor and manage invasive species during and after decommissioning to prevent their spread into disturbed areas. • Implement measures to control noise and vibration during decommissioning to minimize disturbance to local wildlife. • Ensure proper disposal of waste materials to prevent pollution and harm to the biological environment. • Engage with local communities to raise awareness about the importance of protecting the biological environment during decommissioning. • Work with environmental specialists and conservation organizations to develop and implement effective mitigation measures. • Develop detailed site restoration plans that include objectives, timelines, and responsibilities for restoring biological habitats post-decommissioning.
		Solid Waste Generation	• Demolition contractor to adhere to the various manufacturer's guidelines and requirements regarding demolition and disposal • Segregation of waste in order to separate hazardous waste from non-hazardous waste and other streams of waste • Provision of facilities for proper handling and storage of demolition materials to reduce the amount of waste caused by damage or exposure to the elements • Adequate collection and storage of waste on site • Safe transportation to the disposal sites / designated area • Hazardous waste must be disposed by approved waste handler
		Liquid Waste Generation	• Conduct a comprehensive assessment to identify and categorize all sources of liquid waste generated during decommissioning. • Develop a detailed liquid waste management plan outlining procedures for the collection, storage, treatment, and disposal of liquid wastes. • Establish temporary storage facilities for liquid wastes to prevent leaks or spills and ensure safe handling until proper disposal. • Whenever possible, use environmentally friendly materials and products that generate less hazardous liquid waste during decommissioning.

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES
			• Ensure that all liquid wastes are disposed of in accordance with local regulations and environmental standards, using licensed waste disposal facilities. • Provide training for staff on liquid waste handling, storage, and emergency response procedures to minimize risks. • Identify opportunities for the reuse or recycling of liquid waste materials, where feasible, to minimize waste generation. • Engage with the local community to inform them about liquid waste management practices and promote awareness of environmental protection. • Maintain accurate records of liquid waste management activities, including quantities generated, treatment methods, and disposal locations. • Prepare for emergencies related to liquid waste, including establishing an emergency contact list and response procedures. • Maintain an inventory of chemicals and hazardous substances to prevent unnecessary waste generation and facilitate proper management.
		Noise and vibration	• Install portable barriers to shield compressors and other small stationary equipment where necessary. • Use quiet equipment (i.e., equipment designed with noise control elements). • Co-ordinate with relevant agencies in case the noise produced will require a license. • Limit pickup trucks and other small equipment to a minimum idling time, observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible. • Demolish mainly during the day when most of the neighbours are out working.
		Air quality (dust)	• Use water sprays or misting systems to dampen surfaces and reduce dust generation, particularly on unpaved roads and active work areas. • Implement soil stabilization techniques, such as using binders or applying vegetation, to minimize dust from disturbed soil areas. • Enforce speed limits for vehicles operating on-site and on access roads to reduce dust emissions from vehicle traffic. • Use tarps or other coverings to protect stockpiles of loose materials from wind erosion and dust generation. • Engage with local communities to inform them about decommissioning activities and measures being taken to control dust emissions. • Conduct regular inspections to identify potential sources of dust emissions and ensure that mitigation measures are effectively implemented. • Plan for site rehabilitation after decommissioning to restore vegetation cover, which can help prevent dust generation in the long term.
		Air quality (vehicle & machinery fumes)	• Use high-quality fuels with lower sulphur content to minimize emissions from vehicles and generators. • Implement a regular maintenance schedule for all vehicles and generators to ensure they operate efficiently and emit fewer fumes. • Optimize generator operation by running them only when necessary and using them at optimal loads to reduce emissions. • Implement policies to minimize idling time for vehicles and generators, encouraging operators to turn off engines when not in use. • Provide training for drivers and equipment operators on eco-driving practices that reduce fuel consumption and emissions. • Establish an air quality-monitoring program to track emissions from vehicles and generators and ensure compliance with local regulations. • Engage with local communities to inform them about emissions reduction efforts and address any concerns related to air quality. • Conduct scheduled checks to ensure that exhaust systems and emission control devices are functioning correctly. • Establish a reporting system for emissions data to track progress and compliance with environmental standards.
	Impacts on Infrastructure & Utilities	Water Consumption	• Conduct a comprehensive assessment to evaluate water needs for decommissioning activities and identify opportunities for reduction. • Develop a water management plan that outlines strategies for minimizing water consumption throughout the decommissioning process. • Implement systems to recycle and reuse water for various tasks, such as dust suppression, equipment washing, and site clean up. • Provide training for personnel on water conservation practices and the importance of minimizing water use during

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES
			decommissioning. • Engage with local communities to raise awareness about water conservation efforts and the importance of sustainable water management. • Use temporary storage solutions to manage water supplies efficiently and reduce waste. • Implement measures to prevent leaks and spills from water storage and distribution systems. • Provide periodic updates to stakeholders and the community on water management practices and progress in reducing consumption.
	Impacts on social environment	Occupational health and safety	• Develop and implement a comprehensive OHS plan before the commencement of the project • Conduct a thorough occupational health and safety risk assessment to identify hazards associated with decommissioning activities. • Create a comprehensive occupational health and safety management plan outlining procedures, responsibilities, and protocols to mitigate identified risks. • Ensure that all workers are equipped with appropriate PPE, such as helmets, gloves, goggles, and respiratory protection, to minimize exposure to hazards. • Conduct regular safety inspections of the worksite to identify and address potential hazards promptly. • Establish clear emergency response procedures for incidents such as fires, chemical spills, and medical emergencies, and ensure all workers are trained in these procedures. • Develop and enforce safe work practices and standard operating procedures for decommissioning tasks, including equipment handling, dismantling, and waste disposal. • Provide first aid facilities and ensure that trained personnel are available to respond to medical emergencies on-site. • Implement measures to control noise and vibration levels during decommissioning activities, such as using quieter equipment and scheduling high-noise activities appropriately. • Ensure that all contractors and subcontractors adhere to the same occupational health and safety standards as the main contractor.
		Gender-based violence	• Update the existing SEA/SH Prevention and Response Action Plan, to manage the SEA/SH risks that are relevant to the subproject. • The Action Plan to be proportionate to potential SEA/SH risks, and includes measures such as awareness creation for communities and workers; identification of referral services for survivors and a GRM that ensures confidential reporting of GBV cases. • Implement a code of conduct signed by all those with physical presence on site. • Establish Workers GRM with multiple channels including SEA/H channels. • Ensure that Code conducts are singed by all employers or incorporated in the employment contracts.
		Inadequate grievances management	• Constitute a Local Grievances Committee is in consultation with all community segments, and incorporates the existing local dispute resolution mechanism. • Implement a worker's grievances mechanism. • All reported grievances are logged, dated, processed, resolved and closed out in a timely manner. • Proportionate representation of VMGs and vulnerable individuals in the local grievances committee. • GRM provides for confidential reporting of particularly sensitive social aspects such as GBV, as well as anonymity.
		Risks related to Inadequate stakeholder engagement	• Conduct a comprehensive stakeholder mapping exercise to identify all relevant stakeholders, including local communities, government agencies, NGOs, and other affected parties. • Develop a stakeholder engagement strategy that outlines the objectives, methods, and timelines for engaging with different stakeholders throughout the decommissioning process. • Organize public consultations and forums to solicit feedback from stakeholders, ensuring their voices are heard and concerns are addressed. • Invest in building the capacity of local communities and stakeholders to engage in the decommissioning process effectively, providing training and resources as needed. • Collaborate with local leaders and community organizations to facilitate trust-building and effective engagement with the community. • Provide regular updates and reports to stakeholders on the progress of decommissioning activities and how stakeholder feedback has influenced decisions. • Ensure that women and vulnerable groups are actively involved in stakeholder engagement processes, addressing any barriers they

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES
			may face in participation.
		Labour disputes	• Ensure all employees have clear and legally binding employment contracts that outline their rights, responsibilities, wages, and benefits to prevent misunderstandings. • Establish an accessible, transparent grievance mechanism for workers to voice their concerns or disputes. • Maintain open communication between management and workers. • Ensure full compliance with national labour laws. • Implement fair and transparent disciplinary procedures. • Promote equal opportunities and non-discriminatory practices in hiring, promotion, and compensation to avoid conflicts. • Set up a monitoring system to track and evaluate labour relations, allowing for early detection of potential disputes and timely intervention. • Conduct regular worker feedback surveys to gauge satisfaction and identify any emerging concerns that could lead to disputes.
		Child and forced labour	• Adhere to the ESS 2 provisions and FRS Employment Act, which outlaws any form of forced labour. • Report any form of forced labour at the site. • Compliance with the national labor laws and labour management practices. • Put visible signage on site "No Jobs for children" • -Do not allow children at the project site.
		Security risks	• Conduct a thorough security risk assessment to identify potential threats and vulnerabilities associated with the decommissioning activities. • Create a comprehensive security plan that outlines specific measures, protocols, and responsibilities for ensuring site security during decommissioning. • Employ trained security personnel to monitor the site, control access, and respond to security incidents as they arise. • Establish partnerships with local law enforcement and security agencies to enhance overall security coordination and response. • Engage with local communities to build trust and cooperation, encouraging them to report suspicious activities or security concerns. • Implement strict access control procedures to limit entry to authorized personnel only, including the use of identification badges or passes. • Develop and communicate an emergency response plan that outlines procedures for handling security incidents, including evacuation protocols. • Develop a crisis communication plan to inform stakeholders and the community about security incidents promptly and transparently. • Provide training on risk mitigation strategies for all personnel involved in the decommissioning activities.
		Community health and safety risks	• Conduct a comprehensive assessment to identify potential health and safety risks to the local community during the decommissioning process. • Create a health and safety management plan that outlines strategies for minimizing risks and protecting community health during decommissioning activities. • Develop and communicate an emergency response plan that includes protocols for medical emergencies, environmental incidents, and community evacuations if necessary. • Engage with local communities regularly to gather feedback, address concerns, and provide updates on decommissioning activities and safety measures. • Implement measures to minimize noise pollution during decommissioning. • Develop a traffic management plan to control vehicle movement to and from the site, reducing risks of accidents and ensuring safe access for the community. • Implement dust suppression measures, such as regular watering of the site, to minimize dust emissions that can affect community health. • Ensure proper waste management practices to prevent contamination of land and water resources, which could affect community health. • Implement sustainable decommissioning practices that prioritize community health and safety while minimizing environmental impacts. • Establish a feedback mechanism that allows community members to report health and safety concerns related to the decommissioning process.
		Fire hazards	• Conduct a comprehensive fire risk assessment to identify

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES
			potential fire hazards associated with decommissioning activities and materials. • Create a fire safety plan that outlines prevention measures, emergency response protocols, and responsibilities for all personnel involved in decommissioning. • Provide fire safety training for all workers, covering fire prevention, emergency procedures, and the proper use of firefighting equipment. • Ensure the availability of adequate firefighting equipment, such as fire extinguishers, hoses, and water sources, in easily accessible locations throughout the site. • Store flammable materials in designated, secure areas away from ignition sources, following appropriate storage guidelines. • Establish firebreaks or cleared areas around the site to help prevent the spread of fire. • Use clear signage to indicate fire exits, assembly points, and locations of firefighting equipment throughout the site. • Minimize the accumulation of combustible waste materials on-site and establish a routine waste removal process. • Establish communication and coordination with local fire services to ensure a rapid response in case of a fire emergency. • Ensure an adequate supply of water is readily available for firefighting purposes, including water tanks or ponds if necessary.
		Traffic risks	• Develop and implement a Traffic Management Plan (TMP). • Use traffic signs, barriers, and cones to guide and direct both construction and local traffic. • Enforce strict speed limits for construction vehicles within the construction site and along designated transport routes. • Install speed bumps or other traffic-calming measures on roads near the construction site. • Engage with local communities to raise awareness about increased construction traffic and safety measures. • Erect temporary road signs warning local road users of construction activities and increased traffic. • Designate safe parking and loading zones for construction vehicles away from main roads and community spaces.

Estimated budget for the implementation of the ESMP

The total estimated budget for the implementation of the Environmental and Social Management Plan (ESMP) is projected at approximately USD 138,600. This budget covers a range of activities essential to ensuring compliance with environmental and social safeguards throughout the construction and operation phases. Key components include monitoring environmental impacts such as air quality, noise, and waste management, community engagement initiatives to address concerns and mitigate risks like gender-based violence (GBV) and occupational health and safety, capacity building for local stakeholders, and periodic reporting to regulatory bodies.

Stakeholder Analysis, Public Consultations and Disclosure

The public consultation exercise yielded various outcomes as follows:

(i) General support for the project: Most stakeholders expressed their agreement and support for the proposed hybrid power plant, recognizing the potential benefits it will bring in terms of improved access to affordable and clean energy, job creation, and enhanced local economic development. However, there were variations of different strengths in the opinions when analysed across gender, as there were feelings that the project will only directly benefit GECO from economic perspective.

(ii) Land activity of the project site: Project area in general is used mainly for grazing activities, but users consulted did not express any objection and stated that there are similar alternatives areas in Gaalkacyo District that can be used for the same purposes and that the Project does not have any specific different values.

(iii) Existence of cultural sites: There are no sacred sites or cultural heritage sites near the project area.

(iv) Existence of wildlife: No wildlife conservation concern occur at the proposed site. Additionally, the project area has undergone anthropogenic habitats modifications over the years. However, pockets of vegetation dominated mainly by *Acacia reficiens* and *Salvadora persica*, still occur at the proposed project site.

(v) Land use conflicts: No conflicts over land/land ownership was expressed.

(vi) Expectations for regular information sharing: Stakeholders demand transparent, ongoing communication from GECO during construction and operation phases of the project. They emphasize the importance of timely updates on construction activities, potential disruptions, and environmental and social performance, and expect clear channels of communication.

(vii) Expectations on social responsibility programmes (SRP): implementation of SRP by GECO that focuses on community development projects (that addresses women groups as well) as well community needs (health, education, sanitation, water supply, transport, etc.).
(viii) Concerns about potential disruptions: They expect that GECO will implement mitigation measures and keep them informed of any significant changes or delays.
(ix) Employment opportunities: Local stakeholders, particularly youth and women's groups, emphasized the need for job creation as a significant benefit of the project. They expressed an interest in local recruitment, training, and skills development opportunities provided by the project during both the construction and operational phases.
(x) Environmental and social performance: Some stakeholders called for regular monitoring and reporting on the plant's environmental footprint, including any impacts on water resources, air quality, and land use.

In response to stakeholder feedback, the GECO has committed that the stakeholder consultations will be ongoing throughout the project lifecycle, with meetings held at key stages. Additionally, GECO will establish public communication channels like social media and community notice boards to ensure information is accessible. Plans to minimize disruptions, such as dust control, noise pollution, and traffic regulations during all the project phases will be implemented, along with a grievance mechanism for community concerns. Overall, GECO has committed to maintaining transparent and consistent communication with all stakeholders, ensuring that their concerns are addressed and that the project contributes positively to the local community and environment.

Conclusion and recommendations

Conclusion

(i) The report reveals that negative social and environmental impacts associated with the proposed project can be mitigated, and positive impacts enhanced for the benefit the local community and all other stakeholders. It expected that the project proponent, GECO, and the contractors would adhere to the implementation of the environmental and social management plan as proposed in this report. Additionally, the proponent will obtain necessary permits, adhere to all relevant laws and regulatory frameworks during all the project phases, and more importantly engage qualified personnel. The ESIA analysis shows that the proposed power plant will have positive impacts on the FGS, Galmudug State governments, and residents, including increased clean energy, employment, investment, and improved living standards. However, it also poses potential negative impacts like noise, dust, soil erosion, and social risks. To this end, an Environmental and Social Management Plan (ESMP) outlining project activities, impacts, mitigation plans, and monitorable indicators, with implementation timelines and cost estimates will have to be implemented by the proponent.

(ii) A monitoring plan has been developed identifying environmental performance indicators. The project will generate socio-economic benefits, and the stakeholders have consulted, indicating it is long overdue project. Potential adverse impacts are possible to mitigate, with most assessed as low to medium low. The many environmental and social impacts will be temporary, especially during construction phase, and will be manageable through prudent implementation measures as proposed in the ESMP. Overall, the project will be designed, constructed, operated and decommissioned according to the best industry practices and environmental sustainability. Additionally, all mitigation measures as proposed in this ESIA will be integrated to ensure enhanced compliance with state and federal laws and procedures, best international practices, and more importantly in compliance with the World Bank's ESF. Overall, the project is considered beneficial and important for society and the environment, and a worthy investment.

Recommendation

(i) It is strongly recommended that the MoEWR and GECO make a concerted effort in particular, to implement the ESMP provided herein. Following the commissioning of the project, statutory EHS Audits shall be carried out in compliance with the national laws and WB requirements. The environmental performance of the site operations shall be evaluated against the recommended measures and targets laid out in this report.

(ii) On the basis of the findings from this ESIA, the following specific recommendations are made:
  (a) Adherence to the mitigation measures as spelt out in the ESMP and monitoring of the same is mandatory to ensure environmental and social sustainability of the project.
  (b) Contractor to ensure grievance redress mechanism is established and operational before commencement of the construction works.
  (c) Contractor to undertake habitat restoration programmes through planting of indigenous vegetation in all cleared areas to promote environmental sustainability

provided such restorations do not negatively affect the solar PV generation capacity. All restoration activities to use local indigenous flora.

(d) Cultivate and maintain a good working relationship with the community members, and all other relevant stakeholders. This should be a long-term endeavor during all project phases.

(e) Diligence on the part of the contractor and proper supervision by the MoEWR and GECO is crucial for mitigating the potential impacts and ensuring environmental, health, safety, and efficient operation of the project.

(f) EHS Audits shall be carried annually or as prescribed by the FGS Authority during the operational phase.

(g) Ensure social inclusion of the vulnerable groups by paying attention to the most vulnerable. When opportunities arise of, say employment, ensure they are given the high considerations they deserve.

(h) The GECO and the contractor shall adhere to relevant legal and regulatory framework to ensure compliance and success of the project

Authorization opinion

This ESIA report provides enough information for decision-making on the project's continuation. It has shown that the proponent's preferred alternatives and technological alternatives are generally acceptable. The ESIA has also helped identify the environmental and social impacts during all the project phase, including the essential mitigation measures. The proposed project is not in conflict with any of the existing legislations and regulatory frameworks, and achieved favourable social appeal from a cross-section of stakeholders engaged as part of the ESIA study. Based on environmental and social grounds as outlined in this report, the applicant's proposal should be considered for approval, provided all negative impacts mitigation measures as proposed are implemented. It is further expected that the proponent (MoEWR/GECO) shall own the entire project implementation, including monitoring and reporting.

1.0. Introduction

1.1. PROJECT BACKGROUND

Since 2012, Somalia has been working to achieve political stability and reconstruction. However, the aftermath of the conflict has left the electricity sector fragmented and inefficient[1]. The current installed capacity of 276 MW in main load centres across the country is insufficient to meet present demand. A combination of high costs and irregular supply compound the electricity generation, transmission, and distribution has made Somalia ranked among the worst in the world for electricity affordability[2,3]. To address these difficulties, the Federal Government of Somalia obtained World Bank funding to support the efforts to increase access to cleaner and cheaper electricity supply and to re-establish the electricity supply industry through SESRP project. The SESRP Development Objective is to increase access to lower cost and cleaner electricity supply in the project areas and to re-establish the electricity supply industry in different load centres within the Federal Republic of Somalia". The Ministry of Energy and Water Resources (MoEWR) with a designated Project Implementation Unit (PIU) coordinate the SESRP. Overall, SESRP project aims to support the Federal Government of Somalia (FGS) initiative of ensuring increased electricity access to the citizens. This proposed project is in line with the commitment of the FGS as outlined in its ninth national development programmes (NDP-9: 2020-2024). Most relevant to the SESRP, the NDP-9 emphasizes increasing energy supply with special focus on renewable energy sources, and energy market regulatory reforms.

The SESRP aligns with the country's Ninth National Development Plan (NDP-9) for 2020-2024 by contributing to key objectives such as economic diversification, infrastructure development, and energy access. NDP-9 emphasizes the importance of sustainable energy solutions to support economic growth and improve living standards. By integrating renewable energy sources, such as solar, with conventional power systems, the SESRP will help to reduce reliance on expensive imported fossil fuels, increase energy security, and promote environmental sustainability. The SESRP also supports efforts to expand energy infrastructure, which is crucial for fostering industrial growth, job creation, and poverty reduction, in line with the development plan's broader goals of inclusive and resilient development. The SESRP project has the components as outlined in Table 1-1.

Table 1-1: Summary of SESRP project components

- **Component 1** – Sub-transmission and distribution network reconstruction, reinforcement, and operations efficiency in the major load centers of Mogadishu and Hargeisa.
- **Component 2 –** Hybridization and battery storage systems for mini grids.
- **Component 3** – Stand-alone solar off-grid access to public institutions (Health and Education).
- **Component 4 -** Institutional Development and Capacity Building.

1.1.1. Component 2: Hybridization and battery storage systems for mini-grid

This component supports the enhancement of the capacities of electricity services providers (ESPs) to supply clean and affordable electricity to the consumers in the targeted load centres spread across the FGS. GECO is one of the key ESPs participating in Component 2 of the project. GECO has made considerable progress towards meeting the general requirements for enhanced production of clean and affordable electricity. For instance, GECO has already undertaken relevant feasibility studies and acquired adequate space to set up a modern hybrid power plant. Under the proposed arrangement, the MoEWR will provide overall coordination of the project and oversight during planning and implementation of the project. This will include overall coordination and oversight for safeguards due diligence, and implementation. GECO will be responsible for the implementation of the project during construction and operation phases.

An Environmental and Social Impact Assessment (ESIA) study is critical under SESRP to ensure compliance with international and national environmental and social safeguards. This ESIA evaluated potential impacts on the environment, communities, and local economies, identified risks such as pollution, land use conflicts, biodiversity loss, and social concerns like labour conditions and community health and safety. Given the World Bank's stringent environmental and social standards, the present ESIA ensures that the project adheres to best practices for mitigating negative impacts while enhancing positive outcomes. Additionally, the ESIA facilitated stakeholder engagement, ensuring that the concerns of local communities and other stakeholders are considered throughout the project lifecycle.

[1] https://www.trade.gov/country-commercial-guides/somalia-energy-and-electricity
[2] https://www.trtworld.com/opinion/somalia-encourages-foreign-investments-to-fix-its-energy-crisis-12788824
[3] https://sominvest.gov.so/wp-content/uploads/Energy-Sector-Study.pdf

1.1.2. Justification for the ESIA

This ESIA on the proposed Hybrid Power Plant by GECO was commissioned to examine its impacts on the environmental and social spheres prior to commencement. The study sought to identify positive and negative impacts of the project, including proposing measures to mitigate the negative impacts while maximizing on the positive impacts, and was conducted in accordance with WBG's ESS1. In addition, appropriate sectoral legal provisions of the FRS relevant to this project were referenced for the necessary considerations during all project phases. This ESIA has identified both positive and negative impacts of the proposed project to the environment and community. The report proposes mitigation measures (the ESMP) to manage the negative impacts and enhance positive impacts thus ensuring the sustainability of the project.

1.2. OBJECTIVES OF THE ESIA

The main objective of this ESIA was to examine both positive and negative effects of the proposed hybrid power plant in the Project Area (Gaalkacyo City and the surroundings), and propose measures to mitigate the negative impacts while enhancing positive impacts during all the project phases. Directly linked to the main objectives were the specific objectives that included:

- Present an outline of the project background,
- Establish the environmental baseline conditions of the project area and review all available information and data related to the project,
- Identify key areas for environmental, social, health and safety concerns as well as the anticipated impacts associated with the proposed project implementation and commissioning,
- Undertake detailed analysis of project alternatives
- Undertake public consultations with the potentially affected peoples and other interested parties
- Establish a comprehensive environmental and social management plan (ESMP) covering the construction, operation and decommissioning phases of the project,
- Preparation of a comprehensive Project Report in accordance with the World Bank ESS1 guidelines and submission to the MoEWR for further instructions and/or approval.

1.3. SCOPE OF THE ESIA STUDY

The ESIA scope largely covered the following areas:

- *Baseline Conditions Assessments:* Environmental setting (climate, topography, geology, hydrology, ecology, water resources, sensitive areas, baseline information, etc.); socio-economic activities in the surrounding areas (land use, human settlements, economic activities, institutional aspects, water demand and use, health and safety, public amenities, etc.), and infrastructural issues (roads, water supplies, drainage systems, power supplies, etc.).
- *Legal and Regulatory Framework:* Focusing on the relevant Galmudug State, national and WBG's EHSG in general, and those relevant to power generation and supply, and other best practices focusing on allied activities relative to the project in question.
- *Stakeholders Engagement:* Interactive approach was adopted for all stakeholders engaged as part of the ESIA study. A broad spectrum of stakeholders were engaged for purposes of understanding their concerns on a broad range of environmental and social issues relevant to the project.
- Impacts identification and mitigation measures: Identification of a broad range of environmental and social impacts relevant to the project across all project phases.
- Development of ESMP: Development of a robust ESMP covering a broad range of environmental and social issues associated with the power plant during construction, operation and decommissioning phases. Additionally, and implementation plan, including the budgets for various components of the ESMP have been proposed.

1.4. TERMS OF REFERENCE FOR THE ESIA

The HD hereinafter referred to as consultant was assigned to carry out Environmental and Social Impact Assessment for the proposed hybrid power plant. The scope covered various activities related to; project planning activities, and all associated activities across all project phases. The output of this work is this Environmental Impact Assessment project report, which will aid MoEWR in deciding on the project. Overall, this ESIA report has been prepared in compliance with the World Bank's ESS Policies, existing FRS laws and international best practices. The consultant conducted the study guided by the following terms of reference:

- Establish the suitability of the proposed site/location to set up the solar power plant.

- A concise description of the legal and regulatory frameworks relevant to the project, description of the technology, procedures and processes to be used, in the implementation of the project.
- A description of the potentially affected environment/social economic and cultural setting of the project area.
- Consultation with stakeholders including the potentially project affected persons (PAPs).
- A description of positive and negative impacts of the project on the environmental, health, safety and social cultural aspects of the community
- Analysis of alternatives including project site, design and technologies
- Identification of the most appropriate mitigation measures/interventions against negative impacts during construction, operation and decommissioning.
- Development of an ESMP proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment and society, including the cost, timeframe and responsibility to implement the measures.

1.5. ESIA APPROACH AND METHODOLOGY

The approach adopted in undertaking this study considered World Bank's ESS guidelines, existing national legislations and guidelines relevant to the project; and international best practices. The study largely involved the understanding of the project background, the preliminary designs, impacts identification and the mitigation measures' implementation plans. The approach and methodology applied during the study involved collection of both primary and secondary data using both qualitative and quantitative methods for data collection. Secondary data was obtained through literature reviews while primary data was obtained through physical observations, photography, checklists, interviews and stakeholders' consultation.

1.5.1. Key activities undertaken during the ESIA

The ESIA study involved a comprehensive assessment of both environmental and social impacts associated with the proposed project. Baseline environmental and socioeconomic surveys and analyses were done to gather data/information from both primary and secondary sources. Stakeholder engagement was undertaken, and this involved consultations with a broad spectrum of stakeholders drawn from private and public sector entities. These included the local communities, government bodies, and other relevant stakeholders to gather input and address concerns. Risk assessments were performed to identify potential environmental and social impacts, and mitigation measures were developed to ensure compliance with regulations and minimize adverse effects, promoting sustainable development in the region. In summary, the following key activities were undertaken during the study:

- Physical inspections of the proposed project area and site;
- Literature review of relevant documents;
- Stakeholder consultations with different stakeholders and project-affected persons;
- Gathering environmental and socio-economic data of the area by use of checklist;
- Evaluation of the activities around the site and the environmental setting of the wider area.
- Report writing and submission.

The initial stage of the study involved project screening. Other considerations made during this stage included a preliminary assessment of the environmental sensitivity of the proposed project area/site. From the screening, it was evident that the proposed project was of WB's Category B (Moderate Impacts) – a project that has potential adverse environmental and social impacts that are site-specific, reversible, and can be mitigated with standard procedures. As such, a more focused ESIA Study, including the development of an ESMP with specific mitigation measures was undertaken.

1.5.2. Desk study and literature review

The main objective was to gather and analyse existing information relevant to the environmental and social impacts of the proposed hybrid power plant through secondary data sources with a clear focus on environmental conditions, social demographics, regulatory frameworks, and previous relevant studies. The study involved gathering information and data from several sources including government reports, academic research, industry reports, non-governmental organizations' reports, local publications and other relevant reports from the World Bank. We utilized academic databases (e.g., Google Scholar, JSTOR) and government and industry repositories to find relevant documents; and online Sources - search for relevant information on organizational websites, online journals, and other credible sources. From the information and data gathered, we undertook review and analyses that focused on summarizing key findings from each source, focusing on the relevance to the proposed power plant's impacts, identifying common themes, and gaps in information. This was followed by comparative analyses, which focused on comparing our findings with other similar projects to assess potential impacts and mitigation strategies.

The regulatory review focused on examining the existing regulations and guidelines (national, state and World Bank) to ensure compliance and identify necessary permits and approvals. Some of the documents reviewed included the feasibility study documents, various FRS legislations, World Bank safeguard policies, project frameworks (ESMF and RPF), topographical maps, Google Earth/maps, and other relevant documents. More specifically, the literature review of secondary data focused on the followings:

- Relevant legislation and institutional framework governing the proposed project
- Licenses and permits requirements and conditions.
- Types of wastes likely to be generated.
- Documents relevant to the proposed development.

1.5.3. Environmental and social baseline settings

To gain a better understanding of the environmental, socio-economic and cultural setting of the project site and its surroundings, the ESIA team gathered both primary and secondary data. This entailed the use of various tools and methods, including interviews, discussions, photography and observations and check lists.

1.5.4. Public consultations (PC)

The aim of the PC was to ensure that the opinions of all relevant stakeholders interested in a proposed project such as project affected persons, the private and the public entities in the vicinity of the proposed project site are considered during project planning, design, construction, operation and decommissioning phases. The consultations also presented an opportunity for the stakeholders to raise issues and concerns pertaining to the project. Public consultations were conducted using standardized questionnaires, key informant interview guides, focus group discussions and other virtual and physical engagements with individuals drawn from different private and public sector entities. An interactive approach was adopted for discussing relevant information key among them being neighbourhood issues, project acceptability, social, cultural and economic aspects, and environmental Impacts.

1.5.5. Assessment of physical and chemical parameters

No in-situ sampling of air, noise, soil analysis and water quality analysis. The assessment of physical chemical parameters relied mainly on secondary information gathered from literature for Gaalkacyo city and the surrounding areas.

1.5.6. Outline of ESIA steps followed during the assessment

Figure 1-1 summarizes the basic steps used in developing this management plan. The details can be described as follows:

- *Step 1: Project concepts:* The project details regarding; scope, design, implementation, tests, commissioning were first analysed. A feasibility study report was obtained and analysed.
- *Step 3: Project Screening:* Details about baseline conditions and potential environmental and social impacts were collected through desktop study, stakeholder consultations, site visits, photography, and inductive methods.
- *Step 4: Identification of Potential Environmental and Social Impacts:* The Potential Environmental impacts were identified, Classified and magnitude determined.
- *Step 5: Impact Assessment and Consultations:* The Environmental and Social Impacts were analysed, assessed and discussed in details involving consultations with the GECO and other stakeholders.
- *Step 6: Formulation of Mitigation measures:* Mitigation measures to ameliorate or minimize the potential Environmental and Socio – economic impacts were formulated for the entire project life.
- *Step 7: Development of an Environmental & Social Management and Monitoring Plan:* An E&SMMP for the project life was developed indicating parameters to be monitored, persons responsible, timing and costs involved.

Figure 1-1: Summary of ESIA procedure adopted for the proposed GECO hybrid power plant

1.6. TARGET GROUP FOR THE ESIA REPORT

The ESIA Report w prepared for use by different stakeholders to be involved in the construction and operation of the proposed project. This report contains useful information on policies and procedures to be adhered to, implementation modalities, analysis of potential environmental and social impacts and suggested mitigation measures at various stages of project activities. The information will be useful in planning, implementation, management and maintenance of the project.
In this regard, the report is useful to the following stakeholders:

- Engineers to be involved in preparation of designs and plans for the proposed solar power plant;
- Contractors to be engaged in the construction works for the project;
- MoEWR and other relevant FGS and Galmudug State Government ministries and agencies;
- Financiers;
- Project affected persons and other stakeholders.

1.7. KEY ASSUMPTIONS

The Experts made the following assumptions in preparing this ESIA

- All the technical data and information provided by the proponent, implementing and the specialists are accurate and up-to-date
- The design features will be put in place to minimize risks from external factors which could threaten the integrity of the facility which include: risks from other natural calamities; measures to minimize threats or damage from third parties e.g., terrorist attack
- The GECO and the Contractor will implement the measures in the proposed ESMP
- The GECO will undertake monitoring to track the implementation of the ESMP to ensure that management measures are effective to avoid, minimize and mitigate impacts and that corrective action will be undertaken to address shortcomings and/or non-performances.

2.0. Project Description and Context

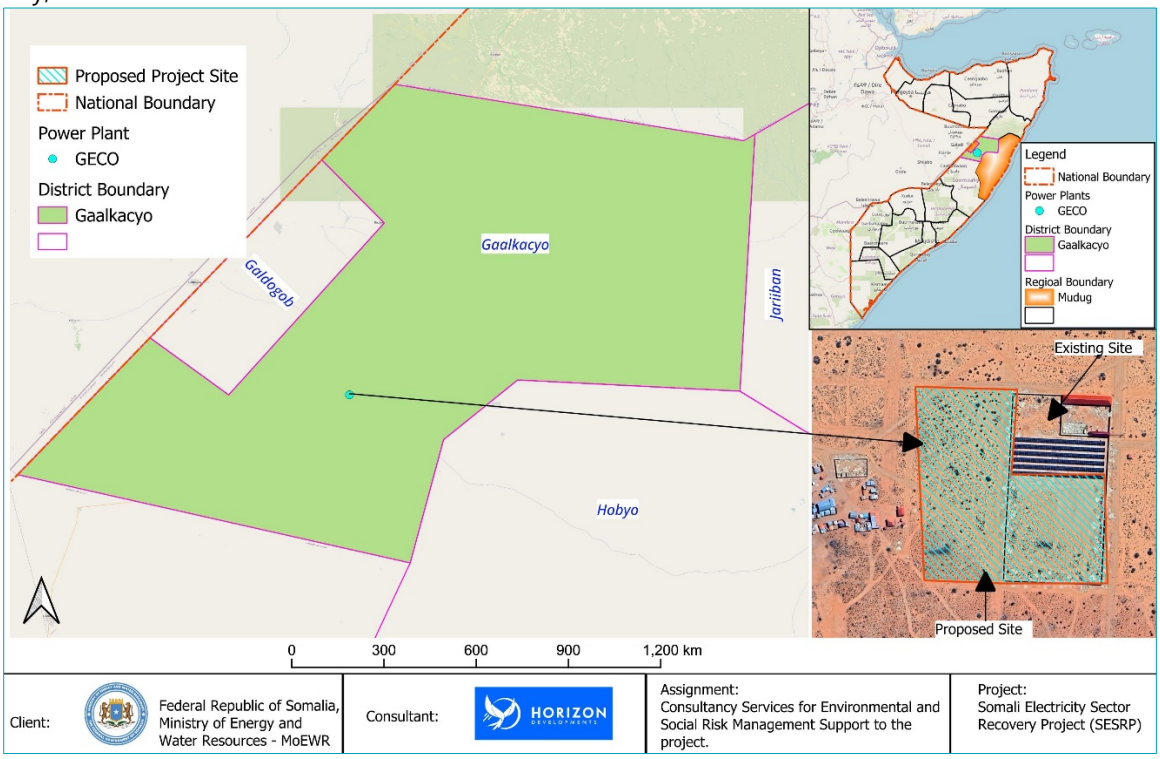
2.1. OVERVIEW

This section provides an overview of the proposed GECO Hybrid Power Plant in the southern outskirts of Gaalkacyo City as currently designed. The description borrows largely from preliminary project designs, discussions with the project engineers, field observations, feasibility study, interviews and available project documentation availed by GECO and MoEWR.

2.2. LOCATION OF THE SITE

The proposed solar power plant situated at 6^{O}43'54.3''N, 47^{O}26'10.8''E on the outskirts of Gaalkacyo City, Galmudug State (Figure 2-1). The project site spans 12.5 acres of open land owned by GECO, and adjacent to the existing GECO Power Plant. The proposed project site area has sparse settlements in the immediate vicinity.

Figure 2-1: Location of the project GECO hybrid power plant site in the southern outskirts of Gaalkacyo City, Somalia



2.3. PROJECT SITE AND SURROUNDINGS DESCRIPTIONS

2.3.1. Site land cover characterization

Pockets of vegetation comprising mainly of *Acacia reficiens* and *Salvadora persica* were observed with little to no grass. Several other flora species associated with arid and semi-arid regions of Somalia were observed. The major land uses near and around the proposed project site included sparsely distributed settlements, open fields used mainly for livestock grazing by the local communities. However, given the projected human population growth around the southern sector of Gaalkacyo City[4], there is likelihood that public facilities such dispensaries, schools, shopping centres and residential houses will spring-up in the project site's surroundings in the future. An all-weather gravel road connects the site.

[4] IOM (2023). Galmudug District Profiling: An assessment to understand the conditions, needs and vulnerabilities of households in Galmudug State in Somalia. International Organization for Migration

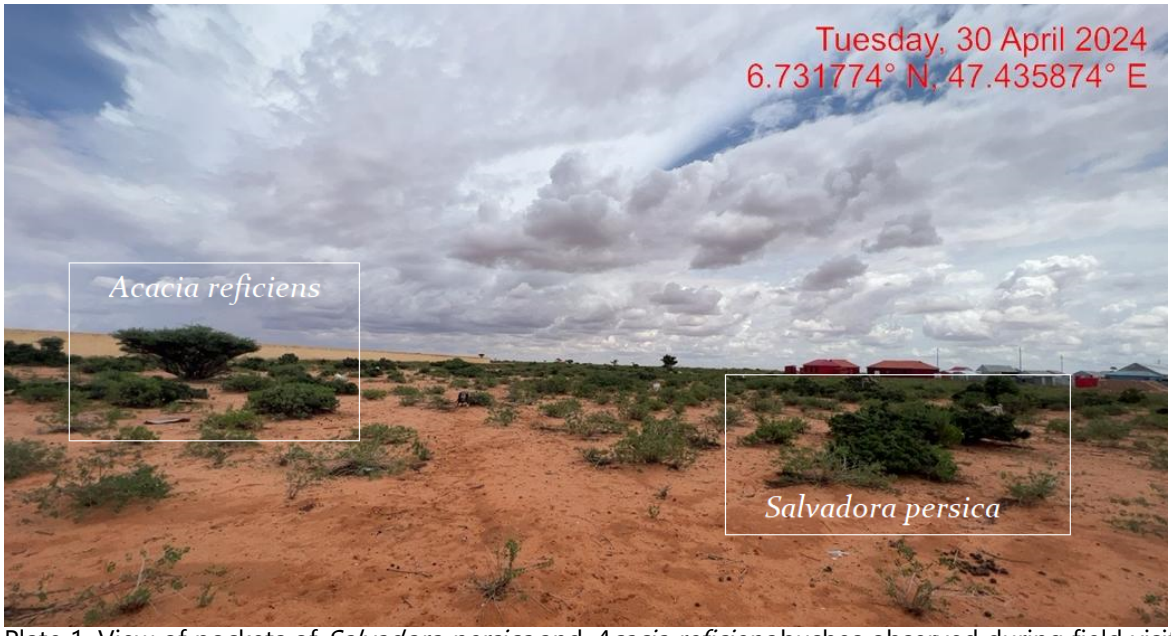


Plate 1. View of pockets of *Salvadora persica* and *Acacia reficiens* bushes observed during field visit at the project site

2.3.2. Site Ownership

The proposed works will be carried out on approximately 12.5 acres piece of land located in the outskirts of Gaalkacyo City to the south. The proposed project site is under the legal custody of GECO. No compulsory land acquisition, displacement or resettlement shall be conducted.

2.3.3. Access to the project site

The proposed project site is adjacent to the current GECO Power Plant. No major investment in access road is anticipated, as the project will use the current main road to GECO power plant site.

2.4. DESCRIPTION OF THE PROPOSED POWER PLANT

2.4.1. Overview

The feasibility study for the proposed project undertaken by MoEWR showed that GECO is a leading electricity service provider, especially in the southern sector of Gaalkacyo City within Galmudug State with a customer base of 12,500 comprising mainly households (92.80%), small and medium sized businesses (6.88%), commercial and industrial (0.32%). There is an increasing number of large-scale consumers whose demand levels will be determined after a comprehensive survey is done. Given the increasing electricity demand in the southern sector of Gaalkacyo City and the surrounding areas, GECO needs to increase its production capacity from the current 2.4 MW from gensets (2MW) and solar PV (0.4MW) to a total of 7MW. GECO currently uses both analogue and digital metering systems but is increasingly investing in smart metering systems for its customers.

Under the proposed new hybrid power plant, GECO will require a new Supervisory Control and Data Acquisition (SCADA) system to control and monitor the operations of the plant. The new SCADA system shall be able to give preference to the generation sources to supply the load in the order of priority starting with solar PV (first priority), batteries (second priority) and diesel generators (third priority).

Our preliminary analysis indicates that ESS5, ESS6 and ESS7 will not be triggered by the proposed investment in the new site. However, ESS8 may be relevant to the project, especially if there is a chance find particularly during construction phase of the project. In the event of a chance find triggering the WB-ESS8, especially during the construction phase, immediate measures should be implemented to ensure the protection of cultural heritage. First, construction activities should be halted near the find to prevent further disturbance. A qualified heritage specialist should be engaged to assess the significance of the find and determine the necessary steps for its protection, documentation, and preservation. The project team must notify relevant authorities and local communities about the discovery to facilitate transparent communication and compliance with legal obligations. A protocol should be established for future chance finds, including training for construction personnel to recognize potential artefacts or

heritage sites. This proactive approach ensures that cultural heritage is respected and safeguarded, aligning with the objectives of ESS8 and promoting responsible development practices.

Overall, it would be important that the project comply with ESS1, ESS2, ESS3, ESS4, ESS8 and ESS10 guidelines during all the project phases from construction, and operation to decommissioning. In addition, compliance with the Federal State of Somalia and state laws for Galmudug shall need to be complied with in this new venture. Based on the feasibility study, the proposed project is category B as per the World Bank guidelines, and as such required environmental and social impact assessments for purposes of developing mitigation measures.

2.4.2. Proposed power generation capacity

From the feasibility study analysis, scenario 2 of 50% REF (i.e., 7MW) has been recommended for detailed design. Given this scenario selection, the proposed location is adequate to accommodate the proposed installation of solar PV, BESS infrastructure and modern gensets. Figure 2-2 shows a schematic presentation of the proposed hybrid power plant. Based on this analysis and from the environmental and social impacts perspectives, the consultant concluded and recommended that the proposed new site would be ideal for the planned investment to meet the required expectations of boosting the current GECO electricity production capacity.

The plant is expected to operate for 25 years with a BESS lifetime of 6000 cycles (approximately 17.5 years), and shall be decommissioned thereafter. Given that the lifetime of a lithium-ion BESS expire after 17 years, a replacement plan for BESS will be implemented to ensure continued functionality for the expected period of 25 years. This shall include procuring and installing new batteries or upgraded storage technologies, safely recycling or disposing of expired batteries in line with environmental regulations, and allocating funds for the replacement. BESS replacement shall be accompanied with routine maintenance to minimize downtime. Additionally, the BESS replacements shall present opportunities to adopt newer, more efficient technologies that could enhance the plant's performance for the remainder of its operational life.

2.4.3. Architecture and basic design specifications

This hybrid power generation site is projected to generate 7MW and is meant to serve the increasing customer base. Table 2-1 summarizes patterns of customer base growth experienced by GECO over the last five (5) years. Overall, GECO customers have grown from 7,367 in 2019 to 12,500 in 2023. The average annual growth is 1,181 customers, which is 14.59%.

Table 2-1: Patterns of GECO customer base growth over the last five years

Year	Total of Customers	Customers Attrition	New customers connected	New Households Connected	New SMES connected	New C&Is connected	Overall % increase
2019	7,367	43	800	750	50	-	
2020	9,870	213	2,503	2,350	86	67	33.98%
2021	10,920	274	1,050	1,040	6	4	10.64%
2022	11,820	213	900	870	27	3	8.24%
2023	12,470	119	650	632	26	1	5.50%
Apr-2024	12,500	172	1,181	1,128	39	15	14.59%

Source: MoEWR (2024). Technical due diligence and proposed design report for GECO power plant, Gaalkacyo, Somalia

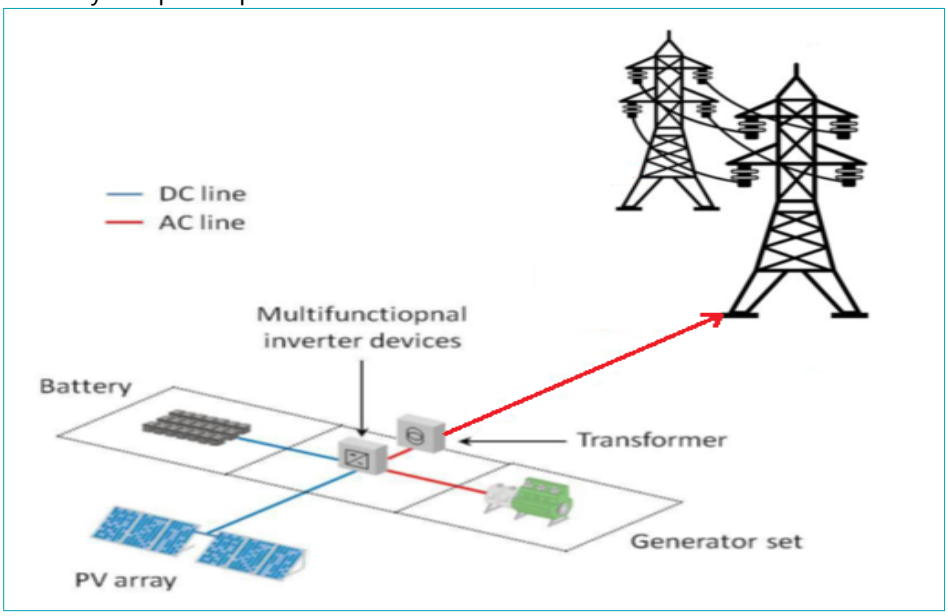
The proposed power plant will be built to comply the International Electro technical Commission (IEC) standards. It will have an installation of solar PV panels, BESS and gensets. The solar PV panels will have a connection to the batteries through underground cables. The standby generator will also be connected to the system as a backup. The goal of the hybridization of diesel systems is to reduce fuel consumption by switching off diesel generator set(s) for a few hours a day, in order to reach a PV energy, share in the final mix of at least 60% or more. The power will be distributed to the customers by the existing medium and low voltage transmission and distribution lines.

The PV plant and the BESS capacities have been sized according to the daily demand and the solar resources. In addition to this design architecture, the project site shall have a site office shall have a control room.

The Solar PV hybrid system will be based on a centralized photovoltaic plant connected to a 3-phase 415V AC busbar line, where the multi-mode battery inverter and the diesel generator will also be connected. The plant will be configured such that a significant portion of daytime loads is fed directly from the solar generator (grid-tie inverter) without intermediate battery storage usage. The Plant will also be equipped with a Diesel Generator (recommended to GECO) to be used as reserve power. Under this design arrangement, the diesel generator switches on automatically whenever the battery state of charge reaches a certain defined DOD (Depth of Discharge). The diesel generator will be equipped with

automatic start-up function controlled by the battery inverter charger. Figure 2-2 illustrates the preliminary design of the proposed GECO power plant.

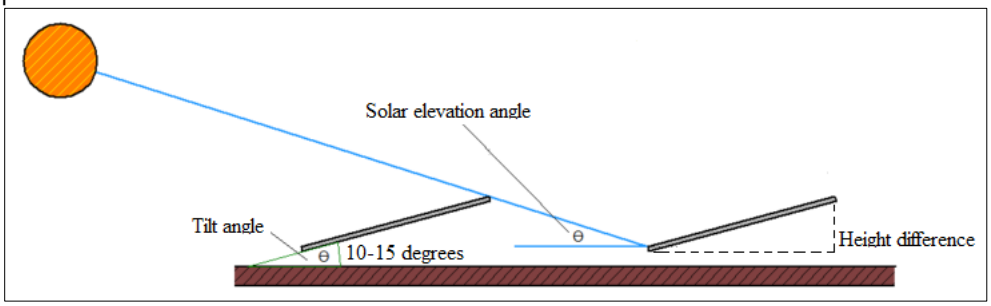
Figure 2-2: Illustration sketch of the proposed design and schematic presentation of the proposed GECO hybrid power plant



2.4.4. Placement of the solar PV arrays

The solar PV array modules support structure shall be ground-mounted on base made of concrete. The support shall have a tilt angle between 10°-15° from the horizontal (Figure 2-3). The support frame shall be of either lightweight aluminium or galvanized steel easy to install, maintain and disassemble at the end-of-life cycle. All the materials (solar panels and mounting gears) will be possibly sourced from abroad, and transported to the project site via road. Cables used within the PV generator shall have appropriate voltage ratings; have a temperature rating higher than 40°C above ambient temperature; be UV-resistant; water resistant, and more importantly be flexible (multithreaded) to allow for thermal/wind movement of modules. The PV inverter shall be of type current source grid-tied to convert DC to an AC sinusoidal current. String inverters shall be installed indoors or outdoors with a cover and suitable for desert conditions with high ambient temperatures and dust.

Figure 2-3: Illustration sketch of the proposed tilt angle of the solar panels placement at the power plant



2.4.5. Powerhouse

The battery, multi-mode inverter and all monitoring equipment will be installed indoors with adequate air ventilation according to the manufacturer's recommendations. Thus, a powerhouse or a containerized solution, considering the equipment manufacturer's recommendations shall be installed. All electrical boards and LV protections will also be installed indoors.

2.4.6. Multi-mode inverter

The priority function of the Multi-Mode Inverter shall be to adjust the instantaneous power consumed from the source according to the battery voltage. The operation of the solar priority function shall be done with an automatic adjustment algorithm of the input limit current. The input limit current is decreased, if there is enough energy available at the DC side, from the initial value.

2.4.7. Battery

The battery considered is lithium-ion battery technology. Lithium-ion batteries, have longer lifetime, are lighter and smaller. The battery nominal voltage does not need to be established at this stage as different technology providers may offer different solutions on this issue. Nevertheless, it must be noted that the voltage class, either ELV or LV, will determine the electrical isolation and accessibility requirements of the battery room. The battery shall have at least a rated capacity of 2.16V at the C10 discharge rate according to DIN 43539-9. The battery shall have a self-discharge when new of less than 5% per month (at 250C and fully charged) of its rated capacity and shall have a Coulombic efficiency of at least 85% and energy conversion efficiency of at least 85% when new and charged to more than 50% of capacity. The battery cycle life for discharge/charge regular cycles down to 80% DOD shall be more than 1500 cycles (According to IEC 896-1).

2.4.8. Diesel Genset

The Diesel Generator Set shall have a capacity of 2MW. The proposed Diesel Genset shall be suitable for indoor or outdoor installation and shall perform accordingly with Multi-mode Inverter. The Diesel Genset shall work in a fully automatic manner. There will also be an external reserve fuel tank with a capacity of approximately over 1000 litres. The selected diesel generator shall have a noise rating of not more that 75dBA @ 1 meter at 75% load under free field conditions. The generator sets will have a high-quality noise absorbent and fire-retardant grade acoustic insulation material.

2.4.9. Power evacuation and distribution

The electricity distribution from the generation plant to the end consumers will be done by means of a distribution lines linked to the current GECO power plant. All lines shall be over-head mounted on concrete poles or eco poles. GECO will seek way leaves for any additional/new the LV lines along the road reserves. Recommended safety measures for any 33kV and 11kV power transmission lines shall include maintaining appropriate clearance distances to ensure public safety and reduce the risk of electrical hazards. Way leave standards typically mandate a minimum horizontal clearance of 2-3 meters from the centre of the transmission line to the nearest structure or vegetation. For safety, the transmission lines shall be well marked, protected by grounding systems, and equipped with appropriate warning signs. Regular inspections and maintenance are essential to identify potential hazards like encroaching vegetation or structural damage, while public education on staying clear of power lines enhances overall safety.

2.5. PROJECT ACTIVITIES

A contractor selected through a bidding process shall undertake the final design and construction of the power plant. Construction will be supervised by GECO and MoEWR to ensure works are undertaken in accordance with specifications. This is to ensure quality work is achieved. It is anticipated that the proposed site will undergo alteration during construction to install the power plant and the associated structures. Some of the activities envisaged in this project include site clearance and levelling, civil works and construction of utilities and structures for the facilities, and installation and connection of the power plant.

2.5.1. Construction phase activities

All construction activities including ground preparation, earth moving, materials delivery, building, walling, roofing and the installation of amenities (power, water, communication equipment, etc.), fittings (doors, windows, safety provisions, etc.) will be carried out by competent personnel obtained through contractors to ensure consistent high standard of finish and providing superb value for money.

2.5.1.1. Outline of the construction activities

Construction activities will involve the following:

- The contractor shall perform site investigations in good time to ensure appropriate designs and construction is done on a sound engineering basis.
- Site preparation (ground-breaking, clearance of vegetation, preparation of a site office and stores, fencing to avoid intrusion)
- Disposal of any soil that could is not required, excavations/earth moving, filling and foundation laying
- Procurement of construction materials and delivery of the same to the site
- Storage and utilization of materials
- Civil, mechanical, and electrical works
- Building works, trampling and removal of construction wastes

- Construction of fuel storage tank
- Installing of containerized generators
- Piping of fuel lines
- Cabling
- Installation of the solar panels
- Completion of the plant
- Post construction clean–up, restoration and landscaping of site
- Load testing
- Remedying of defects after functional tests
- Solid waste collection and commissioning of the plant.

During construction, the contractor shall observe safety and shall erect warning signs to warn on any potential hazards, ensure proper and efficient use of Personal Protective equipment (PPE) for all on site and observe safe work procedures.

2.5.1.2. Construction materials, equipment and services

All materials that will be used in construction of this project shall be of high quality in line with the international standards. Sufficient materials and equipment shall be purchased and stored on site to avoid wastage.

2.5.1.3. Input materials and equipment & machinery

Works and construction activities are expected to use quality construction materials and procedures to ensure quality work, occupational and public safety and environmental protection. The following inputs and equipment will be required for construction:

- building stones
- bus bars, switch gears, circuit breakers
- concrete mixers
- conductors
- electrical equipment
- excavators
- fuels (diesel)
- generator sets,
- glass
- hardcore
- labour force (of both skilled and unskilled workers).
- lightning arrestors and steel structure members
- lorries
- meters
- paints, solvents, whitewash, etc.,
- plumbing equipment
- poles
- raw construction materials (sand, cement, natural building stone blocks, hard core, gravel, concrete among others).
- sand
- solar panels
- timber (e.g., doors and frames, fixed furniture, etc.),
- water
- welding machines, wheelbarrows

2.5.1.4. Use of services and resources

- *Water:* Water is key in the construction of this project. Water will be required for potable use and in the construction of the foundations for the control room, guard house and any other works. The contractor will source water from elsewhere rather than the community water resources.
- *Labour:* The size and the composition of the workforce will be at the discretion of the contractor(s). The contractors will adhere to all the relevant employment legislations in the FRS, and ensure

compliance with the World Bank's ESS2. It is recommended that the contractor seeks unskilled labour from the surrounding areas, and it is estimated that upto forty (40) will be hired during the construction and operation phases of the project.

- *Sewerage:* A negligible sewerage flow is anticipated for the duration of the construction period. On site, use will be made of toilets that will be serviced periodically.
- *Electricity:* Electricity will be essential for the proposed project during both construction and operation. The contractor will need to have a portable generator during construction for fabrication and welding where necessary but GECO will provide electricity for operations.

2.5.1.5. Construction supervision and safety

Throughout the construction phase, supervision shall be carried out by the GECO through a supervising consultant to ensure:

- Workers use personal protective equipment (such as hand gloves, helmets, safety shoes, earmuffs, overalls and dustcoats) at all times as is appropriate.
- Motorized equipment is checked to ensure that they are in good working condition, safe to use and produce minimal noise levels and reduced smoke emission.
- Provision of first aid kit and firefighting equipment (portable cylinders) and placement at strategic positions for access.
- Proper disposal of waste material and toilet facilities are provided for construction workers.
- Emergency response procedures are in place and all workers are aware of them like in case of fire.
- Any work involving deep excavations, elevated heights and lifting heavy loads, poses a number of risks to personnel. The contractor shall develop a worksite plan before commencement of each of the construction. This will ensure that personnel are equipped with the correct protective clothing and equipment and are ready to work safely while also safeguarding the environment.
- Workers shall be provided ablutions facilities and changing rooms.

2.5.2. Operation phase activities

The power plant shall be operated and maintained by GECO. During operation phase of the project, no unauthorized person shall access the power plant. This is in line with GECO policy to ensure safety of staff and the public. Routine maintenance is to be done under supervision by authorized staff from GECO. Throughout the project life, the GECO shall adhere to all requirements of EHSG guidelines and any other applicable legislation in the FRS and in the Galmudug State.

2.5.3. Decommissioning phase activities

GECO shall submit a decommissioning plan to relevant authorities in the FRS and Galmudug State in good time prior to decommissioning. The decommissioning plan shall include a restoration plan. At the decommissioning/demolition phase, the following activities will take place;

- Removal of solar panels and diesel generator and their associated switching equipment's
- Removal of electrical fittings, bus bars and steel poles/structures
- Demolish and carefully handle components that contain oil and fuels like the diesel generators
- Ensure proper handling of the demolished materials and have an authorized and guided transportation and disposal away from human settlement, water bodies and wildlife conservation areas.
- Demolish and remove all the concrete works

3.0. Policy, Legal and Regulatory Framework

3.1. OVERVIEW

This section gives the legal and regulatory framework relevant to the proposed project. Owing to FRS's protracted political instability over the last few decades, there has been the general lack of well-developed environmental laws and administrative frameworks. As such, environmental and natural resources management matters have over the years been managed in accordance with the existing statutes in place. However, FRS is moving towards strengthening its environmental management systems. For instance, a draft environmental and social impact assessment and audit regulations has been finalized[5]. Despite the recent constitutional reforms that define natural resources, common environmental goods, and ecosystem services as protectable public assets and declare the right to a clean and healthy environment, there are still significant gaps in the implementation of environmental legislation in the FRS. Based on our evaluation, the following laws and regulations will apply in the implementation of the environmental and social risk management for the proposed project.

3.1. NATIONAL LAWS AND REGULATORY FRAMEWORK

3.1.1. Provisional Constitution of Somalia

The Provisional Constitution of Somalia, which was ratified in 2012, emphasizes the value of safeguarding the environment and managing the country's natural resources, particularly in Articles 25, 44, and 45 (which deal with the environment, natural resources, and land, respectively). Relevant provisions include:

- *Article 25* guarantees Somali citizens' rights such as a share of the nation's natural resources, protection from excessive exploitation, a healthy environment, and protection from pollution and harmful materials.
- *Article 44* mandates the federal government to prioritize environmental protection, conservation, and preservation, preventing harm to natural biodiversity and the ecosystem.
- *Article 45* encourages the Somali people to actively participate in the development, execution, management, conservation, and protection of natural resources and the environment.

The Constitution provides for the protection of workers' rights, non-discrimination, human rights promotion, and defence against gender discrimination and GBV in the workplace. Articles 11 ("Equality"), 14 ("Slavery, Servitude, and Forced Labour"), 15 ("Liberty and Security of the Person"), 24 ("Labour Relations"), and 27 ("Economic and Social Rights") contain important clauses.

- According to Article 11, "all citizens shall have equal rights and duties before the law, regardless of sex, religion, social or economic status, political opinion, clan, disability, occupation, birth, or dialect." In addition, it says, "Even if the actor did not intend this effect, discrimination is deemed to occur if the effect of an action impairs or restricts a person's rights." It further states that no one shall be subjected to discrimination by the official on the grounds of age, race, colour, tribe, ethnicity, culture, dialect, gender, birth, handicap, religion, political opinion, occupation, or wealth and that this prohibition applies to all official programs.
- "A person may not be subjected to slavery, servitude, trafficking, or forced labour for any purpose," according to Article 14.
- Every person has the right to physical integrity, security, and personal liberty, according to Article 15. "The prohibition of all forms of violence, including any form of violence against women, torture, or inhumane treatment" is one of the provisions that falls under this category.
- Article 24 states that "all workers, particularly women, have a special right of protection from sexual abuse, segregation, and discrimination in the workplace." It also enshrines everyone's right to fair labour relations. All labour laws and practices must adhere to the principle of gender equality in the workplace. It also guarantees every worker the freedom to organize and become a member of a trade union, to go on strike, and to negotiate collectively with employers, trade unions, and employees on labour-related matters.
- Every person's access to clean, drinkable water, healthcare, social security, and the realization of their constitutional rights is upheld by Article 27. Additionally, it says, "It shall be ensured that minorities who have long faced discrimination, women, the elderly, and people with disabilities get the necessary support to realize their socio-economic rights."

Relevance

The proposed proposal complies with Somalia's Provisional Constitution by offering mitigating methods for addressing social, health, safety, and environmental challenges in order to achieve sustainable development. Furthermore, the planned project seeks

[5]Ministry of Environment and Climate Change (2024). Final draft environmental and social impact assessment and audit regulations. Ministry of Environment and Climate Change, Mogadishu, Federal Republic of Somalia.

to generate clean and reliable electricity, which will help the FRS achieve its goal of minimising global warming by lowering greenhouse gas emissions from electricity generation.

3.1.2. Federal and state regulations on environmental, health, and safety

Somalia is currently developing its environmental laws and policies. A National Environmental Policy created by the FGS was accepted by the Cabinet on February 13, 2020. On November 26, 2020, the Cabinet adopted the National Environmental Act after it had been drafted. To be effective, both documents must be authorized by the Parliament. Their adoption has no set schedule in place. Environmental Quality Standards, Sectoral Environmental Assessments, Environmental Impact Assessments, and Environmental Audits are among the national environmental policies, regulations, and laws that must be drafted at the federal level by the MoECC that has formed an ESIA council to help with the coordination of ESIA activities and operations in the FRS. Overall, there is concurrence at the national and state levels that the international standards and best practices in compliance with the WB-ESS should serve as a foundation for conducting the ESIA.

Relevance

The MoEWR (the proponent) including the contractors will be required to fully comply with the environmental and quality standards as per the draft national environment act. The proponent and the contractors engaged in the project will:

- *Develop and implement a formal construction health and safety plan.*
- *Constitute health and safety committee to oversee safety and health during the construction and operation phases of the project.*
- *Ensure that the workers exposed to hazards and or accidents undergo requisite medical examinations.*
- *Ensure that equipment is serviced properly and/or use of the equipment complies with the threshold noise values provided in the EHSG guidelines*
- *Carry out, and record, a fire risk assessment identifying any possible dangers and risks, and where possible remove, the risk of fire and take precautions to deal with the remaining risks.*
- *Develop and implement and emergency preparedness and response plan (EPRP) to be applied during the construction and operation phases of the project.*
- *Implement mitigation during construction to ensure neighbouring properties are not negatively impacted by nuisance dust.*
- *Observe any existing provisions in the FRS on management of traffic of construction vehicles as guided by the ESMP.*

3.1.3. Somalia's Ninth National Development Plan

Somalia's ninth National Development Plan (NDP-9)[6], covering the period 2020-2024, identifies recurrent drought, climate change and environmental degradation as major causes of poverty and food insecurity in Somalia. The NDP-9 prioritizes environmental management, gender and social equity. It focuses on increasing energy supply, particularly from renewable sources, and energy market regulatory reform. Unregulated power production poses a major economic and environmental challenge, leading to high electricity prices and forest destruction. Access to energy is crucial for economic growth and poverty reduction, and the NDP-9 prioritizes investment in the energy sector and energy market regulation. Somalia intends to implement the Power Master Plan (PMP) with support from the World Bank, increasing the supply of renewable energy and establishing regulatory bodies to enhance market efficiency. The PMP highlights the need to diversify energy portfolios and lessen reliance on fossil fuels while identifying supply-side issues such as inadequate capacity for the production of power. Particularly for women and young people, renewable energy can speed inclusive growth and create jobs.

Relevance

The proposed project supports the NDP-9 aims of increasing electricity generation capacity from renewable resources and reducing tariffs, thereby contributing to human and economic development.

3.1.4. Environmental protection and land use policy and regulation

Somalia's environmental protection and natural resources are under limited federal oversight, with the National Environmental Policy and Act approved by the Cabinet but not passed by Parliament. A Climate Change Policy has also been developed. However, federal and state standards and regulations for environmental pollution prevention, waste management, water quality, air quality, and noise have not been formulated or approved. Land use policy and regulation oversight mechanisms are also lacking, with instruments like zoning and land use planning largely absent at federal and state levels.

[6]The NPD-9 is available here: http://mop.gov.so/wp-content/uploads/2019/12/NDP-9-2020-2024.pdf

Relevance

The proposed project will contribute to protection of the environment and climate change mitigation by increasing electricity generation capacity, especially by working towards focusing more on solar electricity production systems thereby reducing GHG emissions.

3.1.5. Labour and employment law

The Labour Code of Somalia (Law No. 65, adopted in 1972), governs labour and working conditions, including employment contracts, terms and conditions, remuneration, occupational health and safety, trade unions, labour authorities, and maternity leave. The code is currently under review to align with the Provisional Constitution and International Labour Organization (ILO) conventions. The Federal Ministry of Labour and Social Affairs is reviewing the revised draft, which was finalized in February 2019 and awaits Parliamentary approval. The current Labour Code remains in effect until the revised code becomes law. The State laws on labour and employment are also under review to align them to the Provisional Constitution and ILO standards.

Relevance

- *The proponent has an obligation to adhere to all the principles and tenets of the Labour Code (1972) pending any ongoing changes and amendments. The proposed project will adhere to the principles of the ILO conventions ratified by the Federal Government of Somalia (FGS), and the relevant provisions of the Provisional Constitution, when dealing with work and labour aspects during construction and operation phases of the project.*
- *The proponent and the contractors will abide by the existing labour laws, including any amendments thereof, including abiding by all stipulations on employee management and relations in all the phases of the project.*
- *The Proponent and Contractor will maintain an insurance policy cover for its employees, record of accident, carryout proper accident investigations; organize for pre-employment and regular medical examinations for staff during construction and operation phases of the project.*
- *The proponent and the contractor will sensitize workers against abuse and exploitation of children, and shall not engage in any child labour during all phases of the project.*

3.1.6. Policy and Law on Gender Equality and Gender Based Violence (GBV)

Gender Based Violence remains one of the most serious threats to the health and safety of women and girls globally. The situation is dire in Somalia where women are girls are at more risk of rape, Intimate Partner Violence (IPV), early and forced marriage and FGM. The Somalia context is fraught with GBV and protection concerns, especially for women and girls[7]. For example, a recent study on GBV in Somalia[8] found out that 18.5% of the women and girls in the IDP camps had experienced gender-based violence in the last 12 months. Further investigation into the nature of the violence revealed that 44.0% of the violence against women and girls were physical assaults, followed by psychological abuse (24.8%), forced marriage (18.8%), attempted rape (7.2%), rape (4.0%) and denial of resources (1.6%). The study showed that about half (57.7%) of that violence were committed by intimate partners or relatives, mostly (60.6%) during the daytime. Moreover, a little over half (57.7%) of the victims were over 20 years old, and 43.7% of them experienced assault more than once.

The Federal Council of Ministers has approved Somalia's National Gender Policy (2016). The Policy aims to promote gender equality and sustainable human development by valuing women and men's contributions in economic empowerment, education, health, and political transformation. The policy outlines gender priorities in health, education, economic empowerment, and political participation. Prioritizing rural areas, the policy focuses on creating economic opportunities for both genders, including vocational, entrepreneurs, and skills enhancement programs and training for women and men, including those with disabilities. The FGS has drafted the Sexual Offenses Bill (2017) with support from the UN, which has been tabled in Parliament and is still under review. The pre-existing Penal Code (1962) includes some provisions relevant to addressing GBV, including criminalizing rape, but it does not provide an adequate legal framework for dealing with GBV cases[9]. In practice, most GBV cases are dealt with by the customary system.

Relevance

[7] file:///C:/Users/pc/Downloads/GBV%20Bulletin%20Apr%20-%20Jun%202018%20Final-1.pdf

[8] Hassan, A.D., Mohamed M.D. & Bashir, S.H. (2023). Prevalence, patterns, and determinants of gender-based violence among women and girls in IDP camps, Mogadishu-Somalia. Journal of Migration and Health, Volume 8. https://doi.org/10.1016/j.jmh.2023.100193.

[9] See UNDP, UN Women, and UNFPA, 2018. Somalia Gender Justice and the Law. Available at https://www.undp.org/content/dam/somalia/docs/Project_Documents/Womens_Empowerment/Gender%20in%20Somalia%20Brief%202.pdf for a review of the Penal Code (1962) provisions relevant to GBV.

In the absence of appropriate measures, the project can exacerbate gender inequalities and sexual and gender-based violence. In adherence to this policy, measures will be put in place to ensure gender inclusivity in decision-making, employment opportunity and access to the energy generated by the project, and mitigate social risks including sexual and gender-based violence, and any form of discriminations.

3.1.7. Somalia's Power Master Plan, 2018

Developed by government of Somalia in coordination with the World Bank, the PMP seeks to create an enabling environment for independent power producers and the policy, legal and regulatory framework for the sector.

Relevance

The proposed project will be a forerunner for independent renewable power producers and will serve as a model for similar renewable energy plants in other locations in Somalia.

3.1.8. Energy policy and regulations

Currently, FRS lacks both an energy sector regulatory framework and a robust energy policy. However, the FGS has made the creation of an energy policy, strategy, and regulatory framework a top priority, in accordance with the NPD-9 and PMP, and a number of laws and rules are presently being developed. At the moment, the responsibility for managing the energy industry rests with the Federal Ministry of Energy and Water Resources (MoEWR). The MoEWR created a draft Energy Policy in 2018, and in order to give the industry a complete framework, they are currently working on an Energy Act and Regulations. Currently, the World Bank, African Development Bank (AfDB), and United States Agency for International Development (USAID) are some of the main partners supporting the implementation of the PMP and providing technical assistance to the FGS in the energy sector. In the absence of regulations, standards and codes of practice, there is no mechanism to vet and enforce ESP services quality, health and safety standards. This is compounded by the limited capacity of federal and state institutions to develop, enforce and monitor the sector. Currently, the Federal and State MoEWR are mandated to issue operating licenses to power plant. However, there are no licensing guidelines and there is not yet any legal basis to regulate their operations once licenses are granted.

Relevance

- *The proposed project shall align its operations to the Somalia's Power Masterplan[10] and ensure that they operate within the principles of the existing energy policy and regulations. The proposed project is relevant in the sense that it will provide sustainable and reliable energy supply, including applying measures to protect and conserve the environment during its construction and operation phases. MoEWR will work closely with GECO to ensure the project complies with the current energy policy and regulations, and any amendments thereof.*
- *The proposed project is in line with the energy policy and regulations in the following ways: (i) the proponent (GECO) has identified and designated a site for the proposed project, and the proposed project is aligned the Somalia Power Masterplan. Additionally, and in collaboration with the MoEWR, there is technical capacity to undertake the project under SESRP.*

3.1.9. Customary legal system and sharia law

Somalia's legal system comprises of civil law, sharia law, and customary law. The Provisional Constitution (2012) defines the country's federal structure and hierarchy of laws. The customary legal system in Somalia, known as the *xeer* system, is crucial for land rights and resource management due to weak formal regulation. This system governs property, enforces contracts, and resolves disputes. Despite variations across regions and clans, it is applicable in most parts of the country. The *xeer* system is compensatory, majoritarian, and uses clan insurance to protect against violations. Elders act as judges or mediators, considering precedent and custom.

The customary *xeer* system also handles most cases of sexual violence and GBV. The FGS and some Federal Member States are making efforts to reintroduce common law courts, but the capacity of and trust in the formal justice system remains weak, and the customary system functions in parallel to state law. A number of customary practices go against basic human rights standards and serve to victimize GBV survivors, for example, crimes of rape are commonly resolved through the marriage of the victim to the perpetrator, and revenge and honour killings are tolerated[11]. Numerous cultural and institutional

[10] https://moewr.gov.so/wp-content/uploads/2020/07/Master_plan1.pdf
[11] See UNDP, UN Women, and UNFPA, 2018 for further discussion of how the customary system handles GBV cases as well as other barriers to access to justice for GBV survivors.

barriers limit women's access to justice, including fear of punishment, reprisals and harassment for reporting GBV incidents, and social stigma[12].

Relevance

- *The power plant is required to operate under the existing customary laws within the states where their projects are located. They are further expected to respect the existing customary laws in handling their relationships with all the stakeholders they engage in their areas of operation.*
- *The land proposed for the project has been legally acquired by GECO under willing buyer-willing seller. Additionally, the land's tenure falls under customary land rights. GECO will observe all the relevant provisions of the customary legal systems and sharia laws related to land management (as appropriate) in all phases of the project.*

3.2. Galmudug State Laws and Regulatory Framework

3.2.1. Overview

Galmudug State, within the Federal Republic of Somalia, operates under a developing environmental and energy legislative framework, shaped by the broader Somali federal governance system. The state's environmental management policies are still in their infancy, influenced by the federal government's strategic vision for sustainable development. While no specific environmental management act is fully formalized for Galmudug, the state aligns with the National Environmental Policy and the 2020 National Environmental Management Act, which aim to promote the sustainable use of natural resources, protection of biodiversity, and mitigation of climate change impacts. These frameworks emphasize the need for environmental assessments, including Environmental and Social Impact Assessments (ESIAs), particularly for infrastructure and energy projects.

In the energy sector, Galmudug follows Somalia's National Energy Policy of 2019, which promotes renewable energy development, particularly solar and wind energy, as key to meeting the state's power needs. The policy encourages private sector participation in energy generation, distribution, and management. It also stresses the importance of energy efficiency and energy access in both urban and rural areas, acknowledging the state's reliance on traditional biomass fuels and imported petroleum products. Galmudug, like other Somali states, faces challenges in regulatory enforcement and capacity-building, but ongoing reforms aim to establish a more robust energy and environmental governance system that balances development with sustainability. The following are the relevant policies, laws, and regulations in Galmudug States hall be applicable to the proposed project:

3.2.2. Galmudug State Development Plan (GSDP-3), 2023-2025

Galmudug State faces numerous socioeconomic development challenges. To address these challenges, the Galmudug State Development Plan (GSDP-3)[13] has been developed to provide a framework for the state's institutions to be successful and efficient. The strategy highlights the need for capacity development, such as training and merit-based recruiting procedures, in order to increase the administrative ability of current and future locally constituted administrations. Additionally, the GSD-3 highlights key elements on sustainable development with clear emphasis on environmental management. Furthermore, the plan acknowledges the need to enhance sustainable income generation to enable delivery of important services to the residents with a clear emphasis on revamping the energy sector through investments, especially in the renewable energy.

Relevance

The proposed project aligns with the GSDP-3's aims of increasing electricity generation capacity from renewable resources and reducing tariffs, thereby contributing to human and economic development of the Galmudug State.

3.2.3. Galmudug Urban Land Law (2022)

In February 2022, the President of Galmudug signed legislation passed through the state legislature, which codified, for the first time, systems of urban land management. This followed similar legislation, passed in 2020, which created a legal framework for the management of rural and agricultural land. The Galmudug Urban Land Law aims to distinguish the functions of state-level and local-level government as they pertain to land, and expedite the creation of local land governance mechanisms. It establishes the Galmudug State Ministry of Public Works as responsible for the planning and harmonizing functions of urban planning. The law also allocates responsibility to the local governments for the registration, distribution, and dispute resolution of urban land and property. The local government is also responsible for urban planning and zoning – with the exception of land allocated for airports, ports, military and other government uses. The state-level Ministry of Public Works, where

[12] UNDP, UN Women, and UNFPA, 2018.

[13] file:///C:/Users/pc/Downloads/Galmudug%20State%20Development%20Plan%20(GSDP-3)%20-%202023-2025.pdf

specific zones will be set out for industrial and residential use, and for transport connectivity, supports this urban planning function.

Relevance
Galmudug State's land laws are crucial for power plant establishment and operation, ensuring land allocation, zoning, environmental compliance, and community relations. Compliance prevents disputes, minimizes environmental risks, and requires ESIAs.

3.2.4. Galmudug State Environmental Management Law (2020)

After enactment by the State Parliament, the President of Galmudug approved this law on October 31, 2020. Article 4, section 1, 2 and 3 stipulates that every person, state actors and private sectors are responsible for maximum protection, care and rehabilitation of the environment. Furthermore, the article divulges that part of protection of the environment is to inform responsible authorities' actions that might cause an adverse impact to the environment. This law emphasizes the protection of natural resources, biodiversity conservation, and sustainable land use practices. They also mandate the use of Environmental and Social Impact Assessments (ESIAs) for any major infrastructure projects, especially in sectors like energy and infrastructure.

Relevance
The Galmudug State Environmental Law (2020) requires that all significant projects, such as the power plant, undergo an ESIA to identify, evaluate, and mitigate potential environmental and social impacts before project approval. By following these regulations, the project ensures compliance with legal requirements, addresses potential environmental and social risks proactively, and promotes transparency and stakeholder engagement. This adherence helps to safeguard environmental quality and community well-being while supporting sustainable development goals in Galmudug State. By commissioning this ESIA, the client (MoEWR) and GECO follow the provisions of this law.

3.2.5. Galmudug State Ministry of Environment and Climate Change Development Plan (2023-2025)

Galmudug State faces numerous challenges in environmental, climate resilience, disaster management, and durable solutions. The collapse of the state and governance structure, insecurity, chronic conflict, and weak rule of law have hindered sustainable management of environmental resources. Rapid deforestation, especially in semi-arid livelihood zones, increases the risk of desertification. Unsustainable exploitation of pastures and rivers further exacerbates the situation, leading to resource depletion and reduced economic opportunities. Under Galmudug State Development Plan (2023-2025), the state Ministry of Environment and Climate Change has prioritized the need for sustainable resource management, including protecting the environment, mitigating climate change impacts, enhancing disaster management capacities, and working towards durable solutions for the population.

Relevance
The Galmudug State Ministry of Environment and Climate Change Development Plan (2023-2025) is crucial for the establishment and operation of a power plant in Gaalkacyo City. The plan prioritizes reducing greenhouse gas emissions, enhancing climate resilience, and promoting renewable energy use. It also emphasizes Environmental and Social Impact Assessments (ESIAs) and environmental protection measures to ensure compliance with the state's regulatory framework and address environmental and community concerns.

3.2.6: Galmudug State Energy Policy (2018)

Building on the FRS energy policy, the Galmudug State's energy policy has the overall objective of increasing the access to efficient, affordable and sustainable energy for urban and rural communities; for the private sector to thrive, as well as for the public sector to meet its energy demand in order to provide better essential services, boost economic growth and reduce poverty. The policy promotes widespread production, use and storage of renewable energy through diversification, innovation, technical cooperation, technology transfer, as a way to reduce the pressures on deforestation for biomass energy generation, and to promote investment in modern, integrated and commercially viable models of energy supply.

Relevance
The Policy plays a crucial role in guiding the establishment and operation of a solar power plant in Gaalkacyo by promoting the adoption of renewable energy sources to meet growing energy demands sustainably. The policy supports the development of solar energy as part of a broader strategy to reduce reliance on fossil fuels, enhance energy security, and contribute to climate change mitigation efforts. It provides the legal and regulatory framework for licensing, technical standards, grid integration, and possibly financial incentives, ensuring that the solar power plant complies with environmental and efficiency standards while contributing to sustainable energy goals in Galmudug.

3.2.7: Galmudug State Labour Legislation: Occupational Health and Safety

Drawing from the FRS labour laws, the Galmudug State, labor code covers protection against risks to the workers, notification procedures in occupational accidents, medical requirements at site and conveyance of injured workers to the hospitals, among others. The labour code has relevant provisions with the regard to OHS as follows:

(i) Protection against possible risks (Article 101): All factories, workshops and other workplaces shall be built, installed, equipped and managed in such a way that the workers are properly protected against possible risks. For this purpose, the employer shall:
   (a) Maintain a perfect state of safety and hygiene to avoid risks of accident or damage to health;
   (b) Take suitable measures to prevent contamination of workplaces from toxic gases, vapours, dust, fumes, mists and other emanations;
   (c) Provide sufficient and suitable toilet and washing facilities, separate for men and women workers;
   (d) Provide an adequate supply of drinking water easily accessible to all workers;
   (e) Maintain fire-fighting appliances and staff trained in their use;
   (f) Provide the necessary safety appliance adapted machinery and plant;
   (g) Maintain machinery, electrical and mechanical plant, instruments and tools in good condition to ensure safety;
   (h) Provide suitable installations for the removal of refuse and drainage of residual waters;
   (i) Take the necessary precautions in the establishment to protect the life, health and morality of the workers;
   (j) Ensure that staff receive the necessary instructions for the prevention of industrial accident, occupational diseases and other risks inherent in their occupations;
   (k) Post up in conspicuous parts of the workplace's notices explaining clearly the obligations of the workers to observe safety rules, and visual signs indicating dangerous places;
   (l) Supply the workers with the apparatus and instruments to guard against the risks inherent in the workplace and the work they do; and
   (m) Take steps to provide the necessary first aid in urgent cases to workers involved in accidents or falling sick during work.

(ii) Notification of industrial accidents and occupational diseases (Article 102)
   (a) The employer shall immediately notify the competent Labor Inspectorate of all accidents resulting in injury of death and occupational diseases.

(iii) Medical facilities (Article 103)
   (a) Every undertaking normally employing more than ten workers at the single Centre shall maintain a first-aid chest.

(iv) Conveyance of injured and sick workers (Article 104)
   (a) It shall be the duty of the employer to arrange, at his own expense, for the conveyance to the nearest hospital of any injured or sick worker who can be conveyed and who cannot be treated on the spot with the means available.

(v) The Revised Draft Somalia Labor Code has more emphasis on OHS requirements. It makes the Director of Occupational Safety and Health (OSH) responsible for the registration of hazards and risks, regulation and supervision of all workplaces and monitoring or enforcing compliance with Labor Code and any other Labor law to the extent that they regulate safety, health and welfare in the workplaces. Part VI of the Revised Draft Labor Code covers the administration of occupational accidents, injury and disease provisions at workplace, employer's general duties towards to OSH, insurance requirements, employees' general duties, medical support, compensations, offenses and penalties etc.

Relevance

This law would be applicable during the construction and operation phases of the solar plant to ensure safe working conditions, provision of protective equipment, and adherence to safety protocols.

3.2.8: Galmudug State Labour Legislation: Discrimination and Abuse

Galmudug's labor legislation prohibits discrimination based on personal characteristics, promotes equality, and addresses workplace abuse, ensuring fair treatment and career advancement for all workers. The FRS Provisional Constitution provides that "all workers, particularly women, have a special right of protection from sexual abuse, segregation and discrimination in the workplace. Every Labor law and practice shall comply with gender equality in the workplace" (Article 24-5). Article 91 states that no woman worker shall be discharged during a period of pregnancy, as duly confirmed by a medical certificate, until the end of the period of leave mentioned in the next succeeding paragraph or until the child is 1-year-old.

Relevance

The Galmudug State Labour Legislation is crucial for a solar power plant in Gaalkacyo City, promoting fair labour practices and preventing discrimination. It ensures a safe, inclusive work environment, enhances employee morale, and promotes sustainable development in the region. Compliance with these legal frameworks is essential for plant success.

3.2.9: Galmudug State Labour Legislation: Child Labour and Forced Labour

Like the FRS labour laws, Galmudug's labor legislation prohibits child labor, forced labor, and exploitation of vulnerable groups, setting minimum working age and imposing legal penalties for violations. Article 90 on prohibited work describes the term "children" means persons of either sex who have not attained the age of 15 years and the term "young persons" means those who have attained the age of 15 years but have not attained the aged of 18 years. Where the age is uncertain, medical opinion shall be obtained. Articles 93 & 94 on is emphatic that it is unlawful to employ children, and further clarifies that on the minimum age for certain types of work. Freedom of labour under Article 6 forbids compulsory labour of any form.

Relevance

The Galmudug State Labour Legislation, particularly on child and forced labour, is crucial for the Gaalkacyo City solar power plant, ensuring ethical practices and promoting a responsible work environment.

3.2.10: Galmudug State Anti-Female Genital Mutilation Act (2024)

Galmudug State's legislation banning Female Genital Mutilation (FGM) is a landmark law that seeks to protect women and girls from harmful traditional practices. Enacted in 2024, this law focuses on the health, safety, and human rights of women, aiming to eradicate all forms of FGM. While this law primarily addresses gender-based violence and health issues, its relevance to energy infrastructure development lies in its broader implications for social governance and community welfare.

Relevance

Energy projects often bring significant social changes, including an influx of workers and changes to community dynamics. During the construction and operation of energy infrastructure, the legislation can influence how communities are engaged, particularly regarding the protection of vulnerable populations like women and girls. The FGM law emphasizes the need for inclusive development that considers women's rights. In energy infrastructure projects, this could translate to ensuring that contractors and stakeholders adopt policies to protect women from gender-based violence, including FGM.

3.3. THE WORLD BANK ESS AND GUIDELINES

3.3.1. World Bank ESS and relevance to the proposed project

The World Bank currently emphasises system guidelines focusing Environmental Social Frameworks (ESF). The ESF supports green, resilient, and inclusive development by strengthening environmental and human rights protections, with an emphasis on labour, inclusion, gender, climate change, biodiversity, community health, and stakeholder involvement. It takes a risk-based approach, which allows for more monitoring and resources for complicated projects while encouraging adaptive risk management and stakeholder engagement. The ESF also focuses on developing national environmental and social management systems, enhancing borrower capacity, and encouraging openness and stakeholder participation through timely information disclosure, continuous consultations, and effective grievance processes. The consultant also referred to all the latest environmental and social standards (ESS) with all the relevant guidance notes (GN) utilized by the World Bank for new projects. The aim of the evaluation was to examine if the proposed project triggered any of the ESS. Table 3-1 summarizes the ESS from the perspectives of triggers and relevance considering the outcomes from the present ESIA.

Table 3-1: The ESS triggers and relevance to the proposed GECO Hybrid Power Plant

ESS	Triggered?	Relevance
ESS1: Assessment and Management of Environmental and Social Risks and Impacts	Yes	Compliance with ESS1 requirements will help the proposed project to minimize adverse environmental and social effects, and promote sustainable development outcomes. By commissioning this ESIA, the proponent is cognisant of the need to comply with the ESS1 requirements
ESS2: Labor and Working Conditions	Yes	Compliance with ESS2 requirements will help project ensure the well-being of workers, protect the health and safety of local communities, and minimize risks associated with project implementation.
ESS3: Resource Efficiency and Pollution Prevention and Management	Yes	The operation of the power plant may result in increased air emissions and waste generation throughout the project, as well as their potential impacts. Additionally, during construction and operation phases, different sets of materials will be used, and

ESS	Triggered?	Relevance
		this would require prudent resource efficiency and waste management.
ESS4: Community Health and Safety	Yes	Predicated on the assumption that the proposed project and its associated activities such as power transmission, and the associated equipment are expected to have potential hazards with impacts of different strengths on community health and safety. The proponent will be required to comply with all the provisions of ESS4
ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	No	ESS5 ensures that any land acquisition or restrictions on land use for the solar plant are conducted in a manner that minimizes displacement and provides fair compensation and resettlement assistance to affected communities. By adhering to ESS5, the project proponents can mitigate social risks, ensure the equitable treatment of displaced persons, and align the project with international best practices for social sustainability. This helps in fostering community acceptance and reducing potential conflicts, thereby contributing to the overall success and long-term viability of the proposed solar PV project.
ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	No	The proposed project location is not within an area hosting any of the species listed in the IUCN threat categories of EN, NT and VU. Additionally, there are no sensitive ecosystems within and near the proposed project site.
ESS7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	No	Based on the screening conducted, a review of the available literature, and engagement with the local administration, it was concluded that the project area does not have indigenous people.
ESS8: Cultural Heritage	Yes	Predicated on the assumption that there may be cultural artefacts or resources in the project area. It is acknowledged that these may be affected, particularly during the execution of civil works for new lines and hybridization activities. By adhering to ESS8, the project proponent will be required to engage with any affected communities, implement measures to avoid or mitigate impacts on cultural heritage, and ensure that any necessary alterations are conducted respectfully and in accordance with local and international guidelines. This not only preserves cultural heritage but also fosters positive relationships with local communities, enhancing the project's social license to operate.
ESS9: Financial Intermediaries	No	This standard will not apply because SESRP is fully funded by directly by WB without involving financial intermediaries
ESS10: Stakeholder Engagement and Information Disclosure	Yes	The proposed project, much like any other development initiative, encompasses stakeholders—individuals or groups with an interest in or potential impact from the project. It is crucial to furnish them with comprehensive information about the project, establish relationships, and provide an opportunity for them to offer feedback. Considering their interests and concerns during the planning and preparation stages is integral to fostering a collaborative and inclusive project environment.

3.3.2. Environmental and Social Management Framework (ESMF) for SESRP Project

An Environmental & Social Management Framework (ESMF) for SESRP has been developed. The purpose of the ESMF was to provide a procedure for environmental and social assessment of the proposed SESRP projects, including the proposed GECO hybrid solar PV solar plant for which this ESIA is focusing on. The framework was prepared because the geographic coverage for SESRP was generally known but the exact locations for the sub projects had not been identified. The ESMF also provides guidelines for MoEWR in determining the appropriate level of environmental and social assessment required for the sub-projects and in preparing the necessary environmental and social mitigation measures for these sub-projects.

Relevance
This SESRP/ESCP and ESMF guided this ESIA report for the proposed GECO Hybrid Power Plant.

3.3.3. Comparison between the World Bank and the FRS legislations relevant to the project

A comparison between the WB policies and the FRS law is presented in this section (Table 3-2). The objective is to find out any gaps and propose a recommendation.

Table 3-2: Comparison between the key WB Environmental and Social Framework relevant to the project and the FGS legislations

World Bank ESFs	FRS laws	Comparison	Recommendation
ESS1 requires screening to determine level of environmental and social assessment to be done. An ESIA is prepared before project implementation ESIA is needed once determination had been established and should be prepared identifying all environmental and social impacts and mitigation measures proposed to address the impacts	• The environmental law requires screening of project to determine level of environmental and social assessment to be done • An ESIA is required once determination is done • ESIA is needed once determination had been established and should be prepared identifying all environmental and social impacts and mitigation measures proposed to address the impacts	• Similar both require screening • Similar-both require ESIA depending on the project impacts	Screening has been done and the project is established as medium risk which requires and ESIA ESIA is prepared in line with ESIA regulations and refers to WB safeguard policies
ESS5 Land Acquisition and Involuntary resettlement should be avoided wherever possible or minimized and exploring all alternatives	• Somalia's transitional constitution emphasizes that Land shall be held, used and managed in an equitable, efficient, productive and sustainable manner. The Federal Government shall develop a national land policy, which shall be subject to constant review. That policy shall ensure: (a) Equity in land allocation and the use of its resources; (b) The guarantee of land ownership and registration; (c) That land is utilised without causing harm to the land; (d) That any land and property dispute is resolved promptly and satisfactorily for all; (e) That the amount of land that a person or a company can own is specified; (f) That the land and property market is regulated in a manner that prevents violations of the rights of small land owners; and (g) That the Federal Member States may formulate land policies at their level. No permit may be granted regarding the permanent use of any portion of the land, sea or air of the territory of the Federal Republic of Somalia. The Federal Parliament shall enact a law regulating the size, timeline and conditions of permits of land use. (5) The Federal Government, in consultation with the Federal Member States and other stakeholders, shall regulate land policy, and land control and use measures (Art. 43).	• **Similar-** displacement in projects should be avoided to the extent possible by exploring alternatives.	WB policy is more elaborate than the FRS Laws.
ESS7 on indigenous people seeks to promote the inclusion of these groups in development project and especially through consultation to ensure they also share in the project benefits and ensure negative impacts do not disproportionately fall on them. The policy requires these groups to be consulted separately to enhance their participation	• Article 11 of the Constitution regarding nondiscrimination and equality sets forth that 'All citizens, regardless of sex, religion, social or economic status, political opinion, clan, disability, occupation, birth or dialect shall have equal rights and duties before the law. Discrimination is deemed to occur if the effect of an action impairs or restricts a person's rights, even if the actor did not intend this effect. The State must not discriminate against any person based on age, race, colour, tribe, ethnicity, culture, dialect, gender, birth, disability, religion, political opinion, occupation, or wealth. All State programs, such as laws, or political and administrative actions that are designed to achieve full equality for individuals or groups who are disadvantaged, or who have suffered from discrimination in the past, shall be deemed to be not discriminatory'(Art. 11). It is also stated in Article 27 regarding economic and social rights that 'it shall be ensured the women, the aged, the disabled and minorities who have long suffered discrimination get the necessary support to realize their socio-economic rights'. • No provisions regarding indigenous rights.	• **Similar**-both seek to promote inclusion of these group so that they do can share the projects benefits and ensure that negative impacts of the project do not fall on them disproportionately • WB needs a social assessment to be conducted	WB policy more elaborate and the two are being used to compliment

World Bank ESFs	FRS laws	Comparison	Recommendation
Project affected persons should be meaningfully consulted and be given opportunities to participate in planning and implementing of projects and especially where there is resettlement	• Article 26 regarding the right to property states that every person has the right to own, use, enjoy, sell, and transfer property. The state may compulsorily acquire property only if doing so is in the public interest. Any person whose property has been acquired in the name of the public interest has the right to just compensation from the State as agreed by the parties or decided by a court.	• Both are similar	Consultation has been done and will be progressed in line with the two WB policy and FRS legislations.

3.4. International conventions and agreements ratified by the Federal Republic of Somalia (FRS)

The FRS is a signatory to a number of international treaties, conventions and agreements that include legally binding commitments to protect the environment and to ensure the sustainable management of natural resources. These include:

3.4.1. The United Nations Convention on biological diversity (CBD), 1992

Article 8 – In-situ conservation (d) Promoting protection of ecosystems, natural habitats and maintenance of viable populations of species in natural surroundings (j) Respecting, preserving and maintaining knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application.

Relevance

The project will not adversely affect biological diversity since the site is in an already built-up area. Implementation of the project will help mitigate climate change a key driver of biodiversity loss.

3.4.2. The UN Framework Convention on Climate Change (UNFCCC) (ratified in 2009).

The primary objective of the Convention is to stabilize greenhouse gas concentrations "at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system." Somalia submitted its new climate action plan (Intended Nationally Determined Contribution) to the UNFCCC in 2015. Somalia has also developed the National Adaptation Program of Action on Climate Change (NAPA), which includes a climate risk assessment[14].

Relevance

The project will provide over 50% electricity generation from solar array replacing existing diesel power generation and thereby cutting GHG emissions.

3.4.3. The UN Convention to Combat Desertification (UNCCD) (ratified in 2002).

The Convention combats desertification in those countries that experience serious droughts and/or desertification. Somalia has developed a National Action Programme for the UNCCD[15].

Relevance

The UNCCD emphasizes sustainable land management practices to prevent desertification and promote the restoration of degraded lands. By aligning the proposed solar power plant project with the principles of the UNCCD. The proposed power plant will be established in an area that has undergone anthropogenic modifications of different strengths. By establishing the proposed power plant in the locality, the GECO will be implementing one of the strategies to minimize environmental impacts, such as using previously degraded lands for the installation, incorporating land restoration measures, and maintaining vegetation cover. This approach not only helps to combat desertification but also enhances the project's environmental sustainability, ensuring that it contributes positively to both energy generation and land conservation efforts in vulnerable areas.

3.4.4. Convention on the Conservation of Migratory Species of Wild Animals (ratified 1985).

This Convention aims to protect those species of wild animals that migrate across or outside national boundaries from becoming endangered.

Relevance

Solar power plants, especially large-scale installations, can pose risks to migratory birds and other wildlife through habitat disruption, collisions with infrastructure, and changes to the local environment. To adhere to the principles of the CMS, the proposed solar power plant will adopt a design layout of the solar panels by implementing bird-friendly infrastructure designs, and monitoring wildlife movements. Aligning the project with the CMS support global biodiversity conservation efforts, ensuring that the solar power development is environmentally responsible and sustainable.

[14]The Somalia National Adaptation Programme of Action: https://www.wiomsa.org/download/national-adaptation-programme-of-action-somalianapa/

[15]The Somalia National Action Programme on UNCCD: https://knowledge.unccd.int/sites/default/files/naps/2018-06/NAP%20Full%20Report%20-%20Final%2023%20May%20digital.pdf

3.4.5. Protocol concerning Regional cooperation in Combating Pollution by Oil and other Harmful Substances in Cases of Emergency (ratified 1988).

Combats pollution by oil and other harmful substances by enhancing measures for responding to pollution emergencies on a national and regional basis.

Relevance

Although the proposed solar power plant will primarily generate clean energy, its construction and operation can still involve activities that carry pollution risks, such as the use of machinery, transportation of hazardous substances, and the potential for spills during maintenance or installation processes. This protocol emphasizes regional cooperation and preparedness to address pollution emergencies, ensuring that any accidental releases of harmful substances are swiftly and effectively managed. The proponent will align with the protocol by developing contingency plans and EPRP for effective emergency responses, and implement best practices to minimize environmental risks. This not only helps protect against pollution but will also strengthen the project's commitment to environmental stewardship and regional cooperation.

3.4.6. Sustainable Development Goals (SDGs) and Agenda 2063 in Africa

Key targets of the SDG 7 – Ensure access to affordable, reliable, sustainable and modern energy for all – are by 2030; ensure universal access to affordable, reliable and modern energy services

Relevance

Implementation of the project will contribute increased Renewable energy generation capacity in Somalia. This is one barrier to increasing affordable access to electricity. However, the project, in itself, will not automatically increase access to electricity for households as this also depends on the tariffs, distribution networks, and regulatory frameworks that are beyond the scope of the project itself. It is hoped that the project will generate interest in and incentivize complementary investment and intervention in the energy sector by the government, development partners, and private sector in Galmudug State to expand access to electricity in the city. It is also hoped that it will provide a model for solar power plants in other locations within Somalia.

3.4.7. International Labour Organization Agreements

Somalia is also a signatory to the International Labour Organization (ILO) Conventions that include legally binding commitments relevant to labour and employment conditions and the social aspects of the project. These include commitments to equal opportunities for women in employment, ending violence and harassment in the workplace, workplace health and safety, and ending child and forced labour, among other areas. Some of the relevant provisions of the ILO that the Country has ratified include:

- Discrimination (Employment and Occupation) Convention (No. 111) (ratified in 1961).
- Forced Labour Convention (No.29) (ratified in 1960).
- Freedom of Association and Protection of the Right of Organize Convention (No. 87) and Right to Organize and Collective Bargaining Convention (No.98) (ratified in 2014).
- Abolition of Forced Labour Conventions (No. 105) (ratified in 2014).
- Worst Forms of Child Labour Convention (No. 182) (ratified in 2014).
- Violence and Harassment Convention (No 190) (ratified in 2021).
- The Tripartite Consultation (International Labour Standards) Convention (No. 144) (ratified in 2021).
- The Occupational Safety and Health Convention (No. 155) and Promotional Framework for Occupational Safety and Health Convention (No. 187) (ratified in 2021).
- Private Employment Agencies Convention (No. 181) (ratified in 2021).
- The Migration for Employment Convention (Revised) (No. 97) and Migrant Workers (Supplementary Provisions) Convention (No. 143) (ratified in 2021).

Relevance

Project implementation will adhere to the principles of the ILO conventions ratified by Somalia. These include that:

- *Contractors will be obliged to have policies and procedures in place to ensure equal opportunities for and treatment of employees regardless of race, colour, gender/sex, religion, political opinion, or social opinion.*
- *Employment practices are non-discriminatory, and to take active measures to prevent and violence, harassment and discrimination in the workplace;*
- *The construction staff will be obliged to adhere to workplace health and safety standards.*
- *Contractors and suppliers will be contractually obligated to comply with the required local and international practices, to have a human rights policy, and to have employment processes that provide the standard terms of employment for casual and temporary workers.*

4.0. Analysis of Alternatives

4.1. Overview

In this chapter, various alternatives available to the project are discussed. The alternatives are as follows; "no-go/do nothing" alternative, alternative construction materials and technology, the alternative sites and alternative sources of energy identified during the ESIA process. The identification and examination of alternatives is fundamental to environmental assessment. It provides decision-makers with information that enables them to properly consider optimal solutions to development proposals. Alternatives illustrate and contrast the environmental implications and consequences of different options available to achieve the same end.

4.2. Relocation Option

The site for the proposed project was selected based on several factors, including:

- Geophysical Factors – An open area with maximal solar irradiance, a location not prone to soil erosion and flooding, and an area with good drainage, etc.
- Land identified is free from any dispute on ownership or any other encumbrances
- No squatters, encroachers or other claims to the land.

Relocation option to a different site is an option available before the project implementation. However, at present GECO does not have alternative sites. Looking for alternative land to accommodate the scale and size of the proposed project and completing transaction may take a long time with no guarantee that the land would be available. The proposed project is meant to improve electrification and accessibility to already established customers/consumers in the southern sector Gaalkacyo City, and the surrounding areas. Several alternatives to supply reliable electricity were considered but the proposed project was selected because it met the electrification needs of the southern sector of the City and surrounding areas. In consideration of the above concerns and assessment, relocation of the proposed project to a different area is NOT a viable option.

4.3. Zero or No Project Alternative

The No Project option in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. This option will, however, involve several losses both to GECO and to the increasing customers in the southern sector of Gaalkacyo City and the surrounding areas. The target majority of the consumers will lack a clean and reliable electricity supply, and the FGS objectives of bringing a reliable, clean and affordable electricity in order to spur economic growth, opportunities for investment and better public services may not be realized. The No Project Option is the least preferred from the socio-economic and environmental perspective due to the following factors:

- Electricity generation relying more on diesel generators with the accompanying GHG emissions will continue;
- The socio-economic status of target communities the local economy would remain unchanged due to lack of affordable, clean and reliable electricity supply;
- Generation of employment opportunities through expansion of business activities that would have been spurred by availability of affordable and reliable electric power will not occur;
- Opening up the area for investors will not occur as anticipated;
- Community health benefits that come with electricity will not be realized;
- The targeted consumers will forgo the desired electricity supply in the area;
- The Galmudug State and FRS in general will be impeded in achieving the objectives of the PMP in meeting the energy requirements.
- The objectives of the FGS's efforts towards achieving NDP-9 will not be realized.

From the analysis above, it becomes apparent that the "no project" alternative would mean the local people and the FGS, would not experience the benefits outlined above and other indirect benefits that would accrue from construction of the proposed project.

Conclusion

It is thereby concluded that the 'do-nothing' option is not a good option economically and should therefore be discouraged and rejected. It is therefore imperative for GECO to establish a new Hybrid Power Plant at the proposed site and supply clean and affordable electricity to Gaalkacyo City and surrounding area.

4.4. Alternative Sources of Energy

4.4.1. Thermal Power Generation

Improving and expanding the current thermal power through installation of more diesel gensets is an option, which can be considered to provide power to the southern sector of Gaalkacyo City and surrounding areas. However, this would imply more diesel would be needed, approximately over 1000 litres of Industrial Diesel Oil (IDO) is burnt daily to generate targeted electricity demand. Thermal generation can also be fueled using alternative fuels such as natural gas, bio diesel, industrial kerosene, heavy vehicle fuel, coal and unleaded petrol. Thermal power generation has serious negative environmental impacts including an increase GHG emission. This approach will go against the FRS goals towards meeting the Paris Agreement targets.

4.4.2. Hydroelectric power

Hydroelectric power offers a renewable alternative for electricity generation in Gaalkacyo, Somalia, but its feasibility in this arid region is highly limited. Hydropower relies on consistent water flow, typically from rivers or dams, which are scarce in Gaalkacyo's dry climate. The environmental impacts of constructing such facilities in an arid area could include altering natural watercourses, affecting local ecosystems, and potentially displacing communities. Furthermore, water scarcity, a significant challenge in Somalia, makes it difficult to maintain reservoirs needed for consistent electricity generation. While hydropower is a clean energy source with low emissions, the geographic and climatic conditions of Gaalkacyo make it an impractical choice compared to alternatives like solar energy, which is more suitable for the region’s abundant sunlight.

4.4.3. Wind energy

Wind electricity generation could be a viable alternative energy source for Gaalkacyo, Somalia, due to the region's potential for harnessing wind power. Wind turbines can generate clean, renewable energy with minimal greenhouse gas emissions, offering an environmentally friendly solution. However, the environmental impacts include potential disruption to local wildlife, such as bird and bat collisions, and noise pollution. The feasibility of wind power depends on consistent wind speeds, which would require thorough assessment in Gaalkacyo. If suitable wind conditions exist, wind energy could provide a sustainable energy solution with low operational costs once installed, complementing the region's solar potential. However, initial infrastructure costs and the need for maintenance in a remote and arid area may pose logistical challenges.

4.5. Analysis of alternative construction materials and technology

The proposed Hybrid Power Plant will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security and environmental aesthetic requirements. Because of its durability and strength, steel is the best choice and all support structures will be steel for the solar panels. Perimeter fence to the proposed solar power plant will be a good undertaking. The perimeter fence can be reinforced with wire mesh fixed to support structures that can be wooden, concrete or steel. Alternatively, a stone perimeter wall can be constructed and this is the option of choice since it is more durable, offer better protection and requires less maintenance. The process material that are input for the proposed project such as generator diesel fuel and oil and water for cooling the generator and for cleaning purposes are critical elements.

4.6. Solid waste management alternatives

Many solid wastes of different categories will be generated from the proposed project. An integrated solid waste management system is recommendable. First, GECO will give priority to reduction at source of the materials. This option will demand a solid waste management awareness program in the management and the staff. Recycling and reuse options of the waste will be the second alternative in priority. This will call for a source separation program to be put in place. The third priority in the hierarchy of options is combustion of the waste that is not recyclable. Finally, the GECO will need to establish partnership with waste handlers, especially in the southern sector of Gaalkacyo City for regular waste removal and disposal in an environmentally friendly manner. This is the most practical and feasible option for solid waste management.

4.7. Selected alternatives

The analysis of alternatives compared the existing power plant location, which lacks adequate space for the new hybrid power infrastructure; the proposed site, which is adjacent to the current power plant, has adequate space for expansion. While maintaining the current location would leverage existing infrastructure and minimize relocation costs, space constraints could limit future growth and operational efficiency. On the other hand, the new site adjacent to the current power plant provided ample room for investment, allowing for optimized layout and future scalability, though it would involve additional

costs in terms of infrastructure development. Careful consideration of long-term benefits, costs, and operational efficiency are crucial in determining the best option for sustainable power generation. A hybrid energy system was chosen consisting of solar PV, BESS and gensets to ensure reliable and stable energy supply. Solar power is intermittent and depends on sunlight availability, while the Battery Energy Storage System (BESS) and gensets allow adequate energy storage and supply.

Conclusion

A hybrid power plant located adjacent to the existing GECO power plant was selected for consideration. It is therefore imperative for GECO to establish a new Hybrid Power Plant at the proposed site and supply clean and affordable electricity to Gaalkacyo City and surrounding areas.

5.0. Environmental and Social Baseline

This section outlines the existing biophysical and socioeconomic background of the proposed project region, which serves as the foundation for identifying and evaluating the project's possible environmental and social implications. It includes both project-specific information regarding the project's area of influence and regional baseline data to help put the project in context.

5.1. Location

The proposed solar power plant (6^{O}43'54.3''N, 47^{O}26'10.8''E) shall be located in the outskirts of Gaalkacyo City, Galmudug State. The project site is in an open area with sparse settlements in the immediate vicinity with 12.5 acres piece of land acquired by GECO for the proposed project. Only a few temporary settlements are found near the proposed project site.

Plate 2. View of the surroundings of the proposed project site

5.2. Environmental Setting

5.2.1. Climatic information

5.2.1.1. Rainfall

The climate in the Galmudug state is tropical arid to dry and sub-humid, and is influenced by the north-easterly and south-easterly airflows of the Intertropical Convergence Zone (ITCZ) over the Ethiopian highlands[16]. Northeasterly and south-easterly air masses meet in the Intertropical Front (ITF) and raise air upwards to produce rain. The annual movements of the ITCZ from north to south across Africa and back again, give rise to four different seasons in the State like rest of Somalia, comprising two distinguishable rainy seasons alternating with two marked dry seasons[17], as follows:

- Gu: March to June (MAMJ), the main rainy season, like for all over Somalia
- Xagaa: July to September, littoral showers, but dry and cool in the hinterland
- Deyr: September to December (SOND), second rainy season, like for all over Somalia
- Jilaal: January to March, longer dry season, like for all over Somalia

Rainfall in the region is erratic, with a bimodal pattern except in the southern riverine areas close to the coast where some showers may occur even during the Xagaa. Peak rainfall months are centred on Gu season, March to June (MAMJ) and Deyr Season, September to December (SOND). Rainfall amounts and intensity in Galmudug is generally 200mm – 300mm annually. However, some parts of Ceel D Heer receive between 300mm - 400mm of rainfall annually. Intense, short rainstorms

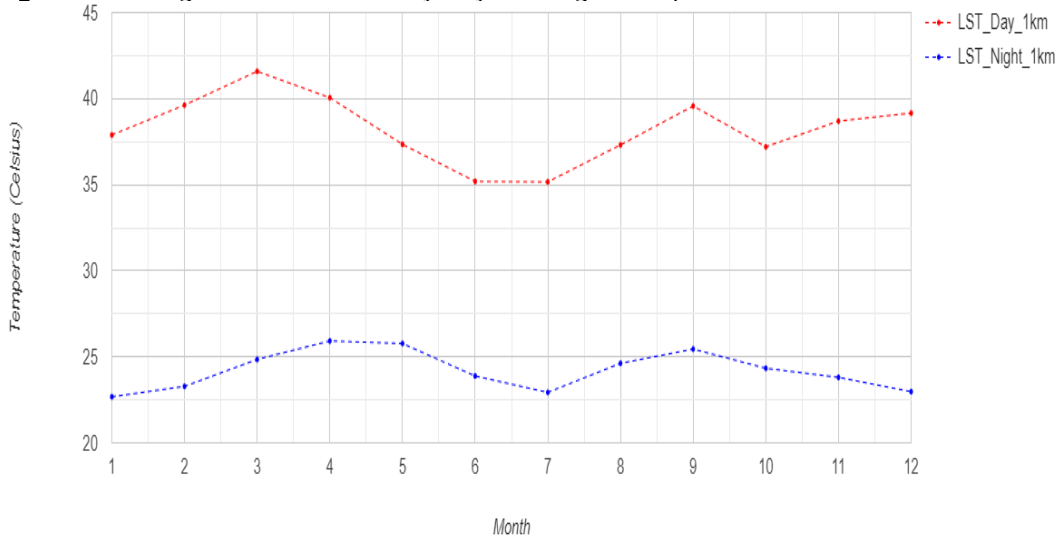
[16] Oduori, S., Vargas, R. & Alim, M. 2007. Land Use Characterization of a Selected Study Area in Somaliland.FAO-SWALIM. Project Report No. L-04. Nairobi, Kenya
[17] FAO-SWALIM (2010). Somalia Water and Land Information Management (2010). Atlas of the Juba and Shabelle Rivers in Somalia. Nairobi: FAO-SWALIM. Available from http://www.faoswalim.org/subsites/River_Atlas_Files/River_Atlas_Documents/index.html

characterize rainfall. The region has a high inter-annual rainfall variation and is subject to recurrent drought of different severity every 4-5 years. Like much of Somalia, precipitation in the Galmudug State will likely increase in the long run (until 2070), with a stronger and more continuous increase under RCP6.0 than under RCP2.6 (Figure 5-2b).

5.2.1.2. Temperature

The climatic conditions of Gaalkacyo, Galmudug State in Somalia are influenced by its geographic location and topography, resulting in a semi-arid to arid climate. Gaalkacyo experiences high temperatures throughout much of the year. The hottest months are typically from May to September, with temperatures often exceeding 35°C during the day[18]. Cooler temperatures are observed from December to February, but even then, daytime temperatures can still be warm. Because of increasing greenhouse gas (GHG) concentrations, air temperature over much of Somalia, including Galmudug State is very likely to rise by 1.4 to 3.4°C by 2070 relative to the year 1876, depending on the future GHG emissions scenario[19]

Figure 5-1: Long term Mean Monthly Day and Night Temperature for GECO Site

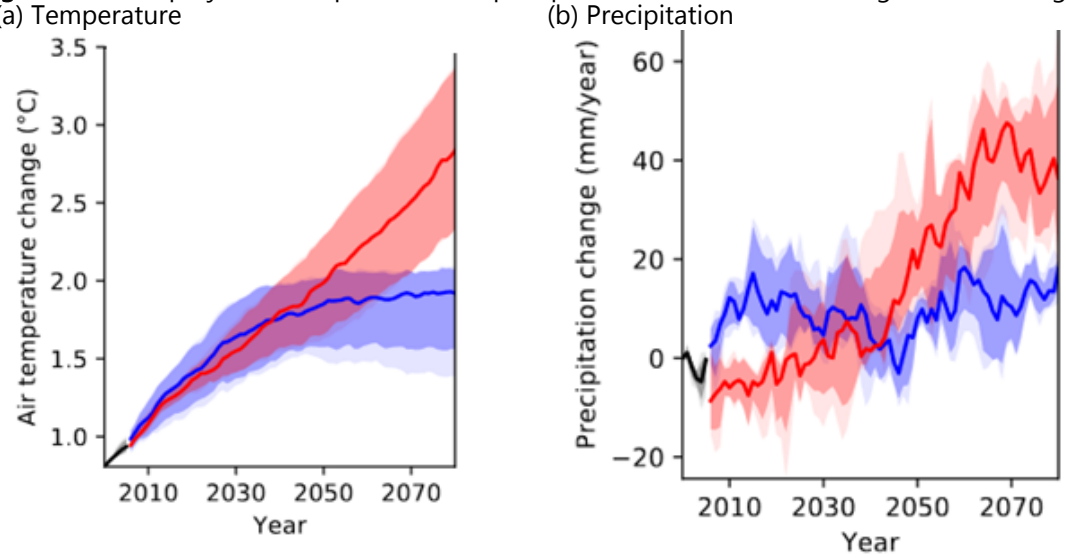


Source: MODIS, based on the past 22 years data (2000-2022)

[18] International Institute of Tropical Agriculture, "Agroecological Zones," 2024. [Online]. Available: https://csi.maps.arcgis.com/apps/MapSeries/index.html?appid=7539d22ab46147ce9888589aea4b1a11. [Accessed May, 30 2024].
[19] Chen, D., M. Rojas, B. H. Samset, K. Cobb, A. Diongue Niang, P. Edwards, S. Emori, S. H. Faria, E. Hawkins, P. Hope, P. Huybrechts, M. Meinshausen, S. K. Mustafa, G. K. Plattner, A. M. Tréguier, "Framing, Context, and Methods. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.," IPCC, 2021

Figure 5-2: The projected temperature and precipitation in Somalia, including the Galmudug State

(a) Temperature (b) Precipitation



Source: https://weatheringrisk.org/sites/default/files/document/220214_SomaliaClimateRiskProfile-05.pdf

5.2.1.3. Air Quality

There are no published ambient air quality data for the municipality of Gaalkacyo.

5.2.1.4. Topography and features

The topography of the Gaalkacyo area of Galmudug State in Somalia is diverse and varied, consisting of plains, plateaus, hills, and low mountains[20]. Large expanses of flat or gently rolling plains characterize much of the area. These plains are often arid or semi-arid, supporting sparse vegetation such as thorny shrubs and grasslands. Plains are important for pastoralism and some limited agricultural activities where water sources are available. Scattered hills and low mountains occur, particularly in the northern and eastern parts of the Gaalkacyo area. These hills and mountains are often rocky and rugged, influencing local weather patterns and providing habitats for wildlife. Although water sources are generally scarce, there are some river valleys in Galmudug State, which provide vital water resources and support vegetation along their banks. In some parts of Galmudug State, particularly towards the south and west, the landscape transitions into more desert-like conditions with sand dunes and sparse vegetation.

5.2.1.5. Geology and soils

The geology and soils of the Gaalkacyo area of Galmudug State in Somalia are influenced by its location within the East African Rift System and its semi-arid to arid climate. The area lies within the broader East African Rift, which is a tectonic plate boundary characterized by volcanic activity, faulting, and rift valleys[21]. This geological setting has influenced the area's landscape and the types of rocks found there. The soils in Gaalkacyo area are generally sandy, sandy-loam, or loamy in texture, reflecting the arid to semi-arid climate. These soils are often low in organic matter and nutrients, making agricultural productivity challenging without proper management and irrigation. Along river valleys and floodplains, there are alluvial soils that are more fertile and suitable for agriculture, and are periodically replenished by sediment deposits during floods. The Gaalkacyo area and the entire Galmudug State is believed to have potential mineral resources such as gypsum, limestone, and possibly oil and gas deposits. However, exploration and extraction activities have been limited due to the challenging security situation and infrastructure constraints.

[20]Central Intelligence Unit (CIA), "Somalia," CIA World Factbook, 2024. [Online]. Available: https://www.cia.gov/the-world-factbook/countries/somalia/. [Accessed May 5, 2024].
[21] https://www.faoswalim.org/resources/Land/Geology_Mineral_Resources_Somalia/Geology.pdf

Plate 3. View of the characteristic soil types at the proposed site

5.2.1.6. Water resources and hydrology

Gaalkacyo relies heavily on groundwater sources due to limited surface water availability. The area has significant groundwater potential, with aquifers varying in depth and quality[22]. Deep aquifers can provide relatively stable water resources, but accessing them often requires drilling boreholes. Many communities rely on shallow wells for their water needs that are in many occasions susceptible to fluctuations in water levels and quality, especially during dry seasons. Several seasonal rivers and streams flow in Gaalkacyo area during the rainy seasons (Gu and Deyr). These seasonal rivers form tributaries of the Shebelle River, and provide water for irrigation and domestic use when flowing[23]. Rainwater harvesting is practiced with traditional methods such as surface water catchments and small reservoirs, which are used to capture and store rainwater for domestic and agricultural purposes. Overall, water scarcity is a pervasive issue in Gaalkacyo, and this is exacerbated by erratic rainfall patterns and prolonged droughts. Water quality is often poor due to contamination from human and livestock activities, as well as limited sanitation infrastructure. Local communities often rely on traditional water management practices and community-led initiatives to conserve water resources, and various international organizations and NGOs support water infrastructure projects, including drilling boreholes, rehabilitating wells, and promoting sustainable water management practices in Gaalkacyo area.

5.2.2. Biophysical environment

5.2.2.1. Flora and fauna

The southern outskirts of Gaalkacyo City, Somalia, is characterized by sparse vegetation adapted to the region's semi-arid climate. Dominant plant species include hardy shrubs such as Acacia and Commiphora, which are well suited to the dry environment with deep roots to access groundwater and small leaves to minimize water loss. These shrubs provide essential cover and forage for local wildlife. Grasses, such as *Cenchrus ciliaris* (buffel grass), are also common, particularly after seasonal rains, creating patches of grazing land for herbivores like gazelles. Other notable flora includes drought-resistant plants like Aloe and Euphorbia, which have adapted to store water in their thick,

[22]Federal Republic of Somalia, "National Adaptation Programme of Action on Climate Change (NAPA)," Federal Republic of Somalia, 2013.
[23] [2] Somalia Water and Land Information Management, "The Juba and Shabelle rivers and their importance to Somalia," Food and Agriculture Organization (FAO), 2024. [Online]. Available: https://www.faoswalim.org/article/juba-and-shabelle-rivers-and-their-importance-somalia. [Accessed 23 May 2024].

fleshy leaves. These succulent species are often found in rocky areas and can survive long dry spells. The vegetation in this region plays a crucial role in preventing soil erosion and supporting the local ecosystem, though overgrazing and human activity can threaten the delicate balance of this semi-arid landscape. Despite its sparse appearance, the flora in Gaalkacyo's outskirts provides essential ecological functions, supporting both wildlife and livestock.

Varieties of wild fauna adapted to the region's semi-arid climate are found in the southern outskirts of Gaalkacyo City. Notable mammals include the Dorcas gazelle (*Gazella dorcas*), striped hyena (*Hyaena hyaena*), and golden jackal (*Canis aureus*), all of which are highly resilient to dry conditions and scarce vegetation. These species thrive in the open plains and scrublands, surviving on a diet of sparse grasses, small animals, and carrion. The area also supports a range of bird species, including the Somali ostrich (*Struthio molybdophanes*), various bustards (Otis spp.); and hornbills, which are commonly found in dry, open environments. Reptiles are well represented in the region, with species such as the desert monitor (*Varanus griseus*) and spiny-tailed lizard (*Uromastyx spp.*) well adapted to the harsh desert climate. Venomous snakes, including the horned viper (*Cerastes cerastes*) and saw-scaled viper (*Echis spp.*) are also common in these arid habitats. Additionally, a variety of invertebrates, such as scorpions and desert beetles, thrive in this environment. Overall, the fauna in the southern outskirts of Gaalkacyo has evolved to withstand the challenges of a semi-arid landscape, relying on limited water sources and sparse vegetation for survival.

5.2.2.2. Vulnerability to climate change

Gaalkacyo and the surrounding areas is highly susceptible to climate change due to its semi-arid climate, fragile ecosystems, and socio-economic challenges. Extreme weather events like droughts, erratic rainfall, and floods pose significant threats to water availability, agriculture, and livestock, crucial for pastoralist communities. Droughts are increasing, leading to water scarcity, crop failure, and depletion of grazing land, causing food insecurity and population displacement. The region's limited infrastructure and weak governance exacerbate its vulnerability, with poor access to climate-resilient resources and increasing desertification. Climate change also increases conflict risks over dwindling resources, contributing to social instability. The CORDEX Africa multi-model median projections indicate that the number of extreme heat days in which maximum daytime temperatures exceed 400C is likely to increase in South Central Somalia including Galmudug state. Each year, by the 2030s, the region could experience between 4 and 30 days of temperatures exceeding this threshold, predominantly during February-April[24,25].

5.2.2.3. Waste management

Waste management in Gaalkacyo City, Somalia, is characterized by informal and underdeveloped systems, reflecting broader challenges in infrastructure and governance. The city lacks a comprehensive and organized waste collection and disposal service, with most solid waste being managed at the household or community level. Informal waste collectors play a key role, though they operate without regulation or proper facilities. Much of the waste, including plastic, organic matter, and hazardous materials, is disposed of in open dumpsites or burned, contributing to environmental degradation and public health risks. Recycling efforts are minimal, and there is little public awareness or institutional support for sustainable waste management practices. Additionally, the lack of designated landfill sites and proper waste treatment facilities further exacerbates the issue, and potentially leading to the contamination of soil and water resources, and increasing the city's vulnerability to diseases and pollution. Addressing these challenges requires improved infrastructure, policy enforcement, and community engagement.

5.2.2.4. Water scarcity and flood risk

The southern outskirts of Gaalkacyo City, Somalia, face a dual challenge of water scarcity and flood risks, both exacerbated by the region's semi-arid climate and irregular rainfall patterns. Prolonged droughts are common, leading to depleted groundwater resources, reduced access to safe drinking water, and the drying up of seasonal rivers and water catchments. This water scarcity severely affects agriculture, livestock, and the livelihoods of local communities. However, when rains do occur, they are often intense and erratic, causing flash floods that the area's limited drainage infrastructure cannot handle. These floods damage roads, homes, and farmland, while also contaminating water supplies and increasing the spread of waterborne diseases. The combination of droughts and flash floods creates a precarious water

[24]Gutiérrez, J.M., Jones, R.G., Narisma, G.T., Alves, L.M., Amjad, M., Gorodetskaya, I.V, Grose, M., Klutse, N.A.B., Krakovska, S., Li, J., Martínez-Castro, D., Mearns, L.O., Mernild, S.H., Ngo-Duc, T., van den Hurk, B., & Yoon, J.H. (2021). 'Interactive Atlas', in Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, eds. V. Masson-Delmotte, P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, et al. (Cambridge University Press). http://interactive-atlas.ipcc.ch/.

[25]World Bank. (2024). Health and Climate Change. https://www.worldbank.org/en/topic/health/brief/health-and-climate-change

management situation, highlighting the need for resilient infrastructure, improved water harvesting techniques, and flood preparedness strategies to mitigate these risks.

5.2.2.5. Agricultural land soil contamination

Agricultural land contamination in the southern outskirts of Gaalkacyo City, Somalia, is a growing concern due to a combination of factors including improper waste disposal, use of chemical fertilizers, and industrial activities related to infrastructure development. The area, traditionally reliant on pastoralism and small-scale farming, faces the threat of soil degradation, which affects crop yields and food security. Contamination from construction projects, particularly dust and potential chemical spills, can affect soil health and water sources. While large-scale studies are limited, anecdotal evidence from local farmers indicates a gradual decline in soil fertility, prompting calls for better environmental management and monitoring.

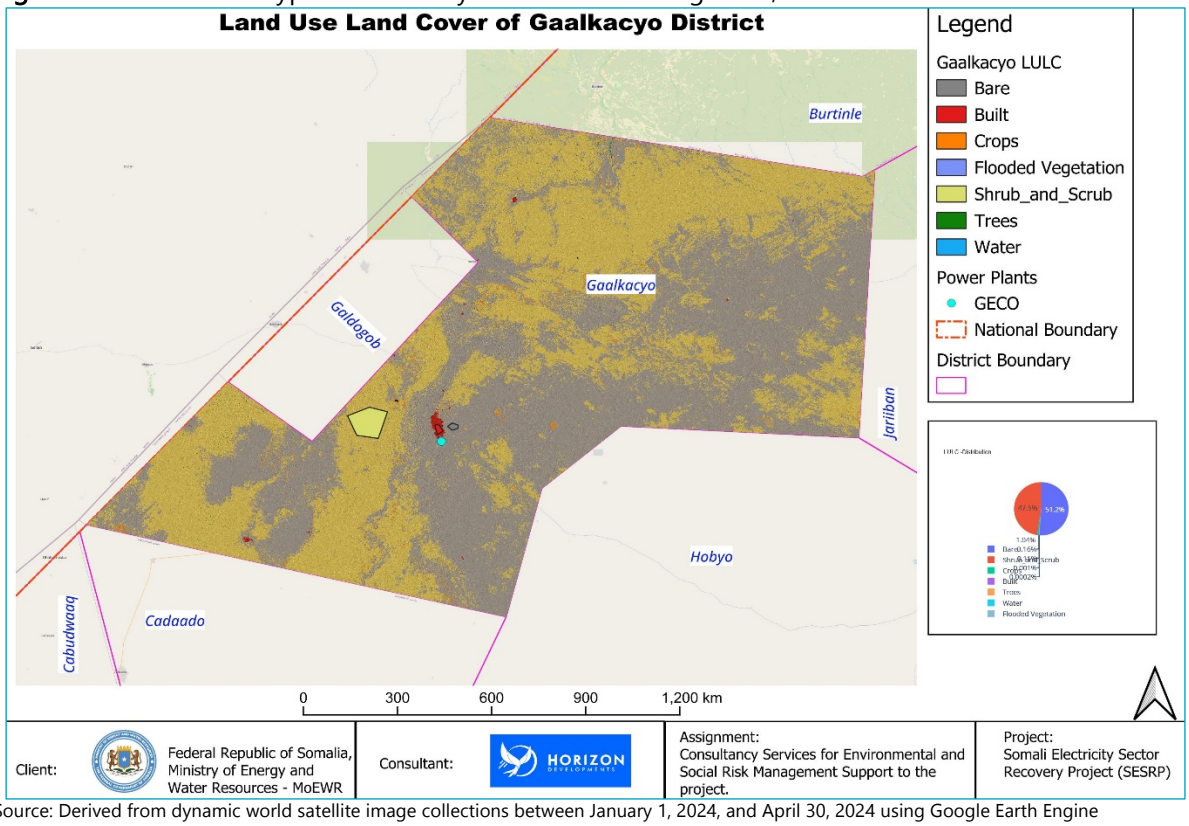
5.2.2.6. Land use and land cover characterization

Land use and land cover in the Gaalkacyo area of Galmudug State of Somalia are influenced by factors such as climate, geography, and human activities. The land use/land cover of Gaalkacyo derived from dynamic world satellite image collections between January 1, 2024, and April 30, 2024, shows that Over 50% of the land cover consists of bare land. Shrub and scrubland make up 47%, while other land cover types including cropland, water bodies, built-up area, and flooded vegetation collectively accounts for less than 2% (Figure 5-3).

The dominant land use in Gaalkacyo area like much of Galmudug State is pastoralism, where nomadic or semi-nomadic communities rely on livestock (such as camels, cattle, goats, and sheep) for their livelihoods. Grazing lands are essential for these communities, and they often move seasonally in search of water and pasture. Agriculture is practiced in some areas where water is available, primarily along river valleys and floodplains[26]. Crops such as sorghum, maize, and vegetables are grown, though productivity is often limited by water scarcity and soil fertility. Gaalkacyo as an urban area has more concentrated infrastructure and population compared to the rural areas. Many rural communities are dispersed across the landscape, often organized around traditional clan structures. Settlement patterns are influenced by access to water sources and grazing lands.

[26] UNOCHA, "Humanitarian Needs Overview of Somalia,". Available: https://reliefweb.int/sites/reliefweb.int/files/resources/20200903_HNO_Somalia.pdf. [Accessed 22 May 2024].

Figure 5-3: Land cover types in Gaalkacyo area of Galmudug State, Somalia



Source: Derived from dynamic world satellite image collections between January 1, 2024, and April 30, 2024 using Google Earth Engine

5.2.2.7. Protected areas and sensitive habitats

While no formal conservation areas exist in the immediate vicinity, the region includes semi-arid ecosystems that are critical for biodiversity, providing habitats for native plant and animal species. Degradation of these habitats, primarily due to deforestation, overgrazing, and construction activities, has led to a loss of vegetation cover and threatens the ecological balance.

5.2.2.8. Environmental management challenges

Like all other regions in Somalia, the Gaalkacyo area of Galmudug State experiences environmental management challenges. Soil erosion is a significant issue in Gaalkacyo, exacerbated by deforestation, unsustainable land use practices, and periodic droughts. Overgrazing and poor land management contribute to land degradation, reducing soil fertility and agricultural productivity. There are no functional solid and liquid waste management systems in the Gaalkacyo, and waste dumping, especially along the roads and on the outskirts of settlements, is a common feature. However, there are greater prospects going into the future as the FGS and Galmudug State governments are working towards better environmental governance through the enactment of environmental legislation and regulations and enforcement mechanisms.

5.3. SOCIO-ECONOMIC SETTING

5.3.1. Overview

Galmudug State like all other regions in Somalia that face socioeconomic challenges. Galmudug State has a pastoral economy, with livestock and agriculture being key sources of income. However, infrastructure development is limited, and political instability and security concerns hinder growth. Despite these challenges, efforts are underway to rebuild and develop these areas.

5.3.2. Population

Galmudug State, with an estimated population of 2.5 million people[27]. The southern sector of Gaalkacyo City within Galmudug State is a dynamic and diverse area with a rapidly growing population due to urbanization and migration from rural areas. The population is predominantly composed of ethnic Somali clans, with a mix of pastoralists, small-scale farmers, traders, and laborers. This part of the city has seen a rise in informal settlements, largely driven by displaced persons seeking refuge from conflict

[27]file:///C:/Users/pc/Downloads/Galmudug%20State%20Development%20Plan%20(GSDP-3)%20-%202023-2025.pdf

and climate-related challenges. The demographic profile is youthful, with a high proportion of individuals under the age of 30, and there are increasing demands for services such as education, healthcare, and employment. Social structures are clan-based, influencing local governance and community organization. Like in the rest of Galmudug State, the households in Gaalkacyo City are predominantly male headed at 58 per cent with 42 per cent of the households being female headed with average size of households being six (6) people[28].

5.3.3. Women and Human Rights

Inequality and human rights issues persist in Somali society, with women, minority groups, and caste groups excluded from politics and the economy. Despite progress in women's political representation, socioeconomic barriers still hinder their participation in the economic sector. Gender-based violence remains a significant concern, with high levels of domestic violence and rape. Women and children are particularly vulnerable to climate change consequences, and Somalia is a source, transit, and destination country for human trafficking. Women in Galmudug State face numerous challenges, including domestic violence, vulnerability to shocks, insecurity, and limited access to education and skills.

5.3.4. Administration and Ethnic Groups

The southern sector of Gaalkacyo City is characterized by a complex administrative structure influenced by local clan dynamics and historical governance challenges. The area falls under the jurisdiction of the Mudug region of Galmudug State, and is overseen by local authorities that often operate in collaboration with clan leaders to maintain order and address community needs[29]. Overall, today, Galmudug's clan structures shape the social and political systems of the state. These systems are based on power-sharing between eleven clans: the ten clans of Salebaan, Sacad, Cayr, Duduble, Mareexaan, Mursade, Dir, Suruur, Wacaysle, Sheekhaal plus several smaller clans, such as the Madhibaan, Tumaal, and Haskul that together are considered as one group. This eleven-clan arrangement is a bit controversial and some argue that it only serves the interest of a few powerful clans. However, this clan-based system shapes political representation, resource allocation, and conflict resolution, often leading to a blend of traditional and formal administrative practices. The interaction between these clans contributes to the region's vibrant cultural identity, while also presenting challenges in terms of unity and stability.

5.3.5. Economy and Poverty

5.3.5.1. Local Economy

The local economy of the southern sector of Gaalkacyo City is diverse and primarily driven by agriculture, trade, and livestock. Many residents engage in subsistence farming and pastoralism, relying on the cultivation of crops like sorghum and maize, as well as the rearing of livestock, which are vital for both food security and income. The area also serves as a commercial hub, with markets bustling with goods ranging from local produce to imported items, fostering trade among communities. However, economic activities are often hampered by challenges such as inadequate infrastructure, limited access to financial services, and the impacts of conflict and climate change. Despite these hurdles, the resilience of the local population is evident as they adapt to changing conditions and seek opportunities for growth and development.

5.3.5.2. Poverty and Social Services

Poverty is a pervasive challenge in the southern sector of Gaalkacyo City, where many residents live below the poverty line and struggle to access essential services. High unemployment rates and reliance on informal economic activities exacerbate the situation, leaving families vulnerable to food insecurity and economic shocks. Social services in the area are limited, with healthcare facilities often understaffed and lacking necessary medical supplies, resulting in inadequate health care for the community. Educational institutions face similar challenges, with overcrowded classrooms and a shortage of qualified teachers hindering the quality of education. Although local and international organizations work to aid and improve conditions, the overall effectiveness of social services remains hampered by ongoing instability and insufficient investment, highlighting the urgent need for comprehensive development efforts to uplift the community.

5.3.5.3. Productive sector (agriculture, livestock, commerce and trade)

Galmudug State faces challenges in its productive sectors, including agriculture, livestock, and extractive industries. Livestock marketing is primarily driven by private enterprises, and public-private partnerships

[28] Somalia National Bureau of Statistics (Formerly Directorate of National Statistics, Federal Government of Somalia), Somali Health and Demographic survey - Galmudug Report 2021.
[29] Safeworld. (June 2020). Clans, consensus and contention: Federalism and inclusion in Galmudug. Accessed, https://www.saferworld-global.org/resources/publications/1257-clans-consensus-and-contention-inclusion-and-federalism-in-galmudug.

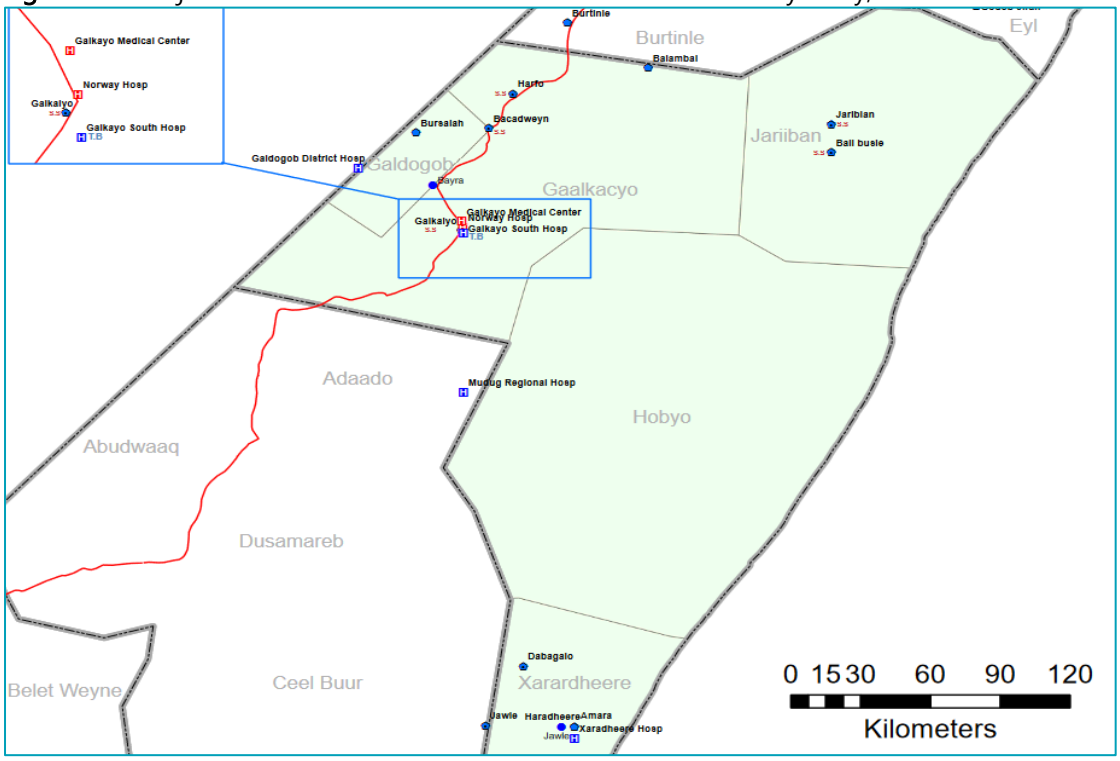
are crucial for effective development. The government should prioritize private sector development, leverage private sector finance, and explore Islamic financing opportunities for economic expansion. The agricultural sector faces significant challenges, particularly due to its heavy reliance on imports for essential food commodities like sorghum and maize. This vulnerability makes the rural population vulnerable to market disruptions and conflicts. To address this, investments in infrastructure, modern farming practices, and access to quality inputs are needed. Strengthening resilience, promoting inter-state cooperation, and addressing conflict causes are essential components for food security and stability in Galmudug State.

5.3.4.4. Health sector

The health sector in Galmudug State is in a recovery and rehabilitation phase, with limited public health service delivery and a large private sector delivering an estimated 60% of health services. Humanitarian health services are provided by numerous NGOs with funding from various sources. The revised Essential Package of Health Services (EPHS) focuses on six key areas, including access to care, reproductive, maternal and new-born health, and non-communicable diseases. Childhood malnutrition remains a challenge, and immunization coverage is very low, indicating the need for urgent steps to expand immunization services. The limited fiscal space of the government budget is a challenge, and the FMoH has proposed a stepwise rollout of the EPHS in Somalia. Urbanization is happening at a rapid pace, and private providers have responded to the demand by establishing service delivery outlets.

Several hospitals and health facilities exist in the southern sector of Gaalkacyo City – the proposed project location. Some of the major health facilities include Gaalkacyo Hospital, Norway Hospital and Gaalkacyo South Hospital (Figure 5-4).

Figure 5-4: Major health facilities in the southern sector of Gaalkacyo City, Somalia



5.3.4.5. Transport sector

Galmudug State's transportation infrastructure is facing several challenges, including poor road conditions, lack of maintenance and restoration, shortage of qualified personnel, inadequate aviation equipment, absence of legislation and policy frameworks, insufficient capacity of line ministries, privately owned airports, a unified system for transport-linked registration, and inadequate investment. The paved roads in the state make transportation difficult and time-consuming, while the absence of legislation and policy frameworks hinders the development of infrastructure. The absence of a unified system for transport-linked registration and the presence of privately owned airports in some districts further exacerbate the situation.

5.3.4.6. Housing sector

Access to adequate housing is a growing challenge in Gaalkacyo City, and in the entire Galmudug State, where many urban dwellers, including IDPs, women-headed households, refugee returnees, persons with disabilities, and youth, live in precarious conditions. The region shares Somalia's public and private housing stock, which has been largely destroyed after over three decades of conflict. Adequate housing is not affordable, especially for IDPs and the urban poor, and they often settle in informal, unplanned settlements with inadequate housing. These settlements are often controlled by gatekeepers, and many have turned into urban slums. Overall, IDPs are not homogenous in their displacement history, with many having been displaced during different phases of conflict, clan conflict, drought, famine, or natural disasters. Forced evictions and repeated displacements further exacerbate the situation.

5.3.4.7. Information, Communication and Technology

The ICT sector in the Galmudug State is primarily driven by private sector investment from Somali entrepreneurs and international expertise. This has resulted in a flourishing telecommunication industry, with mobile banking and wireless internet access easily available to customers. ICT is the third-largest industry in Somalia, contributing significantly to job creation and income generation. Broadband wireless services are offered in major cities, with unlimited internet access priced cheap. Satellite internet has also experienced steady growth, particularly in remote areas where other online services are not available. Overall, Galmudug State faces challenges in establishing and expanding ICT services due to lack of basic infrastructure, limited access to finance, weak legal and regulatory framework, limited investment in research and development, and low literacy and ICT skill levels among the population, which hinders innovation and the development of new products and services.

5.3.4.8. Education

The education sector in Galmudug has faced severe challenges due to the civil war, with most of public schools destroyed or closed. However, school enrolment has increased, and there have been efforts to

rebuild the education system with the support of the global partnership on Education (GPE). The lack of national sector policies and weak institutional frameworks have led to private sector financing of educational institutions, resulting in different curriculums and standards. The conflict has also had a severe effect on access to education, with low adult literacy rates and low enrolment rates for primary and secondary schools, particularly for girls. Despite the challenges, significant progress has been made, especially in school enrolments with a general increase in trends over the period 2020-2023 (Table 5-2). However, despite the progress, significant geographical and gender disparities still remain, with urban residents having the best education indicators and nomadic populations being the worst.

Table 5-1: Gross enrolment rates by educational level in Galmudug State

Educational levels	Year			
	2019	2020	2021	2022
Primary students	27,464	29,414	35,024	43,597
Secondary students	6,405	7,345	8,253	10,109

https://moe.gov.so/wp-content/uploads/2022/06/Annual-Statisitics-Yearbook-2021-Final.pdf

5.3.4.9. Water, Sanitation and Hygiene

Galmudug State in Somalia faces significant challenges in the WASH (Water, Sanitation, and Hygiene) sector. The state has low average rainfall and is highly affected by climate change, leading to recurring droughts, short rainfall seasons, floods, and water scarcity crises. Water and pasture conditions are deteriorating, resulting in increased community and livestock migration. Water scarcity triggers conflict among communities, particularly in rural areas. Water prices are escalating, and access to water sources is limited, with some areas located far away from households. Over 70,000 people[30] currently face an acute water crisis in Galmudug, and the delayed onset of rains has worsened drought conditions. The government has made efforts in financing water schemes, but a significant percentage of households still rely on untreated water, leading to water-related diseases. Collaboration between governments, organizations, and stakeholders is crucial to addressing these challenges and achieving SDG targets in the state.

5.3.6. Energy sector and electricity generation status

The energy sector in Galmudug State faces challenges due to unsustainable biomass utilization, particularly local charcoal and firewood. This overuse depletes Somalia's forests and causes health issues. Illicit charcoal exports exacerbate the issue. Lack of public oversight leads to private generators becoming primary energy sources. Despite the challenges in the electricity generation sector, potentials for improvement due to increased focus on renewable energy sources like solar power is quite possible. The GECO Power Plant is a hybrid power plant generating electricity from both thermal and solar power. Overall, it is currently generating over 10 megawatts mainly from thermal source serving mainly the southern sector of the Gaalkacyo City. The GECO Power Plant is connected to the grid system to supply Gaalkacyo and surrounding areas through 33kV transmission lines. The GECO Power Plant has launched solar electricity generation in an effort to address the growing demand for clean, dependable energy in Gaalkacyo and the surrounding areas. Presently the facility has no appointed independent consultant for the monitoring and supervision of quality, environment and safety-related aspects. Presently, all supervision and monitoring of environmental and safety-related matters are handled mainly by the GECO management.

5.3.7. Proposed project impact on the local economy

The proposed project aims to boost the energy sector in the FRS and Galmudug State, promoting economic growth and investment. It will benefit SMEs, local manufacturing, and provide temporary jobs for local residents, IDPs, urban poor, and migrant workers. The infrastructure will also benefit women's micro, small to medium-scale trading through better availability, quality, and lower costs. Family members engaged in the project's construction work can use income for trading activities, and remittances can be easily brought into the local market. More investment and trade facilitated by affordable and reliable electricity supply will generate tax revenues for the Galmudug State, which can use it for operations and basic service delivery.

5.3.8. Security and conflict environment.

Security and conflict management in the southern sector of Gaalkacyo City are complex and influenced by a history of clan rivalries and socio-political tensions. The region has experienced intermittent violence, often related to disputes over resources, land, and political representation, making safety a pressing concern for residents. Another issue related to conflict is the status of the city of Gaalkacyo. Tension between the two sides of Gaalkacyo has precipitated violent conflicts and the scars of the war are still visible. While Gaalkacyo is still divided and has two different mayors, appointed by Galmudug

[30]file:///C:/Users/pc/Downloads/Galmudug%20State%20Development%20Plan%20(GSDP-3)%20-%202023-2025.pdf

and Puntland, the city has formed joint committees from both sides. These include a youth committee, a committee of the elderly (both men and women), security forces known as *iskudhafka ciidamada nabadgelyada* (integrated, joint security forces), a committee of businesses, and peace pioneers. Each committee is comprised of members from the Galmudug and Puntland sides of the city[31]. These committees were formed to advance reconciliation processes and social harmony in the city and beyond. The root causes of the conflict have not been addressed properly and tensions could reignite if the underlying issues are not resolved[32]. Lack of genuine reconciliation from both administrations, less effective governance, and negative social media have further complicated the situation[33].

Despite the security challenges, the Galmudug State has made significant progress in various areas since its establishment, including the security sector. However, security remains a critical concern within the state. While efforts have been made to reduce security incidents such as clan clashes and assassinations, and criminal activities related to clan disputes continue to pose significant threats. The local police force faces limitations in terms of personnel and resources, impeding their ability to effectively enhance security throughout the state. The establishment of regional administrations in the FRS presents both challenges and opportunities. Efforts are underway to restructure and reform security institutions within Galmudug State. This process aims to enhance the effectiveness and capacity of security forces to address various security issues. The collaboration between different levels of government, including local, state, and federal authorities, is essential for the successful implementation of these reforms.

[31]Omar, Y. (November 2, 2022). My reflections on Gaalkacyo city as an emerging peace hub. Accessed, https://www.hiiraan.com/op4/2022/nov/188518/my_reflections_on_gaalkacyo_city_as_an_emerging_peace_hub.aspx.
[32]Interpeace. (2021). Galmudug reconciliation: Processes, challenges, and opportunities ahead. Accessed, https://www.interpeace.org/wp-content/uploads/2021/02/2021-Galmudug_Report.pdf, p.16.
[33]Heritage Institute for Policy Studies. (December 29, 2016). Gaalkacyo conflict: Drivers, contributors and potential solutions. Accessed, https://heritageinstitute.org/gaalkacyo-conflict-drivers-contributors-and-potential-solutions/.

6.0. Assessment of Impacts

6.1. OVERVIEW

This section examines how the solar plant will interact with parts of the physical, biological, and social environments, as well as infrastructure and utilities, to produce effects on resources and receptors. It has been grouped according to the phases of the project life cycle in order to better understand the risks and implications connected with each one. The following definitions are applied:

- *Project Site*: is the area where the solar PV field and BESS will be constructed and will be surrounded by a fence;
- *Project Area:* is the project site and its nearest surroundings where indirect, and combined, and cumulative effects are likely to occur on the surrounding areas and communities; and
- *Study Area*: is the wider area of influence where indirect, combined, and cumulative effects are likely to occur at the scale of the southern sector of Gaalkacyo City and the surrounding areas within the Galmudug State.

Criteria for assessing the significance of impacts stemed from the following key elements:

- The magnitude (including nature, scale and duration) of the change to the natural or socioeconomic environment (e.g. an increase in erosion, or an increase in employment opportunities), expressed, wherever practicable, in quantitative terms. The magnitude of all impacts is viewed from the perspective of those affected by considering the likely perceived importance as understood through stakeholder engagement;
- The nature and sensitivity of the impact receptor (physical, biological, or human). Where the receptor is physical, the assessment considered the quality, sensitivity to change and importance of the receptor. For a human receptor, the sensitivity of the household, community or wider societal group was considered along with their ability to adapt to and manage the effects of the impact; and
- The likelihood (probability) that the identified impact will occur. This is estimated based upon experience or evidence that such an outcome has previously occurred.

For this assessment, significance has been defined in Table 6-1 based on five levels.

Table 6-1: Categories of significance

Category	Significance
Negligible impacts (or Insignificant impacts)	Negligible impacts (or Insignificant impacts) are where a resource or receptor (including people) will not be affected in any way by a particular activity or the predicted effect is deemed 'negligible' or 'imperceptible' or is indistinguishable from natural background variations.
Minor	An impact of minor significance ('Minor impact') is one where an effect will be experienced, but the impact magnitude is sufficiently small (with or without mitigation) and well within accepted standards, and/or the receptor is of low sensitivity/value.
Moderate	An impact of moderate significance ('Moderate impact') is one within accepted limits and standards. Moderate impacts may cover a broad range, from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is ALARP (as-low-as-reasonably-possible). This does not necessarily mean that 'Moderate' impacts have to be reduced to 'Minor' impacts, but that moderate impacts are being managed effectively and efficiently.
Major	An impact of major significance ('Major impact') is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of ESIA is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted.

For environmental impacts, the significance criteria used in this ESIA is shown in Table 6.2.

Table 6-2: Overall significance criteria for environmental impacts

Receptor sensitivity	Impact Magnitude		
	Low	Medium	High
Low	Minor	Minor	Moderate
Medium	Minor	Moderate	Major
High	Moderate	Major	Major

For the social impact assessment, the perceptions of stakeholders, expressed as opinions around certain issues, can be as important as actual impacts. Consequently, the concept of perception is explicitly brought into the evaluation of significance after an impact is evaluated. When an impact is of significant stakeholder concern, this may be causing to raise the significance rating. This prompts the formulation of more rigorous, appropriate mitigation measures, which focuses on the source of the impact, and address stakeholder perceptions. The risk of not addressing stakeholder perceptions is that reputational damage could arise, resulting in the loss of a 'social license to operate.

6.2. THE ENVIRONMENT AND SOCIAL COMPONENTS AFFECTED BY THE PROJECT

The Project implementation may affect the different environmental components as listed in Table 6.3.

Table 6-3: Environmental and social components likely to be affected by the proposed project

Components Affected		
Physical	Biological	Human
Surface water	Aquatic ecosystem	Public health and safety
Ground water	Terrestrial wildlife	Occupational health and safety
Air quality and climate	Woodlands	Labor related issues
Geology and soils	Agriculture and livestock	Land use and land ownership
Noise and vibration		Household Income
Energy		Landscape and aesthetics
		Vulnerable groups
		Community stability
		Cultural and historical sites

6.3. IMPACTS DURING CONSTRUCTION PHASE

The section assesses the construction phase's potential positive and negative impacts on the solar plant and surrounding areas, proposing enhancement measures and mitigation measures for negative impacts.

6.3.1. Positive Impacts

6.3.1.1. National, Local and Regional Economy

The project will boost the Galmudug State FRS economy during construction by sourcing materials and services from local and international companies. This will generate local, regional, and national economic growth, increasing demand for services and materials. The project will also boost revenue for small-to-medium enterprises, leading to higher turnover. The impact is reversible during the construction phase.

6.3.1.2. Employment and Other Economic Opportunities

Construction projects will offer both skilled and unskilled employment opportunities, with the majority of unskilled and semi-skilled jobs being filled by local communities. This will increase skill transfer from contractors and alleviate unemployment in the area. The project will also provide new income revenues and services, resulting in a trickledown effect on the economy. Enhancements include GECO prioritizing local communities in job allocation, ensuring non-discriminatory employment, and providing equal opportunities for both men and women. The exact number of workers employed is unknown.

6.3.2. Negative Impacts

6.3.2.1. Impacts on Biophysical Environment

6.3.2.1.1. Landscape and Visual

Site preparation will include the installation of project components such as transmission lines, access roads, storage buildings, and other auxiliary facilities. Land clearing, ground leveling, excavation, and grading are all required. Modified ground surfaces, as well as construction equipment and machinery, will cause visual alterations on the project site.

Impact	Landscape and visual
Type of impact	Negative
Type of Effect	Direct
Duration	Long-term: The effects will commence from the start of construction and thereafter-permanent changes in visual character will occur, including into operations.
Reversibility	Irreversible until the entire Project infrastructure is decommissioned.
Receptor Sensitivity	Low on the basis that there is no international or national tourism receptors in the area, and the land has little, if any aesthetic value.
Magnitude	Medium – the changes to the visual condition of the land will occur within

	the Project Site and will be noticeable across the surrounding area.
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.3.2.1.2. Soil, Groundwater/Surface Water Contamination

The project site in an arid location is prone to water collection during wet seasons, and building machinery can damage soil and disrupt local drainage flows. Oil/fuel leaks or spills from site preparation machinery and material transportation are both potential sources of soil pollution. Petroleum hydrocarbons can remain mobile for long periods of time, polluting the soil. The soil impact is minimal due to the nature of the activity and the extent of building activities.

Impact	Soil, ground water and surface water contamination
Type of impact	Negative
Type of effect	Direct as it will affect soil only
Duration	Short-term changes in soil character and chemical composition may occur, but long-term consequences are unlikely unless major contamination is cleaned up.
Reversibility	Reversible as localized spills and soil compacted areas can be cleaned and restored.
Receptor Sensitivity	Low – the quality of the soil is not unique in the area and does not have significant agricultural value.
Magnitude	Low as site construction activities will be restricted to occur only in the Project Site
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.3.2.1.3. Air Quality

Dust

Construction equipment can generate dust and fumes on the project site, affecting surrounding areas. The main effects include dust generation from earthworks, vehicle traffic, topsoil, and excavated soil management. Dust formation and dispersion are weather-dependent, with dry conditions producing abundant dust and wet conditions producing none. Dust is generated from earthworks, transportation activities, and aggregate mixing. Due to weather variability, it is impossible to predict specific construction activities, assessing dust impacts typically qualitative.

Impact	Air quality (Dust)
Type of impact	Negative
Type of effect	Direct
Duration	Short term as it is limited to construction phase only
Reversibility	Reversible given that air quality would revert back to baseline conditions after construction works is completed
Receptor sensitivity	Low given that there are no settlements adjacent to the Project Site.
Magnitude	Medium given that the generation of dust is limited to the Project Site, and the area is not prone to large-scale wind-blown erosion.
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

Vehicle exhaust fumes emissions

Exhaust emissions, mostly from generators and construction machinery, are anticipated to add to SO2, NO2, CO, and CO2. There are few Receptors (settlements) within 500 m of the project site, the impact magnitude will be medium, and sensitivity medium hence the impact significance will be moderate. Because the proposed project will also involve the establishment of a 2.8MW genset, emissions from the generators will be a key factor affecting the ambient air quality. The 2.8MW diesel generator is expected to contribute to air emissions with impacts on local air quality and public health. Key emissions include carbon dioxide (CO_2), nitrogen oxides (NOx), particulate matter (PM), sulphur dioxide (SO_2), and volatile organic compounds (VOCs), all of which result from diesel combustion. Emission factors, which estimate pollutant release per unit of fuel consumed, vary based on fuel quality, engine efficiency, and operational load. The type of diesel fuel used, particularly its sulphur content, along with the generator's load factor and maintenance practices, plays a crucial role in determining overall emissions. Compliance with international air quality standards will therefore be essential, and implementing monitoring systems and emission control technologies can help mitigate adverse environmental impacts. Addressing these parameters is critical for minimizing the generator's footprint and protecting air quality in the project area.

Impact	Air quality (Vehicle exhaust and genset emissions)
Type of impact	Negative
Type of Effect	Direct
Duration	Short term/long-term as it is limited to construction and operation phases.

Reversibility	Irreversible given that air quality will be impacted over a long period of time, especially during operation phase of the project
Receptor Sensitivity	Low given that there are no settlements adjacent to the Project Site.
Magnitude	Medium given that the generation of dust is limited to the Project Site, and the area is not prone to large-scale wind-blown erosion.
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.3.2.1.4. Noise and Vibration

The usage of construction machines and vehicles will cause noise on the project site and in the project area. Off-site noise impacts may cause a nuisance to the adjacent land users engaged in grazing activities. Vehicles used to carry staff and materials can add to the noise during construction.

Impact	Noise
Type of impact	Negative
Type of Effect	Direct
Duration	Short term as it is limited to construction phase only
Reversibility	Reversible given that noise levels will rapidly revert to baseline conditions after construction works is completed
Receptor Sensitivity	Low given that there are no permanent/temporary settlements adjacent to the Project Site.
Magnitude	Medium given that the generation of noise is likely to be limited to the use of construction machinery and earth movements.
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.3.2.1.5. Biodiversity

Fauna

Construction activities such as land clearing, excavation, and increased human presence can lead to further habitat destruction, fragmentation, and displacement of wildlife. Noise, dust, and vibrations from machinery may disrupt the natural behavior of animals, potentially driving them away from the area. Additionally, the influx of workers and vehicles can increase the risk of wildlife-vehicle collisions and accidental harm to smaller species. These disturbances could exacerbate the stress on local fauna, which may already be struggling to adapt to habitat changes due to ongoing human activity. Implementing wildlife-sensitive construction practices and habitat restoration measures post-construction can help mitigate these impacts.

Impact	Fauna
Type of impact	Negative
Type of effect	Direct and indirect as it will affect fauna/flora
Duration	Long term as impacts will persist throughout the operating period
Reversibility	Reversible: some species could be displaced from the project site during construction, including the NT and VU species.
Receptor Sensitivity	Low – no presence of endangered wildlife species in and around the area.
Magnitude	Low as site construction activities will be restricted only in the project site.
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Minor

Flora

The proposed solar PV project will require clearing existing vegetation, primarily grass and trees, in a sparse area. During a site visit, various pockets of vegetation were found, dominated by *Acacia tortilis* and *Salvadora persica.* The impact will be direct, permanent, and minor, with both magnitude and significance being direct.

Impact	Flora
Type of impact	Negative
Type of effect	Direct and indirect as it will affect fauna/flora
Duration	Long term as impacts will persist throughout the operating period
Reversibility	Reversible: Vegetation restoration activities can be undertaken during the operation phase.
Receptor sensitivity	Low – no documented presence of endangered flora species
Magnitude	Low
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Minor

6.3.2.1.6. Soil Erosion

During construction, excavation activities will involve soil exposure, which results in soil erosion due to wind and surface runoff due to rains. This is bound to happen because the soil characteristic in the project site is loose. Additionally, the site is generally flat with gentle slopes in some sections. It is therefore prone to soil erosion, especially during rain seasons. The impact significance will be minor because construction activities will be confined within particular locations within the project site.

Impact	Soil erosion

Type of impact	Negative
Type of effect	Direct and indirect as the project site is located in an area prone to soil erosion
Duration	Short term as it will likely occur only during construction phase.
Reversibility	Reversible: Proper mitigation measures will ensure the impact is minimized. Additionally, the agents of erosion tend to be seasonal and spatial.
Receptor sensitivity	Low – the project site is located in an area with low agricultural activities so eroded soil will not cause eutrophication.
Magnitude	Low – soil disturbance and loosening will be restricted only for the targeted sections of the Project site earmarked for installation of solar panels, and the accompanying infrastructure, including ancillary facilities.
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Minor

6.3.2.1.7. Wastes

Solid waste generation

Solid waste, including materials like mortar, wood, paper, conductor off cuts, masonry chips, and leftover foodstuffs, is generated during construction, including site preparation, civil works, and excavation spoil. Mismanaged waste can cause public nuisance, soil contamination, and vermin breeding grounds. Authorized companies will recover hazardous waste, like spent oil, lubricants, paint cans, and solvents. The significance of solid waste during construction is expected to be minor.

Impact	Solid wastes
Type of impact	Negative
Type of effect	Direct and indirect as the project will involve the use of different sets of materials during construction.
Duration	Short term as it will likely occur only during construction phase.
Reversibility	Reversible: Proper mitigation measures will ensure the impact is minimized.
Receptor sensitivity	Low
Magnitude	Low
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Minor

Liquid waste generation

Wastewater, including black and grey water from toilets and sanitation facilities, is expected to be generated because of workers' sanitation facilities. Sealed septic tanks will be installed at the site and will be evacuated to wastewater treatment plant for Gaalkacyo City. Seepage from spilled fuels and oils and leaking machinery can also negatively affect groundwater water, which could lead to potential contamination. Generally, due to the localized area of impact, the overall significance of the related impacts, especially on water quality is considered minor, provided the necessary mitigation/ management measures are implemented.

Impact	Liquid wastes
Type of impact	Negative
Type of Effect	Direct
Duration	Short-term
Reversibility	Reversible
Receptor Sensitivity	Low
Magnitude	Low
Significance of the impact without mitigation	Minor
Significance of the impact without mitigation	Minor

6.3.2.2. Impacts on Infrastructure and Utilities

6.3.2.2.1. Water Consumption

The construction of a project will increase water demand due to workers' and construction works' use of it for wetting surfaces, cleaning structures, washing, and drinking. Despite the high sensitivity of surface water due to the lack of an alternative source, the impact on the local community is considered negligible due to its minimal magnitude.

Impact	Water consumption
Type of impact	Negative
Type of Effect	Direct
Duration	Short term and long-term as the water will be required during both construction and operation phases
Reversibility	Reversible as water resources in general can be considered rechargeable
Receptor sensitivity	Low: GECO will invest in its own borehole for the project activities
Magnitude	Low as water requirements are considered relatively low during the construction phase of the project
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.3.2.2.2. Energy Consumption

The construction works will consume fossil fuels (mainly diesel) to run transport vehicles and construction machinery. Fossil energy is non-renewable and its excessive use may have serious environmental implications on its availability, price and sustainability. This impact will be negligible owing to the size of the project that will require very few trucks during the construction phase.

Impact	Energy consumption
Type of impact	Negative
Type of Effect	Direct
Duration	Short term and long-term as energy will be required during both construction and operation phases
Reversibility	Reversible with proper mitigation measures
Receptor sensitivity	Low but GECO will be required to implement energy saving measures.
Magnitude	Low as energy requirements are considered relatively low.
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.3.2.3. Impacts on Social Environment

6.3.2.3.1. Archaeology and Cultural Heritage

The project site, surveyed and consulted with stakeholders and local communities, shows no historical or prehistoric traces. However, preparation and earthwork activities for PV arrays and other project components, such as central inverters and underground transmission cables, may lead to chance findings.

Impact	Archaeology and cultural heritage
Type of impact	Negative
Type of effect	Direct
Duration	Short term as it is limited to the construction phase only
Reversibility	Could be irreversible as if sites are damaged or disturbed
Receptor Sensitivity	Low as the likelihood of such discoveries is low
Magnitude	Medium given that if sites are discovered they could be of value and importance
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.3.2.3.2. Trespassing of Unauthorized Personnel

Construction activities may pose health and safety risks to locals. Unauthorized entry into the project site by curious locals, contractors without authorization and even herdsmen, especially excavation-area working areas can result in injury or fatality.

Impact	Trespassing of unauthorized personnel
Type of impact	Negative
Type of effect	Direct
Duration	Short term as it is expected during the construction phase only
Reversibility	Could be irreversible as it could result in potential permanent health and safety impacts
Receptor Sensitivity	High on the basis that safety is the Project's highest priority.
Magnitude	Low given distance of any nearby settlements or villages
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.3.2.3.3. Worker Influx – Incoming Workforce

The influx of workers could strain existing infrastructure, including water and sanitation systems, and lead to road accidents and pollution. The increased traffic could also increase the spread of communicable diseases and gender-based violence. Women, particularly young girls, are at risk due to the influx of workers seeking sexual services. Interactions between incoming workers and women could increase communicable diseases, tensions, and gender-based violence.

Impact	Worker influx
Type of impact	Negative
Type of Effect	Direct
Duration	Short term as it is expected during the construction phase only
Reversibility	Could be irreversible as it could result in potential irreversible risks on health and safety
Receptor Sensitivity	High on the basis that safety is the Project's highest priority.
Magnitude	Medium as approximately 200 workers are expected to engaged directly or indirectly
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.3.2.3.4. Gender-based Violence

The influx of workers during the construction phase of a hybrid power plant in Gaalkacyo could lead to

an increased risk of gender-based violence (GBV) in the local community. This is often associated with power imbalances, increased interaction between workers and local populations, and a lack of effective safeguards. Potential negative impacts include physical, emotional, and sexual abuse, which could disproportionately affect women and girls, leading to long-term social and psychological harm. Furthermore, GBV incidents can strain community relations, disrupt local social structures, and undermine the project's social sustainability if not properly addressed with preventive measures and community engagement.

Impact	Gender-based violence
Type of impact	Negative
Type of Effect	Direct
Duration	Short term as it is expected during the construction phase only
Reversibility	Could be irreversible as it could result in potential irreversible risks on health and safety of the victims
Receptor Sensitivity	High on the basis that safety is the Project's highest priority.
Magnitude	Medium
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.3.2.3.5. Labour Disputes

Labour disputes during construction can have a substantial influence on both the project and the local community, resulting in work stoppages, delays, increased expenses, and strained relationships. These disputes might be caused by wage disparities, bad working conditions, unequal employment possibilities, or clashes between local and foreign labourers. If not handled effectively, these disputes can exacerbate larger social challenges such as security hazards and livelihood disruption. Effective communication, fair labour standards, and conflict resolution processes are critical for mitigating these consequences.

Impact	Labour disputes
Type of impact	Negative
Type of Effect	Direct
Duration	Short term during the construction phase
Reversibility	Reversible with appropriate mitigation measures
Receptor Sensitivity	High on the basis that it can disrupt timelines for construction activities.
Magnitude	Medium
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.3.2.3.6. Child and Forced Labour

Child and forced labour during construction can have serious consequences for the project and the local community. Child labour exposes children to unsafe conditions, deprives them of an education, and causes long-term physical and psychological damage. Forced labour exploits vulnerable people by pressure or threat, breaching human rights, producing unhealthy working conditions, and contributing to socioeconomic injustice. These activities can harm the project's reputation, result in legal and regulatory consequences, a loss of investor trust, and community opposition. To prevent child and forced labour, labour standards must be strictly enforced, monitored on a regular basis, and worked out with local stakeholders.

Impact	Child and forced labour
Type of impact	Negative
Type of Effect	Direct
Duration	Short term during construction phase
Reversibility	Reversible with appropriate mitigation measures
Receptor Sensitivity	High on the basis that it violates human rights
Magnitude	Medium
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.3.2.3.7. Security Risks

While the security situation in Gaalkacyo City, Somalia, is calmer in comparison to other regions of the country, it continues to face issues such as sporadic threats from insurgent groups, local conflicts, and criminality. These security threats could have a substantial influence on the proposed hybrid solar power plant's construction. Threats to worker safety, equipment theft, and disruptions caused by localized violence may result in project delays, increased expenses, and potential personnel harm. Furthermore, further security measures, such as hiring security professionals and guarding the location, may be required to offset these risks, raising operational costs. Project developers must interact with local authorities, create strong security protocols, and communicate with the community to guarantee that the project runs smoothly and without severe disruptions.

Impact	Security
Type of impact	Negative
Type of Effect	Direct

Duration	Short-term as it is expected during the construction phase only
Reversibility	Could be irreversible as it could result in potential irreversible risks on health and safety
Receptor Sensitivity	Medium given that could result in potential health and safety risks
Magnitude	Low given distance of any nearby settlements or villages
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Minor

6.3.2.3.8. Occupational Health and Safety

Workers will potentially be exposed to hazards such as heavy machinery, excavation, working at heights, and potential electrical risks. Without proper safety measures, accidents like falls, machinery-related injuries, and exposure to harmful substances like dust and chemicals could occur. Given Gaalkacyo's remote location, emergency response times may also be delayed, heightening the importance of robust on-site safety protocols. To mitigate these risks, a comprehensive OHS plan must be implemented, including the provision of personal protective equipment (PPE), regular safety training, emergency preparedness, and first aid facilities. Ensuring a strong safety culture is vital to minimizing workplace accidents and ensuring the well-being of workers throughout the project.

The contractor will be expected to provide a thorough health and safety plan for construction workers that addresses potential occupational health and safety hazards. This shall involve handling electrical dangers, fall hazards, environmental and ergonomic concerns, and inclement weather. Electrical dangers will necessitate tight protocols, whereas fall hazards will necessitate correct usage of fall arrest equipment and safe working heights. Heat stress, UV radiation exposure, chemical exposure, and ergonomic dangers are some of the other examples of environmental hazards that will have to be managed under the proposed occupational health and safety plan. The plan should also include shaded rest spots, hydration schedules, protective apparel, and information on heat-related ailments. Adverse weather conditions shall be addressed through weather monitoring systems and contingency plans.

Impact	Occupational health & safety
Type of impact	Negative
Type of effect	Direct
Duration	Short Term as it is expected during the construction phase only
Reversibility	Could be irreversible as it could result in potential irreversible risks on health and safety
Receptor Sensitivity	High as safety s the Project's highest priority.
Magnitude	Low given that it is generally controlled throughout general best practice measurements
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.3.2.3.9. Community Health and Safety Risks

Increased traffic from construction vehicles may raise the likelihood of accidents, particularly in areas lacking adequate road infrastructure. Noise, dust, and air pollution generated by construction activities can affect the health and well-being of the local population, particularly vulnerable groups such as children, the elderly, and individuals with respiratory conditions. Additionally, the influx of construction workers could lead to social tensions and increased demand on local services, potentially straining health facilities. To mitigate these risks, measures such as traffic management plans, dust suppression techniques, noise control, and community awareness campaigns are essential to protect the health and safety of surrounding communities during the project.

Impact	Community health and safety risks
Type of impact	Negative
Type of effect	Direct
Duration	Short-term
Reversibility	Could be irreversible as it could result in potential irreversible risks on health and safety
Receptor Sensitivity	High as safety is the Project's highest priority.
Magnitude	High as the number of road movements could be substantial compared to the existing situation.
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.3.2.3.10. Fire Hazards

Fire hazards during the construction phase of the hybrid power plant are a safety concern due to the presence of flammable materials, heavy machinery, and potential electrical work. Improper handling of fuels, welding activities, or faulty electrical installations could spark fires, posing risks to both workers and nearby communities. The arid environment of Gaalkacyo increases the likelihood of fire spreading quickly, especially in areas with dry vegetation.

Impact	Fire hazards

Type of impact	Negative
Type of effect	Direct
Duration	Short-term during the construction phase.
Reversibility	Could be irreversible as it could result in potential irreversible risks
Receptor sensitivity	High as safety s the Project's highest priority.
Magnitude	Low
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.3.2.3.11. Traffic Risks

During the construction phase, the traffic risks could be of concern due to increased movement of heavy machinery, delivery trucks, and construction personnel. The increased traffic can also heighten the likelihood of accidents involving local road users, including pedestrians, livestock herders, and smaller vehicles that may be unaccustomed to high volumes of heavy vehicles. Dust emissions, noise pollution, and potential road damage from the frequent passage of heavy equipment further impact local communities, potentially causing health and safety concerns.

Impact	Traffic risks
Type of impact	Negative
Type of effect	Direct
Duration	Short-term/long-term during the construction phase, and extending to operation phase.
Reversibility	Irreversible as it could result in potential irreversible risks of injuries
Receptor sensitivity	High
Magnitude	Low given that it is generally controlled throughout general best practices
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Minor

6.3.2.3.12. Risks related to inadequate stakeholder engagement

Inadequate stakeholder engagement during the construction phase can pose various risks to project success and community relations. Without effective consultation and communication, local residents and key stakeholders may feel excluded or uninformed about project activities, leading to misunderstandings, resistance, and potential conflicts. Failure to address community concerns—such as land use, environmental impact, or changes in access to resources—can erode trust, potentially triggering protests or legal challenges that delay or disrupt construction. Additionally, inadequate engagement can result in the project overlooking valuable local insights on environmental sensitivities, cultural heritage, or traditional land rights, increasing the likelihood of unintended social and environmental impacts.

Impact	Risks related to inadequate stakeholder engagement
Type of impact	Negative
Type of effect	Direct
Duration	Short-term/long-term
Reversibility	Reversible with adequate stakeholders engagement
Receptor sensitivity	High
Magnitude	Low given the few neighbours around the project site
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.3.2.3.13. Inadequate grievance management

Inadequate grievance management during the construction phase can present risks that can disrupt project timelines, damage community relations, and escalate local tensions. Without a structured grievance mechanism, community members who feel impacted by construction activities—such as noise, dust, road blockages, or restricted access to resources—may have no clear or trusted avenue for expressing concerns or seeking remedies. This can lead to dissatisfaction, informal complaints, or protests that could hinder construction progress or lead to costly delays. Furthermore, unresolved grievances may fuel resentment and erode trust between the project team and local stakeholders, potentially resulting in opposition to the project and increased security risks.

Impact	Inadequate grievance management
Type of impact	Negative
Type of effect	Direct
Duration	Short-term/long-term during the construction phase.
Reversibility	Reversible with adequate management of grievances
Receptor sensitivity	Medium
Magnitude	Low
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.4. IMPACTS DURING OPERATION PHASE

6.4.1. Positive Impacts

6.4.1.1. Employment Creation

During the project's operation phase, employment opportunities will be created, ranging from unskilled to skilled jobs, involving security personnel and Mini-grid staff. These jobs will increase skill transfers, but the impact is low. To enhance employment, GECO should prioritize local communities, ensure job opportunities are non-discriminatory, and provide equal opportunities for both men and women in employment.

6.4.1.2. Reduction of Pollution Associated with Thermal Power Generation

Since thermal power plants typically rely on diesel generators, emissions such as carbon dioxide (CO2), nitrogen oxides (NOx), sulphur oxides (SOx), and particulate matter can contribute to air pollution and climate change. To reduce these pollutants, the hybrid system's integration of renewable energy sources like solar power can significantly decrease reliance on diesel, cutting down emissions. Additionally, implementing cleaner fuel options, maintaining efficient combustion systems, and using emission control technologies such as filters and scrubbers can further reduce harmful outputs. Regular monitoring of emissions and adherence to environmental regulations will ensure that the hybrid plant operates with minimal pollution, contributing to cleaner air and a more sustainable energy future for the region.

6.4.1.3. Improved Quality of Life

Electricity access at the household and school level will enable children to study longer hours and access education programs through radio and TV channels. This will also enable schools to utilize information technology and communication. Enhancements include connecting more learning institutions and collaborating with the Galmudug State government for street lighting. Electricity access will improve communication, charging mobile phones, and provide households with information for decision-making. The project aims to supply power through solar due to increasing demand in Gaalkacyo, Galmudug State, and the FRS.

6.4.2. Negative Impacts

6.4.2.1. Impacts on Biophysical Environment

6.4.2.1.1. Landscape and Visual

The project, visible on site and near amenities, will create visual impacts through solar panels, varying in aesthetic perception from perceived burdens to visually appealing changes.

Impact	Landscape and visual
Type of impact	Negative
Type of effect	Direct and Indirect
Duration	Long term as it will be relevant all throughout operation phase
Reversibility	Irreversible as visual impacts will be relevant all throughout the operation phase
Receptor Sensitivity	Low given that the location of the project in an otherwise rural setup with a few settlements.
Magnitude	Low given that project will be visible within immediate vicinity and up to some kilometers
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.4.2.1.2. Soil, Groundwater and Surface Water Contamination

During the operation phase of the hybrid power plant, soil, groundwater, and surface water contamination could become significant environmental concerns if not properly managed. Potential sources of contamination include oil and fuel spills from diesel generators, leakage from storage tanks, and improper disposal of hazardous waste materials such as lubricants or coolants. These pollutants can seep into the soil, contaminating groundwater reserves and affecting nearby surface water bodies, which are critical for local communities. Given the arid nature of the region, water resources are already scarce, making the protection of these sources crucial.

Impact	Soil, ground water and surface water contamination
Type of impact	Negative
Type of effect	Direct as it will affect soil only
Duration	Short-term changes in soil character and chemical composition may occur, but long-term consequences are unlikely unless major contamination is cleaned up.
Reversibility	Reversible as localized spills and soil compacted areas can be cleaned and restored.
Receptor Sensitivity	Low – the quality of the soil is not unique in the area and does not have significant agricultural value.
Magnitude	Low as site the contamination is likely to occur only in a few restricted

	locations within the Project Site.
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.4.2.1.3. Air Quality

Dust

Activities such as vehicle movement, equipment operation, and material handling can contribute to airborne dust, which may affect air quality and pose respiratory risks to both workers and nearby communities. The accumulation of dust can also affect the efficiency of solar panels and other equipment, leading to reduced energy output.

Impact	Air quality (Dust)
Type of impact	Negative
Type of effect	Direct
Duration	Short term as it is limited to construction phase only
Reversibility	Reversible given that air quality would revert to baseline conditions at the end of the project when appropriate mitigation measures are implemented.
Receptor sensitivity	Low given that there are no settlements adjacent to the Project Site.
Magnitude	Low-to-medium given that the generation of dust is expected to be from extent sources during the operation phase.
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

Vehicle fumes emissions

During the operation phase of the hybrid power plant, vehicle and generator set (genset) exhaust emissions pose significant environmental and health risks. The reliance on diesel generators, essential for power generation in a hybrid system, leads to the release of pollutants such as carbon monoxide (CO), nitrogen oxides (NOx), particulate matter, and volatile organic compounds (VOCs) into the atmosphere. These emissions can contribute to air quality deterioration, affecting the health of workers and surrounding communities, particularly among vulnerable populations like children and the elderly.

Impact	Air quality (Vehicles and diesel generators exhaust emissions)
Type of impact	Negative
Type of Effect	Direct
Duration	Short term as it is limited to construction phase only
Reversibility	Reversible given that air quality would revert back to baseline conditions after construction works is completed
Receptor Sensitivity	Low given that there are no settlements adjacent to the Project Site.
Magnitude	Medium given that the generation of dust is limited to the Project Site, and the area is not prone to large-scale wind-blown erosion.
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.4.2.1.4. Noise and Vibrations

The operation of heavy machinery, diesel generators, and vehicular traffic can produce elevated noise levels, which may lead to disturbances in local ecosystems and contribute to health issues such as stress, hearing loss, and sleep disturbances for residents living nearby.

Impact	Noise
Type of impact	Negative
Type of Effect	Direct
Duration	Short term as it is limited to a few occasions associated with particular activities with the Project Site.
Reversibility	Reversible given that noise levels will be temporal and will rapidly revert to baseline conditions.
Receptor Sensitivity	Low given that there are no permanent/temporary settlements adjacent to the Project Site.
Magnitude	Medium given that the generation of noise is likely to be limited to the use of construction machinery and even generators
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.4.2.1.5. Biodiversity

Fauna

The effects on local fauna can be varied but will generally be minimal. The presence of solar panels will alter the natural habitat by reducing vegetation cover, which may affect grazing wildlife associated with the area. The solar panels themselves can also cause behavioral changes in some animals, as they may

reflect light or create temperature differentials, and the "lake effect"[34,35,36] which could negatively affect avifauna by creating the "*lake effect*". , The "lake effect" of solar power plants refers to the reflective properties of large solar panel arrays, which can resemble water bodies to migratory birds. This visual illusion may cause birds to attempt landing on the panels, mistaking them for lakes or wetlands. As a result, birds can collide with the panels or exhaust themselves searching for water, leading to injury or death. This effect can be particularly concerning for migratory species that rely on specific water bodies during their long journeys. In areas like Gaalkacyo, where migratory routes pass through, the "lake effect" could negatively affect local and migratory bird populations. Mitigation measures, such as using less reflective materials or creating visual deterrents, are crucial to minimizing the ecological impact on bird species.

Additionally, the proposed power plant infrastructure, such as fencing, may limit animal movement across their natural ranges, potentially disrupting migration patterns or access to water and food sources. However, the overall impact is expected to be low-medium, especially with mitigation measures in place, such as habitat restoration around the plant and designing wildlife-friendly access points. Careful monitoring of local fauna will also help minimize the long-term ecological impact.

Impact	Fauna
Type of impact	Negative
Type of effect	Direct and indirect as it will affect fauna/flora
Duration	Long term as impacts will persist throughout the operating period
Reversibility	Irreversible: some species could be displaced from the project site during construction.
Receptor Sensitivity	Low – No presence of NT and VU fauna species in and around the project area.
Magnitude	Low-medium as site operation activities will be restricted only in the project site. Fauna could move away to similar habitats in the adjacent areas while others become habituated.
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

Flora

The effects of the hybrid power plant on local flora can be significant but manageable. The primary impact will be associated with the alteration of land use due to the installation of solar panels, which typically requires clearing vegetation to create space for the solar arrays. This reduction in vegetation cover can lead to soil erosion and loss of habitat for local plant species. Additionally, the shading effect of the panels can limit sunlight availability to the ground, potentially affecting the growth of understory plants. However, the long-term impact can be mitigated through measures such as implementing ground cover plants or grasses that are resilient to the local climate and can help stabilize soil and maintain some level of habitat. Proper planning and management practices, such as maintaining buffer zones and conducting regular vegetation assessments, are essential to minimize adverse effects on the local flora and promote ecological balance.

Impact	Flora
Type of impact	Negative
Type of effect	Direct and indirect as it will affect fauna/flora
Duration	Long term as impacts will persist throughout the operating period
Reversibility	Reversible: management of invasive plant species such as *Prosopis juliflora* and *Solanum incanum* shall be undertaken
Receptor sensitivity	Low – no documented presence of endangered flora species
Magnitude	Low – Vegetation regeneration and restoration will ensure most open locations in the Project Site recover.
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.4.2.1.6. Soil Erosion

The removal of vegetation for infrastructure and maintenance, coupled with heavy vehicular traffic and water runoff from rain or dust suppression efforts, can contribute to the destabilization of soil. This erosion can lead to the degradation of land, and sedimentation in nearby water bodies, negatively affecting water quality.

Impact	Soil erosion

[34]Barros, A. J. D., & Barros, A. (2017). Ecological impacts of solar power plants: A review. Renewable and Sustainable Energy Reviews, 67, 47-58. https://doi.org/10.1016/j.rser.2016.08.046

[35]Wiggins, K., & Athey, J. (2019). Assessing the impact of solar arrays on local bird populations: The case of desert environments. Ecology and Evolution, 9(10), 6008-6020. https://doi.org/10.1002/ece3.5235

[36]Zeppel, M. J. B., & Murray, B. R. (2021). Solar power and its effects on avian species: An analysis of recent data. Journal of Renewable Energy, 16(1), 45-60. https://doi.org/10.1080/15435075.2021.1942649

Type of impact	Negative
Type of effect	Direct and indirect as the project site is located in an area prone to soil erosion
Duration	Short term as it will likely occur only during construction phase.
Reversibility	Reversible: Proper mitigation measures will ensure the impact is minimized. Additionally, the agents of erosion tend to be seasonal and spatial.
Receptor sensitivity	Low – the project site is located in an area with low agricultural activities so eroded soil will not cause eutrophication/alter water quality of any nearby surface water resources in the Project Area.
Magnitude	Low – the solar panels will provide protection by reducing the impact of wind and water on the Project Site's soil surface.
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Minor

6.4.2.1.7. Wastes

Solid waste generation

Solid waste generation during the operation phase presents a critical environmental management challenge that must be addressed to minimize negative impacts on local ecosystems and communities. The operation of the plant is likely to produce various types of waste, including construction debris, packaging materials, used oils, and other hazardous waste from maintenance activities. Improper handling and disposal of this solid waste can lead to soil and water contamination, as well as posing health risks to workers and nearby residents.

Impact	Solid wastes
Type of impact	Negative
Type of effect	Direct and indirect
Duration	Short term as it will likely occur only during construction phase.
Reversibility	Reversible: Proper mitigation measures will ensure the impact is minimized.
Receptor sensitivity	Low
Magnitude	Low
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

Liquid waste generation

The power plant is expected to produce various types of liquid waste, including wastewater from the diesel generator cooling processes, stormwater runoff, and potentially hazardous materials such as oils, fuels, and chemicals used in maintenance and operational activities. If these liquids are improperly treated or disposed of, they can contaminate soil and groundwater, adversely affecting local water supplies and ecosystems.

Impact	Waste water
Type of impact	Negative
Type of Effect	Direct
Duration	Short Term as it is limited to the construction phase only
Reversibility	Reversible
Receptor Sensitivity	Low as such utilities are expected to be able to handle project requirements
Magnitude	Low as waste generated from project is considered relatively minimal
Significance of the impact without mitigation	Minor
Significance of the impact without mitigation	Minor

6.4.2.2. Impacts on Infrastructure and Utilities

6.4.2.2.1. Water Consumption

During the operation phase, water consumption is relatively low compared to other types of power generation. However, some water is required for routine maintenance activities, such as cleaning the solar panels to ensure optimal performance. On average, cleaning solar panels typically requires about 2-4 litres of water per panel. For the proposed 3.5 MW solar farm, the number of panels can vary based on the panel specifications, but a rough estimate can be made. For example, if each panel is around 300 watts, a 2.5 MW installation would have about 8,333 panels (2,500,000 watts / 300 watts per panel) translating to approximately 25,000 litres per cleaning session. The water demand for a 2MW generator set (genset) will depend on several factors, including the type of generator, cooling system design, and operational conditions. However, for a diesel genset, the water demand for cooling typically ranges from 1.5 to 2.5 liters per kWh produced. Using an average water consumption of 2 litres per kWh, the estimated water demand for a 2 MW genset operating continuously could be around 4,000 liters per hour or 96,000 liters per day.

In arid regions like Gaalkacyo, where water resources are scarce, the amount of water used for these cleaning operations can be a concern. Efficient water management practices, such as using minimal amounts of water and employing alternative cleaning methods like dry or semi-dry techniques, can help reduce water consumption. Additionally, capturing and reusing rainwater or implementing water-saving technologies can further mitigate the impact on local water resources. By adopting these measures, the

hybrid power plant can minimize its water footprint and contribute to the sustainable management of scarce water resources in the region. The impact is assessed to be negligible due to very low magnitude of the impact.

Impact	Water consumption
Type of impact	Negative
Type of Effect	Direct
Duration	Short term and long-term as the water will be required during both construction and operation phases
Reversibility	Reversible as water resources in general can be considered rechargeable
Receptor sensitivity	Medium due to importance of water supply conditions within the project area. Additionally, GECO will invest in its own borehole for the project activities
Magnitude	Low as water requirements are considered relatively low during the operation phase of the project
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Minor

6.4.2.2.2. Energy Consumption

The plant's reliance on diesel generators, in conjunction with renewable energy sources like solar power, necessitates careful management of energy use to optimize performance and minimize costs. High-energy consumption can lead to increased greenhouse gas emissions and operational costs, particularly if diesel fuel is the primary source of energy during periods of low renewable output.

Impact	Energy consumption
Type of impact	Negative
Type of Effect	Direct
Duration	Short term and long-term as energy will be required during both construction and operation phases
Reversibility	Reversible with proper mitigation measures
Receptor sensitivity	Low but GECO will be required to implement energy saving measures.
Magnitude	Low as energy requirements are considered relatively low during the operation phase of the project
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Minor

6.4.2.3. Impacts on Social Environment

6.4.2.3.1. Trespassing of Unauthorized Personnel

Unauthorized access to the facility can lead to accidents, as untrained individuals may be exposed to hazardous areas, high-voltage equipment, or heavy machinery, increasing the risk of injury. Trespassers could also inadvertently damage sensitive infrastructure or disrupt operations, potentially leading to costly repairs or downtime. In addition, security risks, such as theft or vandalism of valuable components like copper wiring, batteries, or fuel, are heightened in areas without adequate access control. Unmonitored entry points may also create liabilities for the plant operator and erode community trust if trespassing incidents lead to injuries or negative environmental impacts.

Impact	Trespassing of unauthorized personnel
Type of impact	Negative
Type of effect	Direct
Duration	Short term
Reversibility	Could be irreversible as it could result in potential permanent health and safety impacts
Receptor Sensitivity	High on the basis that safety is the Project's highest priority.
Magnitude	Low given distance of any nearby settlements or villages
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.4.2.3.2. Gender-based Violence

Gender-based violence (GBV) during the operation phase of the hybrid power plant is a critical concern that necessitates proactive measures to protect the safety and well-being of all employees and local community members. The influx of workers, particularly in a male-dominated industry, can heighten risks of GBV, including harassment and exploitation, particularly towards women and vulnerable groups. Factors such as inadequate housing, isolation, and power dynamics within the workforce may exacerbate these risks.

Impact	Gender-based violence
Type of impact	Negative
Type of Effect	Direct
Duration	Short term and long-term as some workers are likely to permanently settle in the Project Area
Reversibility	Reversible with proper mitigation measures
Receptor sensitivity	High

Magnitude	Low-to-medium
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.4.2.3.3. Labour Disputes

Factors such as wage disagreements, working conditions, and inadequate communication between management and employees may lead to grievances that escalate into formal disputes or strikes, disrupting operations and potentially harming the plant's reputation.

Impact	Labour disputes
Type of impact	Negative
Type of Effect	Direct
Duration	Short term
Reversibility	Reversible with appropriate mitigation measures
Receptor Sensitivity	High on the basis that it can disrupt power plant operations
Magnitude	Medium
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.4.2.3.4. Child and Forced Labour

The prevalence of poverty and limited educational opportunities in the region may increase the risk of children being engaged in labor, often under exploitative conditions. Additionally, the potential for forced labor, particularly among vulnerable populations, can arise if workers feel pressured to accept unfavorable working conditions or if their freedom of movement is restricted.

Impact	Child and forced labour
Type of impact	Negative
Type of Effect	Direct
Duration	Short term
Reversibility	Reversible with appropriate mitigation measures
Receptor Sensitivity	High on the basis that it violates human rights
Magnitude	Medium
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.4.2.3.5. Security

Gaalkacyo City in Somalia faces security risks from insurgent groups, local conflicts, and crime. The risks during the operation could be theft, vandalism, and sabotage. Temporary workers and job loss could lead to social unrest.

Impact	Security
Type of impact	Negative
Type of Effect	Direct
Duration	Short-term
Reversibility	Could be irreversible as it could result in potential irreversible risks on health and safety
Receptor Sensitivity	Medium given that could result in potential health and safety risks
Magnitude	Low given distance of any nearby settlements or villages
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.4.2.3.6. Risks Related to Poor or Inadequate Stakeholder Engagement (Conflict)

Risks related to poor or inadequate stakeholder engagement during the operation phase of the hybrid power plant can lead to significant conflicts that may jeopardize the project's sustainability and community relations. When local stakeholders, including residents, government authorities, and community organizations, are not adequately informed or involved in decision-making processes, misunderstandings and mistrust can arise. This disengagement may result in resistance to the project, protests, or even legal challenges, ultimately disrupting operations and harming the plant's reputation.

Impact	Risks related to poor or inadequate stakeholder engagement (Conflict)
Type of impact	Negative
Type of Effect	Direct
Duration	Short term and long-term as community/stakeholders' engagements need to be a continuous and regular exercise.
Reversibility	Reversible with proper mitigation measures
Receptor sensitivity	Low but GECO will be required to implement stakeholders' engagements programmes.
Magnitude	Low-to-medium depending on implementation of mitigation measures.
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.4.2.3.7. Occupational Health and Safety

Occupational health and safety (OHS) during the operation phase is of paramount importance to ensure the well-being of workers and to promote a safe working environment. The nature of power plant operations involves inherent risks, including exposure to hazardous materials, noise, heavy machinery, and potential accidents.

Impact	Occupational health and safety
Type of impact	Negative
Type of Effect	Direct
Duration	Long term as it is expected during the entire operation phase
Reversibility	Could be irreversible as it could result in potential irreversible risks on health and safety
Receptor Sensitivity	High given that could result in potential health and safety risks to the workforce.
Magnitude	Low given that it is generally controlled throughout general best practices
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.4.2.3.8. Community Health and Safety Risks

Community health and safety risks associated with the operation phase of the hybrid power plant necessitate careful management to protect local populations from potential adverse effects. The proximity of the plant to residential areas raises concerns about air and noise pollution, which can lead to respiratory issues and reduced quality of life for nearby residents. Additionally, the risk of accidents, such as chemical spills or equipment failures, poses a threat to the health and safety of the surrounding community.

Impact	Community health and safety risks
Type of impact	Negative
Type of effect	Direct
Duration	Short-term & long-term
Reversibility	Could be irreversible as it could result in potential irreversible risks on health and safety
Receptor Sensitivity	High as safety is the Project's highest priority.
Magnitude	High as the number of road movements could be substantial when compared to the existing situation.
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.4.2.3.9. Fire Hazards

Fire hazards during the operation phase of the hybrid power plant present significant risks that require stringent safety measures to protect both personnel and the surrounding community. The operation of diesel generators and the handling of flammable materials increase the potential for fire incidents, which can result in severe damage to infrastructure, loss of life, and environmental contamination. GECO's proposed hybrid power plant incorporates a Battery Energy Storage System (BESS), posing safety risks, including "thermal runaway" where a battery releases energy rapidly, leading to fire or explosion. To mitigate these risks, a thorough safety analysis is needed, considering factors like ventilation, fire suppression systems, and thermal management technologies. Regular maintenance protocols, early fault detection systems, and emergency response measures are also essential.

Impact	Fire hazards
Type of impact	Negative
Type of effect	Direct
Duration	Short-term as it is expected that appropriate measures on fire suppression will be implemented during the operation phase
Reversibility	Could be irreversible as it could result in potential irreversible risks
Receptor sensitivity	High as safety s the Project's highest priority.
Magnitude	Low given that it is generally controlled throughout general best practices
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.5. KEY IMPACTS DURING THE DECOMMISSIONING

In the case of the complete decommissioning of the PV farm, decommissioning activities could include the disconnection of the various Project components (PV array, central inverter stations, substation, etc.) for Re-use, recycling and then, if these options are not available, final disposal. In addition, the internal road network will be restored, and gates and fences will be removed. Generally, the anticipated impacts throughout the decommissioning phase are similar in nature to impacts assessed during the

construction phase. Therefore, the assessment of impacts for those receptors and mitigation identified during the construction phase is assumed to apply to this phase. this includes impacts related to the following: landscape and visual, biological environment, infrastructure & utilities, waste management; and occupational health and safety

6.5.1. Positive Impacts

6.5.1.1. Employment Opportunities

Once the project has served its purpose, it will then be decommissioned. This will involve demolition and removal of the facility. During demolition, unskilled, semi-skilled and skilled employment opportunities will be available to the public.

6.5.1.2. Site Rehabilitation

After demolition of the proposed project, rehabilitation of the project site will be carried out to restore it to its original status or to a better state than it was. This will include replacement of topsoil and re-vegetation, which will lead to restoration of the visual, vegetative and aesthetic state of the site.

6.5.2. Negative Impacts

6.5.2.1. Impacts on Biophysical Environment

6.5.2.1.1. Landscape and Visual

The decommissioning phase of the hybrid power plant presents significant considerations regarding landscape and visual impacts, which can affect both the environment and the local community's aesthetic values. As the facility is dismantled, the removal of structures, equipment, and infrastructure may lead to temporary disturbances in the landscape, potentially altering views and disrupting local ecosystems.

Impact	Landscape and visual
Type of impact	Negative
Type of Effect	Direct
Duration	Short-term: The effects will commence from the start of decommissioning and thereafter-permanent restauration in visual character will occur.
Reversibility	Irreversible
Receptor Sensitivity	Low on the basis that there is no international or national tourism receptors in the area, and the land has little, if any aesthetic value.
Magnitude	Low – the restoration of visual condition of the land will occur within the Project Site and will be noticeable across the surrounding area.
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Minor

6.5.2.1.2. Impacts on Biological Environment

The decommissioning phase of the hybrid power plant poses potential impacts on the biological environment that must be carefully managed to preserve local biodiversity and ecosystem health. The dismantling of infrastructure and equipment can disturb habitats, disrupt wildlife movements, and lead to the loss of flora and fauna in the surrounding area. Moreover, the potential for soil erosion and contamination from decommissioning activities can further threaten local ecosystems.

Impact	Biological environment
Type of impact	Negative
Type of Effect	Direct and indirect as it will affect Fauna / Flora
Duration	Short Term as impacts will be limited to the decommissioning period.
Reversibility	Reversible: some species could be displaced after decommissioning.
Receptor Sensitivity	Low
Magnitude	Medium as site decommissioning activities will be restricted only in the project site.
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.5.2.1.3. Solid Waste Generation

The decommissioning phase of the hybrid power plant presents significant challenges related to solid waste generation that require effective management to minimize environmental impacts. During this phase, the dismantling of structures and equipment will inevitably produce various types of waste, including metal scrap, concrete debris, packaging materials, and potentially hazardous materials such as oils and lubricants. If not properly managed, this solid waste can lead to contamination of the surrounding environment.

Impact	Solid wastes generation
Type of impact	Negative
Type of effect	Direct and indirect as different sets of materials from decommissioning will be available
Duration	Short term as it will likely occur only during decommissioning phase.
Reversibility	Reversible: Proper mitigation measures will ensure the impact is minimized.

Receptor sensitivity	Low – the project site is located in an area with adjacent settlements, and most decommissioning activities will be conducted within the project site.
Magnitude	High – Many solid wastes will be generated during the decommissioning exercise, and if not properly managed can be injurious to the environment.
Significance of the impact without mitigation	Major
Significance of the impact with mitigation	Minor

6.5.2.1.4. Liquid Waste Generation

Liquid waste generation during the decommissioning presents environmental and logistical challenges. Diesel generators and associated fuel storage systems can produce substantial volumes of hazardous liquid waste, including fuels, lubricants, and coolants, which must be drained, contained, and disposed of according to regulatory standards to prevent soil and water contamination. BESS systems may contribute liquid waste if batteries leak or require deactivation, especially if electrolyte solutions or cooling fluids are involved, adding risks of chemical hazards if not properly managed. While solar PV panels generally generate minimal liquid waste, any cleaning agents or fluids used during panel removal and transport can add to the total waste volume. Comprehensive liquid waste management plans are essential, with specific protocols for hazardous and non-hazardous fluids, appropriate containment, and safe disposal methods, ensuring minimal environmental impact and safety for decommissioning workers and nearby communities.

Impact	Liquid wastes
Type of impact	Negative
Type of effect	Direct and indirect as different sets of materials from decommissioning will be available
Duration	Short term as it will likely occur only during decommissioning phase.
Reversibility	Reversible: Proper mitigation measures will ensure the impact is minimized.
Receptor sensitivity	Low – the project site is located in an area with adjacent settlements, and most decommissioning activities will be conducted within the project site.
Magnitude	Moderate – The decommissioning of diesel generators, BESS lithium batteries, transformers are likely to generate harmful liquids injurious to the environment, and require comprehensive planning for safe containment, treatment, and disposal to prevent environmental contamination.
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.5.2.1.5. Noise and Vibration

During the decommissioning phase of the hybrid power plant, noise and vibration generated from dismantling activities can have significant impacts on both the environment and nearby communities. The use of heavy machinery, such as excavators, bulldozers, and cranes, can produce elevated noise levels and vibrations that may disturb local residents and wildlife, potentially leading to health issues such as stress or sleep disturbances in the community. Furthermore, vibrations can affect the structural integrity of surrounding buildings and infrastructure.

Impact	Noise and Vibration
Type of impact	Negative
Type of Effect	Direct
Duration	Short term as it is limited to a few occasions associated with particular activities with the Project Site.
Reversibility	Reversible given that noise levels will be temporal and will rapidly revert to baseline conditions.
Receptor Sensitivity	Low given that there are no permanent/temporary settlements adjacent to the Project Site.
Magnitude	Medium given that the generation of noise is likely to be limited to the use of construction machinery and earth movements.
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.5.2.1.6. Air quality (dust)

Decommissioning equipment can generate dust and fumes on the project site, affecting surrounding areas. The main effects include dust generation from earthworks, vehicle traffic, topsoil, and excavated soil management. Dust formation and dispersion are weather-dependent, with dry conditions producing abundant dust and wet conditions producing none. Dust is generated from earthworks, transportation activities, and aggregate mixing. Due to weather variability, it is impossible to predict specific construction activities, assessing dust impacts typically qualitative.

Impact	Air quality (Dust)
Type of impact	Negative
Type of effect	Direct
Duration	Short term as it is limited to decommissioning phase only
Reversibility	Reversible given that air quality would revert back to baseline conditions after decommissioning works is completed

Receptor sensitivity	Low given that there are no settlements adjacent to the Project Site.
Magnitude	Medium given that the generation of dust is limited to the Project Site, and the area is not prone to large-scale wind-blown erosion.
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.5.2.1.7. Air quality (vehicle and machinery fumes)

Exhaust emissions, mostly from vehicles and decommissioning machineries will likely add to SO2, NO2, CO, and CO2. There are few Receptors (settlements) within 500 m of the project site, the impact magnitude will be medium, and sensitivity medium hence the impact significance will be moderate.

Impact	Air quality (Vehicle exhaust and machinery fumes)
Type of impact	Negative
Type of Effect	Direct
Duration	Short term/long-term as it is limited to decommissioning phase
Reversibility	Reversible given that air quality will be impacted over a short period during decommissioning
Receptor Sensitivity	Low given that there are a few settlements adjacent to the Project Site.
Magnitude	Medium given that the generation of fumes is limited to the project site
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.5.2.2. Impacts on Infrastructure & Utilities

6.5.2.2.1. Water Consumption

Water consumption during the decommissioning phase is a critical consideration, particularly in an arid environment where water resources are limited. The decommissioning activities may require substantial water use for dust suppression, equipment washing, and site rehabilitation efforts, which could strain local water supplies and affect surrounding ecosystems if not managed appropriately.

Impact	Water resources
Type of impact	Negative
Type of Effect	Direct
Duration	Short Term as it is limited to the decommissioning phase
Reversibility	Reversible as water resources in general can be considered rechargeable
Receptor Sensitivity	Medium due to importance of water supply conditions within the area
Magnitude	Low as water requirements are considered relatively low
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.5.2.3. Impacts on Social Environment

6.5.2.3.1. Occupational Health and Safety

The decommissioning phase of the hybrid power plant raises significant concerns regarding occupational health and safety (OHS) for workers involved in dismantling activities. The process entails various hazards, including exposure to hazardous materials, such as asbestos or other toxic substances potentially present in older equipment, as well as risks from heavy machinery operation, falling debris, and noise pollution. These factors can lead to serious injuries, respiratory issues, or long-term health problems for workers if proper safety measures are not implemented.

Impact	Occupational health & safety
Type of impact	Negative
Type of effect	Direct
Duration	Short-term as it is expected during the decommissioning phase only
Reversibility	Could be irreversible as it could result in potential irreversible risks on health and safety
Receptor Sensitivity	High as safety s the Project's highest priority.
Magnitude	Low given that it is generally controlled throughout general best practice measurements
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.5.2.3.2. Gender-based Violence

The predominantly male workforce and stress of decommissioning activities can exacerbate power imbalances and vulnerabilities, leading to increased risks of sexual harassment, exploitation, and abuse, particularly for women and girls. Inadequate supervision, limited reporting mechanisms, and weak enforcement of protective measures contribute to GBV incidents. Preventive measures like strong policies, awareness training, and support services are crucial for community safety and a safe decommissioning process.

Impact	Gender-based violence
Type of impact	Negative
Type of Effect	Direct
Duration	Short term as it is expected during the construction phase only

Reversibility	Could be irreversible as it could result in potential irreversible risks on health and safety of the victims
Receptor Sensitivity	High on the basis that safety is the Project's highest priority.
Magnitude	Medium
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.5.2.3.3. Inadequate grievances management

As decommissioning activities often involve extensive dismantling, increased vehicle traffic, noise, and potential environmental impacts like dust or liquid waste leaks, community concerns are likely to rise. Without a reliable and accessible grievance mechanism, affected stakeholders may feel marginalized or unable to voice their concerns, potentially resulting in heightened frustration, protests, or legal challenges that could disrupt the decommissioning schedule and increase project costs. Unresolved grievances may also damage long-standing community relations, affecting the company's reputation and hindering future projects in the area.

Impact	Inadequate grievance management
Type of impact	Negative
Type of effect	Direct
Duration	Short-term during the decommissioning phase.
Reversibility	Reversible with adequate management of grievances
Receptor sensitivity	Medium
Magnitude	Low
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.5.2.3.4. Risks related to inadequate stakeholders management

As decommissioning often involves the dismantling of equipment, increased traffic, noise, and potential disruption to local communities, failing to actively engage stakeholders can result in misunderstandings, opposition, or mistrust. Without clear communication and inclusive consultation, community members may perceive decommissioning activities as harmful, particularly if they are concerned about land restoration, environmental impacts, or changes in local infrastructure. Unaddressed stakeholder concerns can lead to protests, project delays, or even legal challenges, thereby increasing costs and complicating the decommissioning process.

Impact	Risks related to inadequate stakeholder engagement
Type of impact	Negative
Type of effect	Direct
Duration	Short-term/long-term
Reversibility	Reversible with adequate stakeholders engagement
Receptor sensitivity	High
Magnitude	Low given the few neighbours around the project site
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.5.2.3.5. Labour Disputes

Labor disputes during the decommissioning phase can significantly affect the project's completion and the local economy. Workers may face uncertainty about job security, severance pay, or contract termination, leading to disputes over wages, benefits, and working conditions. These disputes can cause delays in decommissioning activities, increase project costs, and disrupt the community. Unresolved disputes can escalate tensions between the workforce, management, and local stakeholders, negatively affecting morale and productivity. Effective conflict resolution and communication strategies are crucial to mitigate these challenges.

Impact	Labour disputes
Type of impact	Negative
Type of Effect	Direct
Duration	Short term during the decommissioning phase
Reversibility	Reversible with appropriate mitigation measures
Receptor Sensitivity	High on the basis that it can disrupt timelines for decommissioning activities.
Magnitude	Medium
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Minor

6.5.2.3.6. Child and Forced Labour

The decommissioning phase of a project can lead to child and forced labor if improper practices are not enforced. This can increase vulnerability for marginalized groups, such as children, who may be subjected to coercion, exploitation, or unsafe working conditions. Child labor deprives young individuals of education and development opportunities, while forced labor violates human rights and dignity. Unethical practices can harm individuals, the project's reputation, and community trust. Strict monitoring and adherence to labor laws and ethical standards are crucial to prevent these issues and

ensure a fair and safe working environment.

Impact	Child and forced labour
Type of impact	Negative
Type of Effect	Direct
Duration	Short term during decommissioning phase
Reversibility	Reversible with appropriate mitigation measures
Receptor Sensitivity	High on the basis that it violates human rights
Magnitude	Medium
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.5.2.3.7. Security Risks

Gaalkacyo City, Somalia, faces security challenges such as sporadic threats from insurgent groups, local conflicts, and crime. The decommissioning phase can pose security risks, potentially causing theft, vandalism, or sabotage. The influx of temporary workers and job loss can lead to social unrest. A reduction in on-site security staff during this phase could expose the project to unauthorized access, increasing the risk of accidents or sabotage. These security challenges may result in delays, financial losses, and disruptions to the decommissioning process. To mitigate these risks, it is crucial to maintain robust security protocols, ensure proper site management, and engage with local stakeholders to minimize potential conflicts.

Impact	Security
Type of impact	Negative
Type of Effect	Direct
Duration	Short-term as it is expected during the construction phase only
Reversibility	Could be irreversible as it could result in potential irreversible risks on health and safety
Receptor Sensitivity	Medium given that could result in potential health and safety risks
Magnitude	Low given distance of any nearby settlements or villages
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Negligible

6.5.2.3.8. Community Health and Safety Risks

The decommissioning phase can significantly harm community health and safety due to increased risks from demolition work, waste handling, and improper disposal of hazardous materials. This can harm children, the elderly, and those with pre-existing conditions. The movement of heavy machinery and vehicles can increase accidents and injuries. Inadequate safety protocols and lack of communication with local residents can exacerbate these risks.

Impact	Community health and safety risks
Type of impact	Negative
Type of effect	Direct
Duration	Short-term as it is expected during the construction phase only
Reversibility	Could be irreversible as it could result in potential irreversible risks on health and safety
Receptor Sensitivity	High as safety is the Project's highest priority.
Magnitude	High as the number of road movements could be substantial when compared to the existing situation.
Significance of the impact without mitigation	Moderate
Significance of the impact with mitigation	Minor

6.5.2.3.9. Fire Hazards

During the decommissioning phase, fire hazards increase due to equipment dismantling and combustible materials. Inadequate fire prevention measures can exacerbate these risks, leading to injuries, property loss, and environmental damage. A fire outbreak can disrupt activities, delay project timelines, and strain emergency response resources. The smoke and pollutants released can also negatively impact air quality, posing health risks to nearby residents.

Impact	Fire hazards
Type of impact	Negative
Type of effect	Direct
Duration	Short-term during the decommissioning phase.
Reversibility	Could be irreversible as it could result in potential irreversible risks
Receptor sensitivity	High as safety is the Project's highest priority.
Magnitude	Low given that it is generally controlled throughout general best practice measurements
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Minor

6.5.2.3.10. Traffic Risks

During the decommissioning phase of a hybrid power plant, traffic risks can increase significantly due

to heightened movement of heavy machinery, transport vehicles, and personnel. The influx of these vehicles may lead to road congestion, particularly on narrow or poorly maintained access roads, posing safety hazards to the community and workers. Increased traffic volume can elevate the likelihood of road accidents, dust emissions, and noise disturbances, which can affect nearby residents' quality of life. Additionally, if traffic management is not adequately planned, there may be delays and potential conflicts with local road users, emphasizing the need for well-coordinated traffic control measures and community communication to mitigate these risks.

Impact	Fire hazards
Type of impact	Negative
Type of effect	Direct
Duration	Short-term during the decommissioning phase.
Reversibility	Reversible
Receptor sensitivity	High as safety is the Project's highest priority.
Magnitude	Low given that it is will be a short-term activity
Significance of the impact without mitigation	Minor
Significance of the impact with mitigation	Minor

6.6. SUMMARY OF THE IMPACTS

The tables below provide a summary of the key impacts of the Project on the physical, biological, and social environment and infrastructure and utilities during the construction, operation and decommissioning phases. The final specific plan and monitoring requirement for the project will be annexed to the ESIA while all inputs will be completed.

6.6.1. Construction Phase

Table 6-4: Summary of key impacts during the Construction phase of the solar plant

Impact	Attribute	Type of effect	Duration	Reversibility	Receptor Sensitivity	Magnitude	Significance without mitigation	Significance with mitigation
Impacts on biophysical environment	Landscape and visual	Direct	Long term	Irreversible	Low	Medium	Minor	Negligible
	Soil, ground/surface water contamination	Direct	Short term	Reversible	Low	Low	Moderate	Minor
	Air quality (Dust)	Direct	Short term	Reversible	Low	Medium	Moderate	Negligible
	Air quality (vehicle exhaust emissions)	Direct	Short-term	Reversible	Low	Medium	Moderate	Minor
	Noise and vibration	Direct	Short term	Reversible	Low	Medium	Minor	Negligible
	Biodiversity (Fauna)	Direct	Long-term	Irreversible	Low	Low/medium	Minor	Negligible
	Biodiversity (Flora)	Direct	Long-term	Reversible	Low	Low/medium	Minor	Minor
	Soil erosion	Direct/indirect	Short-term	Reversible	Low	Low	Minor	Minor
	Wastes (solid wastes)	Direct/indirect	Short-term	Reversible	Low	Low	Minor	Minor
	Wastes (liquid wastes)	Direct	Short-term	Reversible	Low	Low	Minor	Minor
Impacts on infrastructure and utilities	Water consumption	Direct	Short-term	Reversible	Medium	Low	Minor	Negligible
	Energy consumption	Direct	Short-term	Reversible	Low	Low	Minor	Negligible
Impacts on social environment	Archaeology and cultural heritage	Direct	Short term	Irreversible	Low	Medium	Minor	Negligible
	Trespassing of unauthorized personnel	Direct	Short term	Irreversible	High	Low	Minor	Negligible
	Worker influx – incoming workforce	Direct	Short term	Irreversible	High	Medium	Minor	Negligible
	Gender-based violence	Direct	Short term	Irreversible	High	Medium	Moderate	Minor
	Labour disputes	Direct	Short term	Irreversible	High	Medium	Moderate	Minor
	Child and forced labour	Direct	Short term	Irreversible	High	Medium	Moderate	Negligible
	Security risks	Direct	Short term	Irreversible	Medium	Low	Minor	Minor
	Occupational health and safety	Direct	Short term	Irreversible	High	Low	Minor	Negligible
	Community health and safety risks	Direct	Short term	Irreversible	High	High	Moderate	Minor
	Fire hazards	Direct	Short-term	Irreversible	High	Low	Minor	Negligible
	Traffic risks	Direct	Short/long-term	Irreversible	High	Low	Minor	Minor
	Risks related to inadequate stakeholders engagement	Direct	Short/long-term	Reversible	High	Low	Moderate	Minor
	Inadequate grievances management	Direct	Shor/long-term	Reversible	Medium	Low	Moderate	Minor

6.6.2. Operation Phase

Table 6-5: Summary of key impacts during the Operation phase of the solar plant

Impact	Attribute	Type of effect	Duration	Reversibility	Receptor Sensitivity	Magnitude	Significance without mitigation	Significance with mitigation
Impacts on biophysical environment	Landscape and visual	Direct/indirect	Long term	Irreversible	Low	Medium	Minor	Negligible
	Soil, ground/surface water contamination	Direct	Short-term	Reversible	Low	Low	Moderate	Minor

Impact	Attribute	Type of effect	Duration	Reversibility	Receptor Sensitivity	Magnitude	Significance without mitigation	Significance with mitigation
	Air quality (Dust)	Direct	Short-term	Reversible	Low	Low/medium	Minor	Negligible
	Air quality (Vehicle exhaust fumes emissions)	Direct	Short-term	Reversible	Low	Medium	Moderate	Minor
	Noise and vibration	Direct	Short-term	Reversible	Low	Medium	Minor	Negligible
	Biodiversity (Fauna)	Direct/indirect	Long-term	Irreversible	High	Low/medium	Minor	Negligible
	Biodiversity (Flora)	Direct/indirect	Long-term	Reversible	Low	Low	Minor	Negligible
	Soil erosion	Direct/indirect	Short-term	Reversible	Low	Low	Minor	Minor
	Wastes (Solid wastes)	Direct/indirect	Short-term	Reversible	Low	Low	Moderate	Minor
	Wastes (Liquid wastes)	Direct	Short-term	Reversible	Low	Low	Minor	Negligible
Impacts on infrastructure and utilities	Water consumption	Direct	Short/long-term	Reversible	Medium	Low	Minor	Minor
	Energy consumption	Direct	Short/long-term	Reversible	Low	Low	Minor	Minor
Impacts on social environment	Trespassing by unauthorized personnel	Direct	Short term	Irreversible	High	Lows	Minor	Negligible
	Gender-based violence	Direct	Short/long-term	Irreversible	High	Low/medium	Moderate	Minor
	Labour disputes	Direct	Short term	Reversible	High	Medium	Moderate	Minor
	Child and forced labour	Direct	Short term	Reversible	High	Medium	Minor	Negligible
	Security risks	Direct	Short-term	Irreversible	Medium	Low	Minor	Negligible
	Risks related to poor stakeholder engagement	Direct/indirect	Short/long-term	Reversible	Medium	Low/medium	Moderate	Minor
	Occupational health and safety	Direct	Long-term	Irreversible	High	Low	Moderate	Minor
	Community health and safety risks	Direct	Short/long-term	Irreversible	High	High	Moderate	Minor
	Fire hazards	Direct	Short/long-term	Irreversible	High	Low	Moderate	Minor

6.6.3. Decommissioning Phase

Table 6-6: Summary of key impacts during the decommissioning phase of the solar plant

Impact	Attribute	Type of effect	Duration	Reversibility	Receptor Sensitivity	Magnitude	Significance without mitigation	Significance with mitigation
Impacts on biophysical environment	Landscape and visual	Direct	Short term	irreversible	Low	Low	Minor	Minor
	Biological environment	Direct/indirect	Short term	Reversible/Irreversible	Low	Medium	Moderate	Minor
	Solid waste generation	Direct/indirect	Short-term	Reversible	Low	High	Major	Minor
	Liquid waste generation	Direct/indirect	Short-term	Reversible	Low	Moderate	Moderate	Minor
	Noise and vibration	Direct	Short-term	Reversible	Low	Medium	Minor	Negligible
	Air quality (dust)	Direct	Short-term	Reversible	Low	Medium	Moderate	Minor
	Air quality (vehicle/machinery fumes)	Direct	Short-term/long-term	Reversible	Low	Medium	Moderate	Minor
Impacts on infrastructure and utilities	Water consumption	Direct	Short-term	Reversible	Medium	Low	Minor	Negligible
Impacts on social environment	Occupational health and safety	Direct	Short term	Irreversible	High	Low	Moderate	Minor
	Gender-based violence	Direct	Short term	Irreversible	High	Low	Moderate	Minor
	Inadequate grievances management	Direct	Short-term	Reversible	Medium	Low	Moderate	Minor
	Risks related to inadequate stakeholders engagement	Direct	Short-term/long-term	Reversible	High	Low	Moderate	Minor
	Labour disputes	Direct	Short term	Irreversible	High	Low	Minor	Minor
	Child and forced labour	Direct	Short term	Irreversible	High	Low	Minor	Minor
	Security risk	Direct	Short term	Irreversible	High	Low	Minor	Negligible
	Community health and safety risks	Direct	Short term	Irreversible	High	Low	Moderate	Minor
	Fire hazards	Direct	Short term	Irreversible	High	Low	Minor	Minor
	Traffic risks	Direct	Short-term	Reversible	Low	Low	Minor	Minor

6.7. Assessment of Cumulative Impacts

The Environmental and Social Impact Assessment (ESIA) considered the cumulative impacts (Table 6-7) that could result from the additional impacts of other existing and/or planned developments in the area.

Table 6-7: Summary of key cumulative impacts for the proposed power plant project

Attribute	Cumulative Impacts
Landscape and visual	During the construction and operation phases, alterations to the natural topography, the introduction of industrial structures, and the associated infrastructure, such as access roads, may disrupt the area's visual harmony, potentially affecting local aesthetics and cultural connections to the landscape. These changes could influence community perceptions and the area's attractiveness for residential or recreational activities. Mitigating these impacts will require careful site selection, integration of visually compatible designs, and landscape rehabilitation measures, especially during the decommissioning phase, to restore visual balance and reduce long-term effects on the surrounding environment and community well-being.
Land Use	The conversion of land for the facility and associated infrastructure may disrupt traditional livelihoods reliant on pastoral activities, and alter the land's current usage patterns. These changes could intensify land-use conflicts, particularly in a region where access to land is critical for community sustenance and economic activities. Additionally, the project's footprint may limit the availability of land for future pastoral or residential development. Effective land-use planning, stakeholder engagement, and equitable compensation mechanisms are essential to minimize these impacts and ensure that the project's benefits are shared with affected communities.
Biodiversity	Land clearing for the plant and its infrastructure may lead to habitat fragmentation, and degradation, potentially affecting local flora and fauna, including species that rely on the area. The disturbance caused by construction activities, such as noise, dust, and increased human activity, could further disrupt any wildlife in the area. The introduction of invasive species or changes in vegetation dynamics may result in long-term ecological imbalances. These impacts could also affect local communities that rely on biodiversity for ecosystem services such as grazing. The "lake effect" likely to emerge from the project is likely to lead to incidences of bird collisions, especially during bird migration seasons. On a positive note, the shift to more renewable energy could reduce pollution and mitigate climate change, ultimately benefiting local ecosystems in the long term.
Air quality, and noise/vibrations	During the construction phase, activities such as land clearing and heavy machinery operation may temporarily increase dust and emissions, potentially degrading local air quality and impacting the health of nearby communities. However, once operational, the solar power plant will significantly reduce reliance on fossil fuels, leading to lower greenhouse gas emissions and improved air quality over time. In terms of noise, construction activities could generate sound disturbances, affecting the daily lives of residents. Conversely, solar power plants generally operate quietly, contributing to a reduction in long-term noise pollution. To mitigate adverse effects, it will be crucial to implement effective noise control measures during construction and monitor air quality, ensuring that the benefits of renewable energy transition do not come at the cost of community well-being.
Socio-economic conditions	The proposed solar power plant is poised to significantly influence the socio-economic conditions of the region, with both positive and negative implications. On the positive side, the project is likely to create job opportunities during construction and operation phases, enhancing local employment rates and contributing to economic development. Reliable access to electricity will stimulate local businesses, improve educational facilities, and increase healthcare service efficiency, fostering overall community well-being. However, the transition to a solar-powered economy may initially disrupt traditional livelihoods, particularly for those dependent on pastoralism or other land-based activities, raising concerns about potential displacement or changes in land use. Furthermore, if not managed inclusively, the project could exacerbate inequalities, with benefits skewed towards certain groups while marginalizing others. To optimize socio-economic outcomes, it is essential to engage local communities throughout the planning and implementation processes, ensuring that the benefits of renewable energy are equitably distributed and aligned with sustainable development goals.
Infrastructure, utilities and public services	The proposed hybrid power plant in Gaalkacyo, Somalia, is expected to have cumulative impacts on local infrastructure, utilities, and public services. The project's development will likely increase demand for existing road networks, water supply systems, and waste management services, potentially overburdening them if not adequately planned. The construction phase could exacerbate traffic congestion and road deterioration due to heavy equipment transport. Strains on utilities such as water and electricity may arise from workforce accommodation and operational needs. Conversely, the power plant offers opportunities to strengthen local infrastructure, improve electricity access, and enhance service delivery through investments in ancillary facilities. Effective planning, capacity building, and collaboration with local authorities will be crucial to managing these impacts and maximizing community benefits.
Occupational health and safety at workplace	On one hand, the shift towards cleaner energy sources could reduce air pollution and associated health risks such as respiratory illnesses, benefiting workers and the surrounding community. However, construction and operation of the plant may expose workers to physical hazards such as accidents, noise pollution, and exposure to chemicals or hazardous materials, potentially increasing risks of injury or chronic conditions. The influx of workers during construction could also strain local healthcare facilities and services, while changes in the local environment—such as increased traffic or disruption to existing ecosystems—could affect mental health and wellbeing. Proper health and safety measures, including risk assessments, worker training, and environmental monitoring, will be essential to mitigate these impacts and ensure the plant's benefits outweigh its potential harms.
Community health, safety and security	While the plant could provide a more stable and cleaner energy supply, potentially improving living conditions and reducing reliance on traditional, polluting energy sources like firewood and diesel, it also poses several risks. The potential for water contamination from the plant's waste products, along with the strain on local infrastructure and services due to an influx of workers, may also exacerbate existing health challenges. The overall impact on community health and safety will depend on the implementation of effective mitigation measures, including robust environmental management, public health monitoring, and community engagement strategies.

6.8. Project Vulnerability to Natural/Climate Related Hazards and Proposed Mitigation Measures

The proposed hybrid power plant by GECO in Gaalkacyo City, comprising solar PV, Battery Energy Storage System (BESS), and a diesel generator (Genset), is vulnerable to various natural and climate-related hazards. Given Gaalkacyo's arid and semi-arid climate, extreme heat and prolonged droughts could affect the efficiency of solar PV panels by reducing their energy output and increasing wear on system components. Additionally, dust storms, which are frequent in the region, may lead to the accumulation of dust on solar panels, reducing their efficiency and necessitating frequent cleaning. Furthermore, strong winds and occasional flash floods during heavy rainfall events pose risks to infrastructure, potentially causing damage to solar arrays, battery storage units, and electrical systems if not properly designed for resilience. Moreover, climate change-induced variability in weather patterns may increase the frequency of extreme weather events, potentially straining the hybrid system's operational stability. For instance, increased temperatures may affect battery storage efficiency, reducing its charge retention capacity over time. The reliance on diesel generators as a backup also presents challenges, as rising temperatures and supply chain disruptions due to extreme weather events could affect fuel availability and storage. To enhance resilience, the design and operation of the power plant must integrate climate adaptation strategies, such as robust structural foundations, dust-resistant solar panel coatings, proper drainage systems, and climate-smart maintenance schedules. Implementing these measures will be crucial to ensuring the long-term reliability and sustainability of the power plant in Gaalkacyo's dynamic environmental conditions.

Mitigation measures	
Protection against extreme heat	• Use high-temperature-resistant solar PV panels and components to maintain efficiency in Gaalkacyo's hot climate. • Install reflective coatings or shading mechanisms for BESS enclosures to minimize overheating and ensure optimal battery performance. • Implement active cooling or ventilation systems for battery storage units and gensets to prevent heat-related efficiency losses.
Dust and sand accumulation	• Use anti-soiling and dust-resistant coatings on solar panels to minimize efficiency losses. • Ensure regular cleaning/maintenance schedule for solar panels, battery units, and gensets to remove accumulated dust. • Install wind barriers or vegetation buffers around the site to reduce dust intrusion.
Protection against strong winds and storms	• Design solar panel mounting structures to withstand high wind speeds and ensure secure anchoring. • Reinforce BESS and genset enclosures to prevent damage from wind-driven debris. • Conduct periodic structural assessments and maintenance to identify vulnerabilities.
Flood and drainage	• Elevate critical equipment, including BESS and gensets, on raised platforms to prevent flood damage. • Design and implement a proper drainage system to prevent waterlogging around infrastructure. • Use waterproof enclosures for electrical components to mitigate risks from flash floods/heavy rainfall.
Climate-Resilient Energy Supply	• Incorporate hybrid system redundancies, such as additional battery capacity or backup generators, to ensure reliable power supply during extreme weather disruptions. • Optimize the energy management system to adapt to fluctuating solar energy generation caused by climate variability. • Diversify fuel storage and sourcing strategies to mitigate potential supply chain disruptions due to climate-related hazards.
Monitoring and Adaptive Management	• Establish a weather monitoring system on-site to track extreme conditions and inform operational adjustments. • Develop an emergency response and disaster recovery plan to ensure rapid restoration of operations in case of extreme events. • Conduct periodic risk assessments and integrate emerging climate adaptation technologies to enhance long-term resilience.

7.0. Mitigation, Monitoring and Reporting

This section examines the mitigation measures for the outlined impacts as assessed for the project (Section 6). It also gives detailed account on monitoring and reporting requirements for the mitigation measures. The mitigation measures together with the accompanying monitoring and reporting requirements have been pooled according to the project phases – construction, operation and decommissioning. The proposed solar power plant, presents a valuable opportunity to harness renewable energy and promote sustainable development, especially in the Galmudug State and in the FRS in general. However, like any large-scale infrastructure project, it has potential environmental and social impacts that need to be carefully managed. Effective impact mitigation measures and robust monitoring and reporting protocols are essential to minimize adverse effects on the local community, ecosystem, and landscape. These include addressing issues such as community health and safety, soil erosion, biodiversity conservation, energy consumption, and solid waste management. Monitoring and reporting requirements ensure that mitigation measures are consistently implemented, compliance is maintained, and any unforeseen impacts are swiftly addressed. By adopting these strategies, the proposed Hybrid power plant can operate sustainably while contributing positively to the region's energy needs.

Table 7-8: Mitigation measures, monitoring and reporting during the construction, operation and decommissioning phases for the proposed GECO Hybrid Power Plant

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
Impacts on biophysical environment	Landscape and visuals	• Erect a fence around the power plant.	Construction	• Presence of a perimeter fence
	Soil, ground/surface water contamination	• Scoop and correctly dispose contaminated soil. • Care must be exercised not to spill any fossil fuels • Construction vehicles must be maintained in good state. • Contractor to develop an oil-spill containment plan. • Ensure wastewater generated is discharged into approved drainages.	Construction	• Records of any leakages from construction equipment/ vehicles. • Oil spill containment plan. • Provision of fuel/oil drip and spill trays
	Air quality (Dust)	• Suppress dust during dry periods by use of water sprays; • Stockpiles of excavated soil should be covered/palliated • Burning of woody debris & construction waste to be prohibited • Ensure all the personnel use PPEs. • Restrict speed on loose surface roads during dry or dusty conditions • Trucks moving materials to site to be covered to prevent dust emissions.	Construction	• Visual Observation of dust Provision of PPEs especially masks
	Air quality (Vehicle exhaust emissions)	• All drivers vehicles must be sensitized not leave vehicles idling. • Maintain all machinery in good to minimize GHG emissions and PM.	Construction	• Engine maintenance records • Inspection of stacks
	Noise & vibration	• Use modern equipment fitted with noise-reduction technologies • Ensure regular maintenance of machinery to reduce noise emissions. • Establish a GRM for community to report noise or vibration disturbances. • Establish a monitoring to regularly measure noise and vibration levels. • Inform nearby communities in advance about and scheduled high-noise. • Provide appropriate PPEs to workers during construction activities. • Restrict construction activities to daylight hours (e.g., 7:00 AM to 6:00 PM).	Construction	• Noise levels-Records of noise measurements done by contractor within the project area and at distances of 30m from the Hybrid power plant

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
	Biodiversity (Fauna)	• Site clearing work/earthwork to be done during the dry season to minimize impacts on fauna. • Vehicle movements shall be limited to designated paved/unpaved roads and maintained at 15-20 km/h. • Site preparation shall minimize clearing of vegetation and topsoil. • Ensure wildlife-friendly designs for infrastructures. • Temporary-use areas shall be restored and revegetated • An ecologist shall be hired to coordinate the fauna monitoring.	Construction	• Full implementation of biodiversity management plan for the project • Regular biodiversity monitoring and reporting
	Biodiversity (Flora)	• Ensure proper demarcation and delineation of the project site to be affected by construction works. • Designate access routes and parking areas • Re-vegetation including planting of trees around the plant/facility	Construction	• Number of trees cleared • Planted trees
	Soil erosion	• Avoid ground-breaking during the seasons of high rainfall to avoid erosion. • Monitoring of areas of exposed soil during rainy seasons to ensure that any incidents of erosion are quickly controlled. • Construction related impacts like erosion and cut slope destabilizing should be addressed through landscaping and grassing, carting away and proper disposal of construction materials • Use silt traps where necessary • Monitoring of areas of exposed soil during rainy seasons to ensure that any incidents of erosion are quickly controlled. • Ensure spoil from excavations is arranged according to the various soil layers. This soil can then be returned during landscaping and then rehabilitation, in the correct order which they were removed that is top soil last	Construction	• Assess size of rills or Gulleys forming from accelerated run off from compacted areas
	Wastes (Solid wastes)	• All hazardous products and waste should be labelled and handled properly to avoid contact with the ground • Dispose hazardous waste through an approved waste handler • Segregate waste • Provide litter collection facilities such as bins • Contractor to put in place and comply with a site waste management plan • Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of waste generated over time • Recovery of materials remains and return to stores • Re-use of materials where possible • Proper budgeting to avoid waste generation • Proper disposal of waste in line with solid waste regulation • Construction wastes to be managed in accordance with internationally accepted construction standards of a hybrid	Construction	• Presence of well-maintained receptacles and centralized collection points.

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
		power plant		
	Wastes (Liquid wastes)	• All chemicals should be stored within the bunded areas and clearly labelled detailing the nature and quantity of chemicals within individual containers. • Create awareness for the employees on site on procedures of dealing with spills and leaks • Develop and implement a detailed Spill Prevention Plan (SPP) • Disposal of waste through septic tanks • Ensure secure storage of all hazardous materials, including fuel and oil, in compliance with local regulations. • Frequent inspection and maintenance of the generator to minimize leakages. • In case of spillage, the contractor should isolate the source of oil spill and contain the spillage using sandbags, sawdust, absorbent materials and/or other materials approved by materials. • In the event of accidental leaks, contaminated top soil should be scooped and disposed of appropriately. • Install oil-water separators in drainage systems to capture and remove oil or fuel from stormwater. • Keep accurate documentation of fuel and oil storage volumes, transfer activities, and inspection results to aid in compliance reporting and performance reviews. • Proper training for the handling and use of fuels for the operators of the power plant. • Provide sanitary waste facilities for both genders clearly marked • Refuelling and maintenance of vehicles will not take place at the construction site. • The waste oil or used oil must be disposed-off appropriately. • Vehicles and equipment must be serviced regularly and kept in good state to avoid leaks.	Construction	• Engine maintenance records • Oil spill containment plan • Presence of separate and clean washrooms for both the gents and ladies
Impacts on infrastructure and utilities	Water consumption	• Ensure prudent use of available water • Consultations with the project local committee on water use to avoid conflicts with the community • Source and utilize a sustainable and reliable water supply for both construction and operation phase.	Construction	• Water usage records
	Energy Consumption	• Ensure responsible electricity use at the construction site through sensitization of staff to conserve electricity. • Proper planning of transportation of materials will ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts. • Complementary to these measures, they monitor energy use during construction and set targets for reduction of energy use.	Construction	• Energy consumption records

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
Impacts on social environment	Archaeology and cultural heritage	• Develop and implement a Chance Finds Procedure and ensure protocols are followed. • Engage a qualified archaeologist to monitor all ground-disturbing activities to ensure early identification. • Establish a clear protocol for halting construction activities immediately if any archaeological or cultural materials are found. • If archaeological artefacts or sites are discovered, establish temporary buffer zones around these areas to protect them from further disturbance. • If chance finds are made, ensure proper documentation, including detailed records, photography, and GPS coordinates, before any further action is taken.	Construction	• Stratigraphic Soil profile reports during excavation • Fully developed artefact recovery protocols • Discovery of human burials reports during excavation. • Regulatory Compliance reporting under Somali Heritage Laws.
	Trespassing of unauthorized personnel	• Controlled access to the site only with prior approval • Fencing off the construction site to keep of unauthorized personnel • Hazard communication • Maintain records of any person who comes to site • Ensure proper barricading	Construction	• Presence of a controlled access and records of every person accessing the site
	Worker influx – incoming workforce	• Tap into the local workforce to the extent possible to reduce labour influx. • Recruit local workforce to the extent possible especially for unskilled and semi-skilled jobs. • Raise awareness among local community and workers on the need to have a good /cordial working relation • Sensitize workers regarding engagement with local community. • Establish and operationalize an effective GRM accessible to community members. • The contractor and the project/community grievance redress committee to work closely address complains raised on time. • Respect for community values/culture. • Prompt payment of workers as per the contractual agreements/terms.	Construction	• Records of employees/updated employee register. • Number of local community employees and external employees/ updated employee register.
	Gender-based violence	• Update the existing SEA/SH Prevention and Response Action Plan, to manage the SEA/SH risks that are relevant to the subproject. • Implement a code of conduct signed by all those with physical presence on site. • Establish Workers GRM with multiple channels including SEA/H channels. • Ensure that Code conducts are singed by all employers or incorporated in the employment contracts.	Construction	• Minutes of awareness creation sessions for the community and workers on GBV-SEA/SH. • Code of conduct signed by all those with physical presence on site. • GRM that ensures confidentiality of GBV cases in place. • Documented referral services for survivors. • Grievances raised, aggrieved persons and status on resolution etc.

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
	Labour disputes	• Ensure full compliance with local labor laws. • Ensure that all workers receive clear, written contracts outlining their rights, responsibilities, wages, benefits, working hours, and terms of employment. • Establish mechanisms to guarantee fair and timely payment of wages and benefits. • Establish worker welfare committees to represent labor concerns, promote dialogue, and facilitate the resolution of potential issues. • Implement and enforce non-discrimination policies to ensure equal treatment of all workers regardless of gender and clan. • Set up a formal, transparent grievance redress mechanism to handle worker complaints and disputes in a timely manner.	Construction	• Number of grievances filed and time taken to resolve them. • Frequency of labor disputes. • Health and safety violations. • Worker turnover rate and compliance with working hours and overtime rules. • Labor law compliance audits • Worker welfare committee activities.
	Child and forced labour	• Implement and monitor the employment register regularly. • Compliance with the national labor laws and labour management practices. • Put visible signage on site "No Jobs for children" • Do not allow children at the project site. • Adhere to the ESS 2 provisions and FRS Employment Act, which outlaws any form of forced labour. • Report any form of forced labour at the site.	Construction	• Updated employment register indicating locals employed, their ages, national identification numbers etc. • Grievances raised aggrieved persons and status on resolution etc. • Number of reported cases of forced labour.
	Security risks	• Conduct a comprehensive risk assessment to identify security threats. • Engage local stakeholders (government, law enforcement, and communities) to understand local security concerns. • Collaborate with local law enforcement and security agencies to provide support and enhance security measures. • Hire licensed security personnel familiar with the area to provide 24/7 site surveillance, patrols, and monitoring. • Use surveillance systems, such as CCTV cameras and motion sensors, to monitor critical areas in real-time. • Implement strict access control protocols, including identity verification and sign-in procedures for workers. • Provide workers with ID badges and restrict entry to authorized personnel only. • Develop a security incident response plan that includes procedures for evacuation, medical emergencies, and reporting incidents. • Provide workers with security training, and protocols for responding to security threats. • Maintain constant communication and coordination with local authorities regarding security updates and developments in the region.	Construction	• Number of security incidents and response time to security incidents. • Compliance with security protocols. • Incidents of unauthorized site access. • Grievances related to security. • Community engagement on security issues. • Security risk assessments. • Coordination with local law enforcement. • Security equipment functionality. • Frequency of security audits.

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
		• Prepare contingency plans for potential security scenarios, including kidnappings, armed attacks, and civil unrest. • Have security response teams on standby to address urgent security breaches or emergencies.		
	Occupational Health and safety	• Develop and implement a comprehensive OHS plan before the commencement of the project • Use skilled personnel for activities which demand skills/technical tasks • Workers coming to the site should be knowledgeable on safety precautions to take • Provide appropriate PPE to all workers. • Undertake risk assessment by contractor of the construction activities and implement mitigation measures appropriately • Availability of equipped first aid box on site • Provide safe drinking water for workers • Engagement of trained first aider on site • Establish safety committees	Construction	• Records of any near misses, incident, and accidents. • Records of corrective actions implemented if there was an accident.
	Community health and safety risks	• Allowing migrant workers time to be with their families • Awareness creation and consultations with local communities prior and during construction on the dangers of these diseases • Ensure equal treatment of workers • Informing workers on local cultural values and health matters. • The contractor is impressed upon not to set a construction camp on site. • The contractor will provide public education/information about HIV/AIDS transmission and prevention measures.	Construction	• Number of awareness creation sessions conducted.
	Fire Hazards	• 'No smoking' signs shall be posted at the construction site • A fire risk assessment and evacuation plan should be prepared and must be posted in various points of the construction site including procedures to take when a fire is reported. • Create awareness to the construction workers on potential fire hazards • Designate an assembly point • No smoking shall be done on construction site • Provision of firefighting equipment on site during construction.	Construction	• Records of any Fire incidences • Fire equipment and evacuation plan
	Traffic risks	• Develop and implement a Traffic Management Plan (TMP). • Use traffic signs, barriers, and cones to guide and direct both construction and local traffic. • Enforce strict speed limits for construction vehicles within the construction site and along designated transport routes. • Install speed bumps or other traffic-calming measures on roads near the construction site. • Engage with local communities to raise awareness about	Construction	• Number of traffic incidents. • Traffic management plan compliance. • Speed limit violations. • Traffic safety training attendance. • Community complaints related to traffic. • Emergency response time to traffic

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
		increased construction traffic and safety measures. • Erect temporary road signs warning local road users of construction activities and increased traffic. • Designate safe parking and loading zones for construction vehicles away from main roads and community spaces.		incidents. • Community awareness programs on traffic safety. • Use of alternative routes by construction vehicles.
	Risks related to Inadequate stakeholder engagement	• Update the existing SEP to make it more relevant to the subproject and the identified stakeholders. • In line with the SEP, undertake adequate consultations prior to construction and throughout the project cycle with all segments of the community and other relevant stakeholders. • Prepare and implement a GRM to deal with grievances. • The grievance redress committee to include representatives from the community. • Sensitize stakeholders on SEP and GRM.	Construction	• Availability of and implementation of the Stakeholder Engagement Plan. • Number of stakeholder consultations held • Record of stakeholder consultations held (minutes of meetings and list of participants). • Information disclosed, to whom it was disclosed (Men, women, PWD, youth, vulnerable individuals and households etc., methods and languages used in the disclosure (culturally appropriate and accessible), grievances raised and status on resolution etc. • Concerns raised and actions raised.
	Inadequate grievances management	• Constitute a Local Grievances Committee is in consultation with all community segments, and incorporates the existing local dispute resolution mechanism. • Implement a worker's grievances mechanism. • Awareness on the culturally appropriate and accessible GRM to all community segments including VMGs, vulnerable individuals and households and CSOs • All reported grievances are logged, dated, processed, resolved and closed out in a timely manner. • Proportionate representation of VMGs and vulnerable individuals in the local grievances committee. • GRM provides for confidential reporting of particularly sensitive social aspects such as GBV, as well as anonymity.	Construction	• Local Grievances Committee in place, composition of committee, awareness of community and workers on project and worker GRMs, updated GRM logs, types of grievances • Availability of grievance redress process • Number of grievances reported • Number of grievances resolved in a timely manner • Number of grievances escalated to national courts and the World Bank Grievances Redress Service and Inspection Panel.
Impacts on biophysical environment	Landscape and visual	• Fence off the power plant.	Operation	• Presence of a perimeter fence
	Soil, ground/surface water contamination	• Infrastructure shall be designed to ensure that contaminated run-off does not reach water source i.e., earth dam. • Contractor to develop an oil-spill containment plan as part of the emergency response plan. • No vehicle maintenance and service shall be done at project site • Ensure that potential sources of petro-chemical pollution are handled in such a way to reduce chances of spills and leaks.	Operation	• Oil spill containment plan. • Provision of fuel/oil drip and spill trays
	Air quality (Dust)	• Trees can be planted around the plant/facility provided they	Operation	• Visual inspection

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
		do not cast shadows to the solar panels to act as wind breakers and hence decrease dust pollution • Ensure planting of grass around and within the facility compound		
	Air quality (Vehicle fumes emissions)	*Vehicles* • Maintain all machinery and equipment in good working order to ensure minimum emissions of carbon monoxide, NO2, SO2 and suspended particulate matter. *Generators* • Use of diesel which is Sulphur- free to run the power producing generators to be encouraged • The stack chimney of the generators will be increased from its normal height of 3 meters to 6 meters • Invest in modern diesel generators with advanced combustion systems. • Install Diesel Particulate Filters (DPF) in each generator to trap particulate matter. • Use Selective Catalytic Reduction (SCR) to significantly reduce NOx emissions by injecting ammonia or urea into the exhaust stream. • Install Oxidation Catalysts: these catalysts to reduce carbon monoxide (CO) and volatile organic compound (VOC) emissions. • Ensure regular maintenance of diesel generators to maintain optimal efficiency, minimize fuel consumption, and reduce emissions. • Regularly monitor emissions and adjust generator performance to ensure compliance with environmental standards. • Implement strategies to reduce idling time when diesel generators are not needed or can be supplemented by the hybrid system. • Regularly report emissions data to local regulatory authorities as part of environmental compliance.	Operation	• Engine maintenance records • Inspection of stacks
	Noise & vibration	*Genset* • Install soundproof enclosures around the diesel generators • Construct barriers or walls around the generators to block or deflect sound away from sensitive areas. • Use anti-vibration mounts or isolators under the generator to minimize the transmission of vibrations • Ensure regular servicing of the diesel generator to maintain its optimal function. • Install high-performance silencers on the generator's exhaust system to reduce noise emissions • Use flexible connectors on the exhaust system to reduce vibrations that can amplify noise.	Operation	• Noise levels-Records of noise measurements done by contractor within the project area and at distances of 30m from the Hybrid power plant

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
		BESS • Install soundproof or acoustically treated enclosures around noisy inverters and transformers. • Use quieter, high-efficiency fans and cooling systems, or design them with lower noise outputs. • Equip the BESS unit with vibration isolators or mounts to reduce noise generated by vibrations • Install sound barriers or walls around the BESS unit to deflect or absorb noise. • Use sound-absorbing materials within the BESS unit's housing to absorb sound before it escapes. • Regularly service and maintain fans, inverters, and other equipment to ensure they operate smoothly		
	Biodiversity (Fauna)	• Ensure wildlife-friendly designs for infrastructures. • An ecologist shall be hired to coordinate the fauna monitoring. • Bird deterrents will be installed to prevent collisions with solar panels. • Post-construction monitoring will be undertaken to assess the impacts on local fauna and adapt mitigation strategies.	Operation	Full implementation of biodiversity management plan for the project Regular biodiversity monitoring and reporting
	Biodiversity (Flora)	• Re-vegetation including planting of trees around the plant/facility	Operation	• Number of trees cleared • Planted trees
	Soil erosion	• Monitoring of areas of exposed soil during rainy seasons to ensure that any incidents of erosion are quickly controlled. • Landscaping with grass on areas without electrical installation (lower areas) • Construct the drainage system in a way to follow natural drain of the water • Concrete only the required area and leave the rest of the land with vegetation like grass • Construct rain water harvesting system on the control buildings/office and harness into storage tanks for use	Operation	• Assess size of rills or Gulleys forming from accelerated run off from compacted areas • Provision of a drainage system and a rain water harvesting system
	Wastes (Solid wastes)	• Provide waste handling facilities such as labelled waste bins • Emphasis on prudent waste generation and give priority to reduction at source • Undertake solid waste management awareness to operators • Operator to contract a licensed waste handler to collect and dispose solid waste *Damaged solar panels and hazardous wastes* • Ensure segregation from other waste streams • All hazardous products and waste should be labelled and handled properly to avoid contact with the ground • Dispose hazardous waste through an approved waste handler	Operation	• Presence of well-maintained receptacles and centralized collection points.
	Wastes (Liquid wastes)	*Sanitary wastes*	Operation	• Presence of separate and clean

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
		• Provide sanitary waste facilities for both genders clearly marked • Disposal of waste through septic tanks *Oils from vehicles* • Refuelling and maintenance of vehicles will not take place at the construction site. • Create awareness for the employees on site on procedures of dealing with spills and leaks • Vehicles and equipment must be serviced regularly and kept in good state to avoid leaks. *Chemicals* • All chemicals should be stored within the bunded areas and clearly labelled detailing the nature and quantity of chemicals within individual containers. *Generators* • Proper storage of the oil is required to ensure no leakages • Frequent inspection and maintenance of the generator to minimize leakages. • No vehicles should be serviced or maintained at the project site. • The waste oil or used oil must be disposed-off appropriately. • Proper training for the handling and use of fuels for the operators of the power plant. • In the event of accidental leaks, contaminated top soil should be scooped and disposed of appropriately. *Accidental fuel and oil spill* • Develop and implement a detailed Spill Prevention Plan (SPP) • Ensure that secondary containment systems are in place for all fuel storage tanks, oil storage areas, and transformers. • Conduct regular maintenance checks on fuel tanks, pipelines, transformers, generators, and other oil equipment. • Install spill and leak detection systems on fuel storage tanks, transformers, and pipelines. • Implement safe fuel handling protocols to reduce the risk of spills during fuel transfers. • Set up a routine for monitoring fuel and oil storage areas, and other fuel-handling equipment for leaks or wear. • Ensure quick clean up of spills by designated response teams trained in handling hazardous materials. • Install oil-water separators in drainage systems to capture and remove oil or fuel from stormwater. • Establish proper waste management protocols for the		washrooms for both the gents and ladies. • Engine maintenance records • Oil spill containment plan • Records of all accidental spills and number of Litres

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
		disposal of used oil, fuel, and filters from equipment maintenance activities. • Implement a regular environmental monitoring program to check for any signs of contamination in soil, groundwater, and surface water near the plant. • Ensure secure storage of all hazardous materials, including fuel and oil, in compliance with local regulations. • Keep accurate documentation of fuel and oil storage volumes, transfer activities, and inspection results to aid in compliance reporting and performance reviews.		
Impacts on infrastructure and utilities	Water consumption	• Ensure prudent use of water. • Install water-conserving automatic taps. • Any water leaks through damaged pipes and faulty taps should be fixed promptly.	Operation	• Water usage records
	Energy consumption	*Lightings* • Install an energy-efficient lighting system • Replace conventional lighting with energy-efficient LED bulbs • Utilize daylight sensors to adjust indoor lighting levels based on the amount of natural light, reducing the need for artificial lighting during the day. • Integrate lighting controls into the plant's energy management system to monitor and optimize energy use in real-time. • Conduct periodic energy audits to evaluate lighting energy consumption and identify areas for further improvement. *Diesel generators* • Implement energy-efficient technologies and practices in plant operations. • Conduct scheduled maintenance and servicing of diesel generators. • Regularly review and adjust the hybrid power system's configuration to optimize the balance between solar, BESS, and diesel power, reducing diesel generator runtime. • Ensure high quality, low-sulphur diesel is used to improve generator efficiency and reduce fuel consumption and emissions. • Implement measures to reduce unnecessary idling of diesel generators. • Provide training to operational staff on energy-efficient practices and optimal use of the hybrid system to minimize diesel reliance. • Install technologies such as diesel particulate filters (DPF) or catalytic converters to reduce the environmental impact of diesel consumption and improve overall generator efficiency.	Operation	• Diesel Generator Usage (hours/month): • Solar Energy Generation (kWh/month): • Battery Energy Storage System (BESS) Utilization (cycles/month). • Lighting Energy Consumption (kWh/month). • Maintenance Records for Diesel Generators. • Carbon Emissions (tons of CO2/month).

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
Impacts on social environment	Trespassing of unauthorized personnel	• Fencing off the facility to keep of community members, children and livestock from entering into the facility • Controlled access to the site only with prior approval • Maintain records of any person who comes to site	Operation	• Presence of a controlled access and records of every person accessing the site
	Gender-based violence	*GBV- SEA and SH* • Update the existing SEA/SH Prevention and Response Action Plan, to manage the SEA/SH risks that are relevant to the subproject. • The Action Plan to be proportionate to potential SEA/SH risks, and includes measures such as awareness creation for communities and workers; identification of referral services for survivors and a GRM that ensures confidential reporting of GBV cases. • Implement a code of conduct signed by all those with physical presence on site. • Establish Workers GRM with multiple channels including SEA/H channels. • Ensure that Code conducts are singed by all employers or incorporated in the employment contracts. *Inaccessibility of project benefits to VMGs and other vulnerable individuals due to affordability challenges* • Consult VMGs and Vulnerable individuals and households on charges for sub project services and put in place specific interventions to ensure the vulnerable equally access project benefits.	Operation	• Minutes of awareness creation sessions for the community and workers on GBV-SEA/SH. • Documented referral services for survivors. • Interventions to enable those vulnerable access project benefits. • Number of complaints raised by VMGs/vulnerable individuals regarding access to project services.
	Labour disputes	• Ensure all employees have clear and legally binding employment contracts that outline their rights, responsibilities, wages, and benefits to prevent misunderstandings. • Establish an accessible, transparent grievance mechanism for workers to voice their concerns or disputes. • Maintain open communication between management and workers. • Ensure full compliance with national labour laws. • Implement fair and transparent disciplinary procedures. • Promote equal opportunities and non-discriminatory practices in hiring, promotion, and compensation to avoid conflicts. • Set up a monitoring system to track and evaluate labour relations, allowing for early detection of potential disputes and timely intervention. • Conduct regular worker feedback surveys to gauge satisfaction and identify any emerging concerns that could lead to disputes.	Operation	• Number of Labour Disputes Raised (disputes/month): • Grievances Resolved Within Agreed Timeframe (percentage): • Worker Turnover Rate (percentage). • Number of Grievances Filed Regarding Wages or Compensation (grievances/month). • Number of Labour Dispute Awareness Campaigns (number/year).
	Child and forced labour	• Compliance with the national labor laws and labour	Operation	• Number of child labour incidents

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
		management practices. • Put visible signage on site "No Jobs for children" • -Do not allow children at the project site. • Adhere to the ESS 2 provisions and FRS Employment Act, which outlaws any form of forced labour. • Report any form of forced labour at the site.		reported (incidents/month). • Number of forced labour incidents reported (incidents/year). • Grievances related to child or forced labour (number of grievances/year). • Community outreach and awareness campaigns on child labour (campaigns/year). • Compliance with international labour standards (compliance level). • Social audits conducted (number of audits/year). • Local community feedback on employment practices (satisfaction level).
	Security risks	• Monitor local security developments and adjust security protocols accordingly. • Maintain a secure perimeter with robust fencing of the site • Use remote monitoring where feasible, with a centralized control room for real-time surveillance and immediate response. • Enforce strict access control measures, ensuring that only authorized personnel can enter the facility. • Deploy trained security personnel to guard the site 24/7. • Continue engaging local communities to foster positive relationships and minimize hostility. • Maintain and regularly update a comprehensive security incident response plan • Maintain close coordination with local law enforcement and security agencies • Implement a rigorous vetting process for all employees to minimize the risk of insider threats. • Develop and periodically review contingency plans for worst-case scenarios, such as armed attacks, civil unrest, or natural disasters.	Operation	• Number of security incidents reported (incidents/month): • Number of security audits conducted (audits/year): • Community engagement activities held (number/year): • Incidents of violence or threats against staff (number/year). • Collaboration with local law enforcement (number of meetings/year). • Number of partnerships established with security and NGOs (active partnerships).
	Risks related to poor or inadequate stakeholder engagement (Conflict)	*Risks related to Inadequate stakeholder engagement* • Update the existing SEP to make it more relevant to the subproject and the identified stakeholders. • Timely and prior disclosure of project all project information, including project instruments, the full rights and entitlements of project affected persons, sub-project positive and negative impacts and opportunities, proposed subproject budget. • In line with the SEP, undertake adequate consultations prior to construction and throughout the project cycle with all segments of the community and other relevant stakeholders. • Prepare and implement a grievance redress mechanism to	Operation	• Availability of and implementation of the Stakeholder Engagement Plan. • Number of stakeholder consultations held • Record of stakeholder consultations held (minutes of meetings and list of participants). • Availability of grievance redress process.

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
		deal with grievances. • The grievance redress committee to include representatives from the community. • Sensitize stakeholders on SEP and GRM. *Inadequate grievances management* • Employ from the community to the extent possible • Engage the community members and other stakeholders in a timely manner • Work closely with the GRM committee members in solving the conflicts • Solve all conflicts/grievances at the earliest time possible • Ensure all grievances are logged and closed • Monitoring the pattern of grievances to come up will long term measures		
	Occupational health and Safety	• Ensure only qualified staff are employed to work in the facility • All workers operating the project site must be equipped with appropriate and adequate person protective equipment (PPE) such as; safety footwear, helmet among others. • Operators must be skilled on firefighting management • Annual EHS audits should be done	Operation	• Provision of PPEs and WIBA cover • Environmental audit reports
	Community health and safety risks	*Public Health Impacts* • Informing workers on local cultural values and health matters. • Allowing migrant workers time to be with their families • Ensure equal treatment of workers. *Shocks and electrocutions* • Inspect the wiring of the houses before connecting power • Safety awareness campaigns to the community before connection of power on safety precautions such as: • Require community to engage a certified technician to do wiring in the premises • Use of quality materials while wiring • Refraining from individual illegal extensions of power lines to other houses • Observing safety measures while using electricity such as not touching sockets and switches with wet hands or wiping with wet cloths • Keeping off all electricity infrastructure e.g., not tying livestock on electric poles, no cutting earth wires that run along some electric poles, not interfering with sockets or switches • Reporting any electric wire/conductors if found fallen on the ground • Report any incident regarding electricity at the local office – staff in charge of operating the power plant.	Operation	• Number of awareness creation sessions conducted. • Records of awareness sessions conducted • Incidences report • Number of awareness creation sessions conducted.

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
		Public Health Impacts –HIV/AIDs • Sensitize workers and the community on prevention and mitigation of HIV/AIDS and other sexually transmitted diseases, through staff awareness and awareness campaigns for the community • Allowing migrant workers time to be with their families		
	Fire hazards	• The power plant must contain firefighting equipment (Portable fire extinguishers) of recommended standards and in key strategic points, including diesel generators, fuel storage areas, BESS locations, etc. • Detection/alarm systems that can detect fire should be and installed • A fire evacuation plan should be prepared and posted at strategic points and should include procedures to take when a fire is reported. • Workers especially operators of the plant must be trained on fire management • 'No smoking' signs shall be posted within the power plant area • A fire Assembly point should be identified and marked	Operation	• Provision of serviced fire equipment, evacuation plan and safety signages • Records of fire safety training
Impacts on biophysical environment	Landscape and visual	• Create a comprehensive decommissioning plan that includes strategies for minimizing visual impacts on the landscape. • Implement a revegetation plan using native plants and vegetation to restore the natural landscape and improve visual aesthetics. • Ensure proper management and disposal of all debris and waste materials to prevent visual pollution in the surrounding landscape. • Conduct regular clean-up and maintenance of the site to remove any debris or unsightly materials, ensuring a tidy landscape. • Install informational signs explaining the decommissioning process and future land use plans, promoting transparency and community understanding. • Provide regular updates to stakeholders on decommissioning progress and visual impacts, ensuring ongoing communication and involvement.	Decommissioning	• Photographic documentation: • Vegetation health monitoring: • Number of complaints: • Soil erosion assessment: • Public awareness programs participation. • Community engagement metrics.
	Biological environment	• Develop habitat protection plans that outline specific measures to protect sensitive habitats, such as wetlands, flora, and fauna during decommissioning. • Implement erosion and sediment control measures to protect soil and water quality, preventing sediment runoff into adjacent habitats. • Plan for revegetation and habitat restoration using native plant species after decommissioning to promote biodiversity and ecosystem recovery.	Decommissioning	• Biodiversity surveys. • Community engagement records. • Erosion and sedimentation rates. • Flora and fauna species lists. • Habitat quality assessments. • Invasive species monitoring. • Vegetation health monitoring.

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
		• Monitor and manage invasive species during and after decommissioning to prevent their spread into disturbed areas. • Implement measures to control noise and vibration during decommissioning to minimize disturbance to local wildlife. • Ensure proper disposal of waste materials to prevent pollution and harm to the biological environment. • Engage with local communities to raise awareness about the importance of protecting the biological environment during decommissioning. • Work with environmental specialists and conservation organizations to develop and implement effective mitigation measures. • Develop detailed site restoration plans that include objectives, timelines, and responsibilities for restoring biological habitats post-decommissioning.		
	Solid Waste Generation	• Demolition contractor to adhere to the various manufacturer's guidelines and requirements regarding demolition and disposal • Segregation of waste in order to separate hazardous waste from non-hazardous waste and other streams of waste • Provision of facilities for proper handling and storage of demolition materials to reduce the amount of waste caused by damage or exposure to the elements • Adequate collection and storage of waste on site • Safe transportation to the disposal sites / designated area • Hazardous waste must be disposed by approved waste handler	Decommissioning	• Presence of well-maintained receptacles and centralized collection points
	Liquid Waste Generation	• Conduct a comprehensive assessment to identify and categorize all sources of liquid waste generated during decommissioning. • Develop a detailed liquid waste management plan outlining procedures for the collection, storage, treatment, and disposal of liquid wastes. • Establish temporary storage facilities for liquid wastes to prevent leaks or spills and ensure safe handling until proper disposal. • Whenever possible, use environmentally friendly materials and products that generate less hazardous liquid waste during decommissioning. • Ensure that all liquid wastes are disposed of in accordance with local regulations and environmental standards, using licensed waste disposal facilities. • Provide training for staff on liquid waste handling, storage, and emergency response procedures to minimize risks. • Identify opportunities for the reuse or recycling of liquid waste materials, where feasible, to minimize waste generation.	Decommissioning	• Liquid waste generation quantities. • Soil contamination assessments. • Incidence of spills and leaks. • Liquid waste management plan compliance. • Public reporting and complaints. • Community engagement metrics. • Volume of recovered reusable liquids.

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
		• Engage with the local community to inform them about liquid waste management practices and promote awareness of environmental protection. • Maintain accurate records of liquid waste management activities, including quantities generated, treatment methods, and disposal locations. • Prepare for emergencies related to liquid waste, including establishing an emergency contact list and response procedures. • Maintain an inventory of chemicals and hazardous substances to prevent unnecessary waste generation and facilitate proper management.		
	Noise and vibration	• Install portable barriers to shield compressors and other small stationary equipment where necessary. • Use quiet equipment (i.e., equipment designed with noise control elements). • Co-ordinate with relevant agencies in case the noise produced will require a license. • Limit pickup trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use and encourage workers to shut off vehicle engines whenever possible. • Demolish mainly during the day when most of the neighbours are out working.	Decommissioning	• Noise levels-Records of noise measurements done by contractor within the project area and at distances of 30m from the project site
	Air quality (dust)	• Use water sprays or misting systems to dampen surfaces and reduce dust generation, particularly on unpaved roads and active work areas. • Implement soil stabilization techniques, such as using binders or applying vegetation, to minimize dust from disturbed soil areas. • Enforce speed limits for vehicles operating on-site and on access roads to reduce dust emissions from vehicle traffic. • Use tarps or other coverings to protect stockpiles of loose materials from wind erosion and dust generation. • Engage with local communities to inform them about decommissioning activities and measures being taken to control dust emissions. • Conduct regular inspections to identify potential sources of dust emissions and ensure that mitigation measures are effectively implemented. • Plan for site rehabilitation after decommissioning to restore vegetation cover, which can help prevent dust generation in the long term.	Decommissioning	• Community complaints and feedback. • Cumulative dust impact assessment. • Effectiveness of dust control measures. • Health impact assessments. • Long-term dust emission trends. • Post-activity dust clean-up reports. • Public awareness programs participation. • Soil and vegetation dust monitoring. • Traffic patterns and impact assessment. • Visual assessment of dust levels.
	Air quality (vehicle & machinery fumes)	• Use high-quality fuels with lower sulphur content to minimize emissions from vehicles and generators. • Implement a regular maintenance schedule for all vehicles and generators to ensure they operate efficiently and emit fewer fumes.	Decommissioning	• Community complaints and feedback. • Cumulative emission impact assessment: • Environmental compliance audits.

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
		• Optimize generator operation by running them only when necessary and using them at optimal loads to reduce emissions. • Implement policies to minimize idling time for vehicles and generators, encouraging operators to turn off engines when not in use. • Provide training for drivers and equipment operators on eco-driving practices that reduce fuel consumption and emissions. • Establish an air quality-monitoring program to track emissions from vehicles and generators and ensure compliance with local regulations. • Engage with local communities to inform them about emissions reduction efforts and address any concerns related to air quality. • Conduct scheduled checks to ensure that exhaust systems and emission control devices are functioning correctly. • Establish a reporting system for emissions data to track progress and compliance with environmental standards.		• Health impact assessment reports. • Long-term emission trends. • Maintenance records of vehicles.
Impacts on Infrastructure & Utilities	Water Consumption	• Conduct a comprehensive assessment to evaluate water needs for decommissioning activities and identify opportunities for reduction. • Develop a water management plan that outlines strategies for minimizing water consumption throughout the decommissioning process. • Implement systems to recycle and reuse water for various tasks, such as dust suppression, equipment washing, and site clean-up. • Provide training for personnel on water conservation practices and the importance of minimizing water use during decommissioning. • Engage with local communities to raise awareness about water conservation efforts and the importance of sustainable water management. • Use temporary storage solutions to manage water supplies efficiently and reduce waste. • Implement measures to prevent leaks and spills from water storage and distribution systems. • Provide periodic updates to stakeholders and the community on water management practices and progress in reducing consumption.	Decommissioning	• Community feedback • Compliance with water usage regulations: • Impact on local water resources: • Mitigation measure implementation records. • Water consumption efficiency • Water recycling rates: • Water usage quantities and supply.

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
Impacts on social environment	Occupational health and safety	• Conduct a thorough occupational health and safety risk assessment to identify hazards associated with decommissioning activities. • Create a comprehensive occupational health and safety management plan outlining procedures, responsibilities, and protocols to mitigate identified risks. • Ensure that all workers are equipped with appropriate PPE, such as helmets, gloves, goggles, and respiratory protection, to minimize exposure to hazards. • Conduct regular safety inspections of the worksite to identify and address potential hazards promptly. • Establish clear emergency response procedures for incidents such as fires, chemical spills, and medical emergencies, and ensure all workers are trained in these procedures. • Develop and enforce safe work practices and standard operating procedures for decommissioning tasks, including equipment handling, dismantling, and waste disposal. • Provide first aid facilities and ensure that trained personnel are available to respond to medical emergencies on-site. • Implement measures to control noise and vibration levels during decommissioning activities, such as using quieter equipment and scheduling high-noise activities appropriately. • Ensure that all contractors and subcontractors adhere to the same occupational health and safety standards as the main contractor.	Decommissioning	• Incident reporting and tracking. • Health and safety training participation. • Personal protective equipment (PPE) compliance. • Safety audits and inspections. • First aid response records. • Compliance with safety regulations. • Incident investigation reports.
	Gender-based violence	• Update the existing SEA/SH Prevention and Response Action Plan, to manage the SEA/SH risks that are relevant to the subproject. • The Action Plan to be proportionate to potential SEA/SH risks, and includes measures such as awareness creation for communities and workers; identification of referral services for survivors and a GRM that ensures confidential reporting of GBV cases. • Implement a code of conduct signed by all those with physical presence on site. • Establish Workers GRM with multiple channels including SEA/H channels. • Ensure that Code conducts are singed by all employers or incorporated in the employment contracts.	Decommissioning	• Minutes of awareness creation sessions for the community and workers on GBV-SEA/SH. • Code of conduct signed by all those with physical presence on site. • GRM that ensures confidentiality of GBV cases in place. • Documented referral services for survivors. • Grievances raised, aggrieved persons and status on resolution etc.
	Inadequate grievances management	• Constitute a Local Grievances Committee is in consultation with all community segments, and incorporates the existing local dispute resolution mechanism. • Implement a worker's grievances mechanism. • All reported grievances are logged, dated, processed, resolved and closed out in a timely manner. • Proportionate representation of VMGs and vulnerable	Decommissioning	• Local Grievances Committee in place, composition of committee, awareness of community and workers on project and worker GRMs, updated GRM logs, types of grievances • Availability of grievance redress

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
		individuals in the local grievances committee. • GRM provides for confidential reporting of particularly sensitive social aspects such as GBV, as well as anonymity.		process • Number of grievances reported • Number of grievances resolved in a timely manner • Number of grievances escalated to national courts and the World Bank Grievances Redress Service and Inspection Panel.
	Risks related to Inadequate stakeholder engagement	• Conduct a comprehensive stakeholder mapping exercise to identify all relevant stakeholders, including local communities, government agencies, NGOs, and other affected parties. • Develop a stakeholder engagement strategy that outlines the objectives, methods, and timelines for engaging with different stakeholders throughout the decommissioning process. • Organize public consultations and forums to solicit feedback from stakeholders, ensuring their voices are heard and concerns are addressed. • Invest in building the capacity of local communities and stakeholders to engage in the decommissioning process effectively, providing training and resources as needed. • Collaborate with local leaders and community organizations to facilitate trust-building and effective engagement with the community. • Provide regular updates and reports to stakeholders on the progress of decommissioning activities and how stakeholder feedback has influenced decisions. • Ensure that women and vulnerable groups are actively involved in stakeholder engagement processes, addressing any barriers they may face in participation.	Decommissioning	• Frequency of stakeholder meetings. • Documentation of stakeholder concerns. • Follow-up actions on feedback. • Community representation in decision-making. • Collaboration with local organizations. • Long-term engagement strategies.
	Labour disputes	• Ensure all employees have clear and legally binding employment contracts that outline their rights, responsibilities, wages, and benefits to prevent misunderstandings. • Establish an accessible, transparent grievance mechanism for workers to voice their concerns or disputes. • Maintain open communication between management and workers. • Ensure full compliance with national labour laws. • Implement fair and transparent disciplinary procedures. • Promote equal opportunities and non-discriminatory practices in hiring, promotion, and compensation to avoid conflicts. • Set up a monitoring system to track and evaluate labour relations, allowing for early detection of potential disputes and timely intervention. • Conduct regular worker feedback surveys to gauge	Decommissioning	• Number of Labour Disputes Raised (disputes/month): • Grievances Resolved Within Agreed Timeframe (percentage): • Worker Turnover Rate (percentage). • Number of Grievances Filed Regarding Wages or Compensation (grievances/month). • Number of Labour Dispute Awareness Campaigns (number/year).

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
		satisfaction and identify any emerging concerns that could lead to disputes.		
	Child and forced labour	• Adhere to the ESS 2 provisions and FRS Employment Act, which outlaws any form of forced labour. • Report any form of forced labour at the site. • Compliance with the national labor laws and labour management practices. • Put visible signage on site "No Jobs for children" • -Do not allow children at the project site.	Decommissioning	• Number of reported cases of forced labour. • Updated employment register indicating locals employed, their ages, national identification numbers etc. • Grievances raised, aggrieved persons and status on resolution etc.
	Security risks	• Conduct a thorough security risk assessment to identify potential threats and vulnerabilities associated with the decommissioning activities. • Create a comprehensive security plan that outlines specific measures, protocols, and responsibilities for ensuring site security during decommissioning. • Employ trained security personnel to monitor the site, control access, and respond to security incidents as they arise. • Establish partnerships with local law enforcement and security agencies to enhance overall security coordination and response. • Engage with local communities to build trust and cooperation, encouraging them to report suspicious activities or security concerns. • Implement strict access control procedures to limit entry to authorized personnel only, including the use of identification badges or passes. • Develop and communicate an emergency response plan that outlines procedures for handling security incidents, including evacuation protocols. • Develop a crisis communication plan to inform stakeholders and the community about security incidents promptly and transparently. • Provide training on risk mitigation strategies for all personnel involved in the decommissioning activities.	Decommissioning	• Incident reports. • Access control measures. • Response time to security incidents. • Training of security personnel. • Community security awareness programs. • Stakeholder feedback on security. • Analysis of security trends. • Feedback from security personnel.
	Community health and safety risks	• Conduct a comprehensive assessment to identify potential health and safety risks to the local community during the decommissioning process. • Create a health and safety management plan that outlines strategies for minimizing risks and protecting community health during decommissioning activities. • Develop and communicate an emergency response plan that includes protocols for medical emergencies, environmental incidents, and community evacuations if necessary. • Engage with local communities regularly to gather feedback, address concerns, and provide updates on	Decommissioning	• Health incident reports. • Community health assessments. • Feedback mechanisms for community concerns. • Community satisfaction surveys. • Communication of health risks. • Injury rate monitoring. • Environmental health audits. • Documentation of community feedback.

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
		decommissioning activities and safety measures. • Implement measures to minimize noise pollution during decommissioning. • Develop a traffic management plan to control vehicle movement to and from the site, reducing risks of accidents and ensuring safe access for the community. • Implement dust suppression measures, such as regular watering of the site, to minimize dust emissions that can affect community health. • Ensure proper waste management practices to prevent contamination of land and water resources, which could affect community health. • Implement sustainable decommissioning practices that prioritize community health and safety while minimizing environmental impacts. • Establish a feedback mechanism that allows community members to report health and safety concerns related to the decommissioning process.		
	Fire hazards	• Conduct a comprehensive fire risk assessment to identify potential fire hazards associated with decommissioning activities and materials. • Create a fire safety plan that outlines prevention measures, emergency response protocols, and responsibilities for all personnel involved in decommissioning. • Provide fire safety training for all workers, covering fire prevention, emergency procedures, and the proper use of firefighting equipment. • Ensure the availability of adequate firefighting equipment, such as fire extinguishers, hoses, and water sources, in easily accessible locations throughout the site. • Store flammable materials in designated, secure areas away from ignition sources, following appropriate storage guidelines. • Establish firebreaks or cleared areas around the site to help prevent the spread of fire. • Use clear signage to indicate fire exits, assembly points, and locations of firefighting equipment throughout the site. • Minimize the accumulation of combustible waste materials on-site and establish a routine waste removal process. • Establish communication and coordination with local fire services to ensure a rapid response in case of a fire emergency. • Ensure an adequate supply of water is readily available for firefighting purposes, including water tanks or ponds if necessary.	Decommissioning	• Fire incident reports. • Fire risk assessments. • Documentation of fire hazards. • Monitoring of flammable materials storage. • Documentation of community feedback on fire safety.
	Traffic risks	• Develop and implement a Traffic Management Plan (TMP). • Use traffic signs, barriers, and cones to guide and direct both construction and local traffic.	Decommissioning	• Number of traffic incidents. • Traffic management plan compliance.

IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	PROJECT PHASE	MONITORING INDICATOR
		• Enforce strict speed limits for construction vehicles within the construction site and along designated transport routes. • Install speed bumps or other traffic-calming measures on roads near the construction site. • Engage with local communities to raise awareness about increased construction traffic and safety measures. • Erect temporary road signs warning local road users of construction activities and increased traffic. • Designate safe parking and loading zones for construction vehicles away from main roads and community spaces.		• Speed limit violations. • Traffic safety training attendance. • Community complaints related to traffic. • Emergency response time to traffic incidents. • Community awareness programs on traffic safety. • Use of alternative routes by construction vehicles.

8.0. Environmental and Social Management Plan

This section describes the environmental and social management plan (ESMP) for the proposed project. The ESMP provides a logical framework within which the identified negative environmental and social can be mitigated and monitored (Table 8.1). It is expected that GECO will refer to this ESMP during all phases of the project and develop specific implementation plans. In addition, the ESMP assigns responsibilities of actions to various actors and provides a timeframe within which mitigation measures and monitoring can be done. Overall, the key objectives of the ESMP are:

(i) To monitor the implementation of mitigation measures against potential adverse impacts of construction and operation phases of the project to ensure that they conform and comply with relevant environmental and social policies, guidelines and legislation;

(ii) to assess for emerging non-anticipated adverse environmental and social impacts and implement relevant mitigation measures to maintain them within acceptable levels; and

(iii) To maintain best practice in environmental, social health and safety during all phases of the project. Ensure the project is implemented according to environmental laws of country and state and policies of the WB.

8.1. THE ESMP IMPLEMENTATION TOOLS

The implementation of the proposed ESMP will be the responsibility of the MoEWR, GECO and the Contractors as the main players. To facilitate the implementation, several tools to be used in shall be used.

8.1.1. Construction phase

The contractor will prepare targeted management plans to deal with specific environmental and social aspects guided by the ESMP and any other emerging issues on the ground. The contractor shall prepare these plans and have them approved by the MoEWR before they mobilize to the site:

- Construction management plan
- Rehabilitation and site closure plan
- Local recruitment plan
- Workplace health and safety plan
- Community safety plan
- Emergency management and response plan
- SEA/SH prevention and response plan
- Stakeholder engagement management plan
- Grievance Redress mechanism
- Labour influx management plan

8.1.1.1. Construction management plan

The construction management plan for the proposed project shall include the following elements:

- *Management of fuels and other hazardous materials:* The Contractor shall comply with all applicable laws, regulations, permit and approval conditions and requirements relevant to the storage, use, and proper disposal of hazardous materials.
- *Management of the construction site:* The contractor shall prevent littering and the random discard of any solid waste on or around the construction site. The contractor shall manage other solid and liquid waste.
- *Fire prevention and management:* The Contractor shall take all necessary precautions to prevent fires caused either deliberately or accidentally during construction process. The Contractor shall prepare a fire prevention and fire emergency plan as a part of the plans to be submitted to MoEWR and GECO.
- *Management of air quality:* The Contractor shall institute appropriate measures to minimize or avoid air quality impacts. This shall be achieved through formulation of air quality management plan.
- *Neighbouring landowner and occupier relations:* The Contractor shall respect the property and rights of neighbouring landowners and occupiers at all times and shall treat all persons with deliberate courtesy. The Contractor shall respect any special agreements between the MoEWR/GECO and the neighbours e.g., the wayleaves agreements signed between MoEWR/GECO and landowners will need to be respected by the Contractors.
- *Complaints register:* The Contractor shall establish and maintain a register for periodic review by the MoEWR/GECO that logs all the complaints raised by the neighbours or the public about

construction activities. The register shall be regularly updated, and records maintained including the name of the complainant, his/her domicile and contact details, the nature of the complaint and any action taken to rectify the problem.

- **Construction control:** The construction control for the proposed project shall cover control of access and materials supply. The Contractor shall prepare a method statement including plans for all construction activities for approval by the supervising contractor and the MoEWR/GECO.

8.1.1.2. Rehabilitation and site closure plan

After completion of construction activities, the contractor shall clear the site of construction materials and dispose wastes as recommended in the ESMP. The contractor shall remove all temporary works on the construction site and grow grass or any other indigenous vegetation on areas that are not covered by the installations to control erosion.

8.1.1.3. Local recruitment plan

The contractor will prepare a local recruitment plan to guide on recruitment of locals. The plan shall pay attention or adhere to Employment Act of both the FRS, Puntland State Government and the WB ESS2. In designing the local recruitment plan contractor shall: wherever possible, give priority to qualified local people when hiring employees, ensure all community segments - men, women, vulnerable individuals, minority clans, and VMGs who meet OP 4.10 criteria - can access subproject benefits during construction, and that the contractor prioritizes hire of locals for skilled, semi-skilled and unskilled labour.

8.1.1.4. Workplace health and safety plan

The workplace health and safety plan to be implemented by the Contractor, MoEWR and GECO shall include the following key measures:

- The contractor shall prepare and implement measures to minimize diseases likely to be contracted by the construction workers because of the proposed project such as HIV &AIDs and other communicable diseases.
- The contractor shall have obligations of managing the safety of its employees by; provision of appropriate PPEs to employee, training employees on competence, employing competence and qualified staff, provision of First Aid Kits onsite, and document and create awareness on safe work procedures and work instruction.
- The contractor will manage accidents by having an emergence response plan which will include contacts for emergency service providers e.g., ambulances, fire brigade and nearest hospitals.
- Health and safety performance will be continuously monitored, and procedures reviewed with the aim of eliminating risk as far as reasonably practicable.

8.1.1.5. Community health and safety plan

The community health and safety plan shall be developed and implemented by the contractor. The Community health and safety plan shall include:

- Adherence to the existing FRS and Puntland State laws and regulations, and the WB ESS4.
- The contractor to ensure that construction work is undertaken in manner not likely pose risks to community health and safety.
- The contractor shall undertake an independent risk assessment prior to any construction activity. The findings of this assessment will inform the development of a community safety plan and create awareness to the community on the same.

8.1.1.6. Traffic management plan

The development and implementation of a Traffic Management Plan (TMP) during the construction phase is crucial for ensuring the safety of both workers and the local community. A TMP will outline strategies to manage the increased traffic flow caused by construction vehicles, minimize disruptions to existing transportation networks, and mitigate risks such as accidents, road damage, and delays. Key elements of TMP shall include designated access routes for heavy machinery, scheduling of vehicle movements to avoid peak traffic times, and clear signage to guide drivers and pedestrians. Coordination with local authorities will be essential to ensure that the plan aligns with road safety regulations and minimizes negative impacts on local communities, especially in residential and commercial areas near the construction site. Regular monitoring and adjustments to the plan will be necessary to address any evolving traffic challenges.

8.1.1.7. Emergency preparedness and response plan

The Contractor shall develop an emergency plan that will enable rapid and effective response to all types of environmental emergencies in accordance with recognized national and international standards. The emergency plan shall include establishment of a network of communication between

the Contractor and emergency services including police, ambulance services, and fire brigades among others. There is the potential of fire on the site, this will be avoided by the provision of fire protection and firefighting equipment including fire extinguishers, signage, danger plates, and plates name plates. The fire equipment will be placed where they are visible and easy to reach.

8.1.1.8. SEA/SH prevention and response plan

The contractor will update the existing SEA/SH Prevention and Response Action Plan that will include a channels for SEA/H reporting that ensures confidentiality. The plan should have an Accountability and Response Framework. The plan will include the necessary measures for prevention and response of GBV impacts. The mitigation measures shall include:

- Ensuring that the local employment opportunities are equitably accessible to all segments of the community
- Ensure equal pay for equal work
- Updating and implementing GBV (SEA/SH management) plan that shall include sensitisation of community members and subproject workers on the potential of the subproject giving rise to, exacerbating and/or mitigating SEA and SH, and the appropriate mitigation measures.
- The contractor shall map all GBV service providers and document referral services for survivors
- The contractor shall sensitize community members and subproject workers on the referral pathways, prepare and implement a functional and accessible GBV GRM for use by workers and community members (as appropriate).

8.1.1.9. Stakeholder engagement plan

A Stakeholder Engagement Plan is a formal approach to communicate with project stakeholders to achieve their support for the project. The SEP is a useful tool for managing communications between the contractor and other stakeholder. The plan prepared shall specify the frequency and type of communications, media, contact persons, and locations of communication events. For this assignment, the Contractor shall update and apply the SEP already developed by the MoEWR as part of the SESRP, and modify where necessary to meet the local unique challenges.

8.1.1.10. Grievance redress mechanism

The contractor shall ensure that all PAPs are informed how to register grievances or complaints, including specific concerns about land and environment. The PAPs will be informed about the dispute resolution process, specifically about how the disputes will be resolved in an impartial and timely manner. For this particular project, Alternative Dispute Resolution (ADR) approaches will be given preference and based on customary rules, arbitration, or third-party mediation. ADR will be promoted or defended as a resolution to disputes related to land. The affected persons and other stakeholders also have a right to access the World Bank Grievance Redress Service (GRS) and the World Bank Inspection Panel at no cost. The local grievance redress committee shall be established before the commencement of the project to handle and address all grievances during all the project phases. The principles of grievance mechanism management that need to be observed shall include:

- All complaints and grievances are resolved as quickly as possible; and that the resolution of complaints and grievances should be at the lowest possible level for resolution.
- All complaints that can be resolved shall be resolved immediately on the site.
- The focus of the GRM shall be to resolve issues in a customarily appropriate fashion at community level and record details of the complaint, the complainant and the resolution.

A grievance redress mechanism and a grievance redress committee (GRC) shall be established in a culturally appropriate manner in consultation with the community. The GRM committee will have the following roles:

- Log the grievances
- Maintain records of the GRC meetings and grievances
- Resolve the grievances to the extent possible.

Proposed grievance procedures

For this particular project, the following grievance procedures are proposed:

(i) *Registration* - Community members can inform the contractor about concerns directly and if necessary, through third parties. Once a complaint has been received, it will be recorded in a complaints log or data system. The log will be kept in hardcopy or electronic form. All reported grievances will be categorized, assigned priority, and routed as appropriate.

(ii) *Grievance logbook*. The grievance logbook will ensure that each complaint has an individual reference number, and is appropriately tracked and recorded actions are completed. The information to be recorded shall include:

- Name, age, gender of complainant;

- Date the complaint was reported;
- Date the grievance logged;
- Action taken;
- Date information on proposed corrective action sent to complainant (if appropriate);
- The date the complaint was closed; and
- Date response was sent to complainant.

(iii) *Sorting and Processing* - This step determines whether a complaint is eligible for the grievance mechanism and its seriousness and complexity. All the complaints/grievances shall be screened. However, this will not involve judging the substantive merit of the complaint. The following guide will be used to determine whether a complaint is eligible or not:

- The complaint/grievance pertains to the power plant project.
- The issues raised in the complaint/grievance fall within the scope of issues the grievance mechanism is authorized to address.

Ineligible complaints/grievances may include those where:

- The complaint is clearly not power plant project -related.
- The nature of the issue is outside the mandate of the grievance mechanism.
- The complainant/grievance has no standing to file.
- Other project or organizational procedures are more appropriate to address the issue.

(iv) *Closing out and escalation:* Project-related grievances will be addressed and closed out as appropriate. The GRM will provide a channel for escalation e.g., through legal redress.

(v) Monitoring and evaluation: The proponent MoEWR/GECO will monitor all the activities of the stakeholder engagement and grievance management activities.

It should be noted that if complainants are not satisfied with the grievance process, even after arbitration, they have the right to present their complaint through the legal (FRS and or Puntland State) systems. However, it is expected that most disputes will be resolved at the lowest level through the GRC. Since most disputes/grievances are likely to arise arise during the Construction and operation period, the contractor's Environmental and Social Safeguard team specifically the Community Liaison Officer will work closely with the community to be able to resolve disputes. The responsibilities of the Community Liaison Officer shall include:

- Monitor day to day implementation of the project
- Address grievances as they arise on the project
- A member of the GRC to respond on issues that may have been brought to the attention of the committee before escalating to other relevant entities.
- Escalate grievances internally to get a lasting solution

World Bank Grievances Redress Mechanism

The World Bank has established two grievance redress mechanisms that provide avenues for individuals and communities to submit complaints directly if there is belief that they have been, or are likely to be, adversely affected by a World Bank-funded project. In this project PAPs and other stakeholders have the right to know and access at no cost these GRMs as described below.

- World Bank Grievances Redress Service: The Grievance Redress Service (GRS) is an avenue for individuals and communities to submit complaints directly to the World Bank if they believe that a World Bank-supported project has or is likely to have adverse effects on them, their community, or their environment. The GRS enhances the World Bank's responsiveness and accountability to project-affected communities by ensuring that grievances are promptly reviewed and addressed. Complaints must be in writing and addressed to the GRS and sent through the following methods namely:
  (a) Online by accessing the online form;
  (b) Sending an Email to grievance@worldbank.org; or
  (c) Submitting a letter to the World Bank Headquarters in Washington D.C., United States or World Bank Kenya County Office.

- World Bank Inspection Panel: The Inspection Panel is an independent complaints mechanism for people and communities who believe that they have been, or are likely to be, adversely affected by a World Bank-funded project. The Panel is an impartial fact-finding body, independent from the World Bank management and staff, reporting directly to the Board. The Inspection Panel process aims to promote accountability at the World Bank, give affected people a greater voice in activities supported by the World Bank that affect their rights and interests, and foster redress when warranted. In September 2020, the Board updated the resolution that created the Panel and added to the Panel functions. At the same time, the Board approved a resolution establishing the World

Bank Accountability Mechanism (AM). The new AM began operations in early 2021 and houses the Panel to carry out compliance reviews and a new Dispute Resolution Service (DRS), which will give complainants another way to have their concerns addressed. Contacts for registration of complaints to the IP are; Tel: +1 202 458 5200; email: ipanel@worldbank.org.

8.1.1.10. Labour influx management plan

The purpose of this plan shall be to provide a clear set of actions and responsibilities for the control of impacts linked to in-migration within the Project's area of influence. This plan will be regularly reviewed and updated to reflect revised Project design, socio-economic changes and learning experienced during its implementation. The objectives of this plan shall be to:

- Monitor the scale of project induced in-migration into the project area and specific in-migration;
- Support Puntland State government and communities to manage both internal and external immigration into the project area; and
- Mitigate and manage any negative impacts and enhance and promote any positive impact related to labour influx.

The plan shall consider these measures:
Prepare and Implement a Labour Management Plan (LMP) with policies and measures for ensuring that:

(i) Any sub-contractors and workers are sensitised on:
  (a) Puntland State/FRS labour laws
  (b) Puntland State/FRS child labour laws
  (c) FRS/International forced labour laws

(ii) Enforce:
  (a) The Code of conduct
  (b) Puntland State/FRS labour laws
  (c) Puntland State/FRS child labour laws
  (d) FRS/International forced labour laws

8.2.2. Operation phase

The operation phase of the proposed project will be mainly power supply, line maintenance and clearing of wayleaves. GECO under the supervision of MoEWR shall be responsible for all the mitigation measures for negative impacts during the operation phase. This will be done by implementation of the following steps:

- Inspections
- Corrective action
- Reporting

8.2.3. Decommissioning phase

The rehabilitation and decommissioning management plan shall include the following:

(i) Planning for Closure
  (a) The MoEWR (the proponent) shall investigate practical options for closure of the facility at least one year before decommissioning and submit a report to relevant FRS and Puntland State authorities.
  (b) The MoEWR and GECO shall develop rehabilitation and decommissioning plan in conjunction with relevant stakeholders at least one year before the end of facility's operations.
  (c) The MoEWR and GECO shall explore options of re-use and recycling of the facility's components/structures.

(ii) The decommissioning
  (a) The MoEWR and GECO shall take into consideration the health and safety of personnel, contractors, neighbours and the public during the planning and implementation of the demolition process.
  (b) The MoEWR and GECO shall undertake a further survey to identify any contaminated areas and remediate them accordingly.

(iii) Post Closure
The MoEWR and GECO shall ensure that the facility's site is free of impacts associated with the closure and demolition. In this regard, the MoEWR and GECO shall develop, rollout and implement a monitoring plan to include:
  (a) Monitoring of the rehabilitated site to confirm whether progress is satisfactory.

(b) Outline of how land improvement and future land use will be affected by the past operations and decommissioning of the associated infrastructure.

8.3. THE ESMP IMPLEMENTATION ARRANGEMENTS

The specific roles and responsibilities of proponent, implementing agency, supervision consultant and contractor are as indicated in Table 8-9.

Table 8-9: The ESMP implementation arrangements for the proposed GECO Hybrid Power Plant-Gaalkacyo

Entity	Roles and responsibilities
Proponent - MoEWR	The MoEWR will provide overall coordination and oversight of the project. MoEWR will be responsible for overall responsibility for safeguards due diligence, and compliance monitoring. The MoEWR will also provide funding for the project planning and implementation.
Project Implementation Unit	The MoEWR has already put in place a Project Implementation Unit (PIU) to guide implementation of the project. In the PIU Environmental and Social issues are spearheaded by an Environmental and Social Expert whose role is to coordinate and oversee implementation of safeguards. HD consulting firm has been contracted to provide environmental and social backstopping services during the project implementation.
GECO	GECO will be responsible for implementation and operation of the project on behalf of the MoEWR. Some of the key responsibilities include but not limited to are; GECO will supervise construction works through a supervision consultant and also directly Monitoring the progress of the project in terms of the safeguards and technical aspects. Monitoring of the ESMP implementation Ensuring the project is on course in terms of timelines GECO to hire an E&S specialist to support with the management of risks
Puntland State Government	The Puntland State Government is a key stakeholder in this project. The roles of the Puntland State Government shall include giving relevant approvals needed, solving grievances that cannot be sorted at project level, monitoring progress of the project among others.
FRS and Puntland Ministries of Environment	Shall be responsible for approval of ESIA and EHS reports and licensing. Additionally, the ministries shall be free to check progress of implementation of ESMP.
E&S supervising consultant	• The E&S supervising consultant shall prepare quarterly supervision reports detailing environmental, health, social and safety compliance on quarterly basis amongst other technical aspects • Ensure the project adheres to all environmental and social impact assessment (ESIA) recommendations, national regulations, and international standards such as the World Bank ESS. • Oversee the implementation of mitigation measures for environmental, social, and community health and safety risks identified during the ESIA, including soil erosion, waste management, biodiversity protection, and labour influx. • Supervise the proper execution of the ESMP during the construction phase; ensuring contractors comply with the stipulated environmental and social safeguards. • Conduct regular field inspections and audits to assess the environmental and social performance of the contractors and identify non-compliance issues. • Prepare and submit periodic environmental and social monitoring reports to the MoEWR, regulatory bodies, and the World Bank. • Coordinate the training of train project staff and contractors on environmental and social management procedures, including waste handling, safety protocols, and community engagement. • Support the contractor and client is development of EPRP, and oversee emergency preparedness and response plans for potential environmental and social incidents, ensuring swift action to mitigate impacts. • Ensure that gender-based violence (GBV) risk mitigation measures and other labour-related guidelines are implemented on-site, particularly in managing the labour influx and worker-community relations. • Liaise with local and regional environmental authorities in Gaalkacyo to ensure compliance with the Puntland State Environmental Policy (2014) and the Puntland State Environmental Management Act (2016). • Continuously identify potential environmental and social risks throughout the construction phase and recommend adaptive management strategies as needed.
Contractor	• Implementation of the contractor related aspects of the ESMP and regularly (monthly) reporting • The contractor on his part will have to appoint an EHS officer and a Social Specialist to coordinate and report on the ESMP implementation respectively. • The contractor to engage a Community Liaison Officer to act as a link between the community and the contractor and support the Social Specialist. • The contractor will also have the obligation of managing the E&S risks related to his/her operations. • Maintaining the required level of stakeholder engagement and communication, including providing project schedule information to the public, accepting and resolving public grievances, advertising and hiring local workers. • Maintain a working grievance redress mechanism. • The contractor is to comply with all regulations and laws at the Puntland State and FRS levels level and other relevant regulations and laws

Entity	Roles and responsibilities
	• The contractor shall refer to ESIA recommendations and the ESMP when preparing the contractors- ESMP and the specific plans • The contractor shall provide water required for use in connection with the works including the work of subcontractors and shall provide temporary storage tanks, if required • The contractor shall make his own arrangements for sanitary conveniences for his workers. Any arrangements so made shall be in conformity with the public health requirements for such facilities and the contractor shall be solely liable for any infringement of the requirements. • The contractor shall be responsible for all the actions of any subcontractors whom s/he subcontracts. • The contractor shall take all possible precautions to prevent nuisance, inconvenience or injury to the neighbouring properties and to the public generally, and shall use proper precaution to ensure the safety of the community • All work operations, which may generate noise, dust, vibrations, or any other discomfort to the workers and/or visitors of the client and the local community, must be undertaken with care, with all necessary safety precautions taken. • The contractor shall take all effort to muffle the noises from his tools, equipment and workmen to not more than 70dBA • The contractor shall upon completion of working, remove and clear away all plant, rubbish and unused materials and shall leave the whole site in a clean and tidy state to the satisfaction of the MoEWR and GECO. He shall also remove from the site all the liquid and solid wastes. • No blasting shall be permitted without the prior approval of the MoEWR and the relevant Puntland State authorities. • Borrow pits will only be allowed to be opened up on receipt of permission from the approving authorities. • The standard of workmanship shall not be inferior to the MoEWR and WB Standards. No materials for use in the permanent incorporation into the works shall be used for any temporary works or purpose other than that for which it is provided. Similarly, no material for temporary support may be used for permanent incorporation into the works. • Disposing of the waste generated during construction phase activities shall be done in accordance to the ESMP. • The contractor EHS officer will report on ESMP implementation during construction period. The aspect to be reported by the contractor will include safety issues i.e. hours worked, recordable incidents and corresponding Root Cause Analysis (lost time incidents, medical treatment cases), first aid cases, incidents and accidents, potential near misses, and remedial and preventive activities required (for example, revised job safety analysis, new or different equipment, skills training etc.); Environmental incidents and near misses; noncompliance incidents with permits and national law; Training on E&S issues (dates, number of trainees, and topics); Details of any security risks; Worker & External stakeholder grievances and E&S inspections by contractor, including any authorities.

8.4. MONITORING

In the context of this particular ESMP (Table 10), monitoring denotes a systematic process of collecting, analysing and using information to track the progress of implementation of the ESMP including coming up with measures to address any emerging issues. The monitoring will involve recording information to track performance and recommendations to keep implementation of ESMP on track. The monitoring will have two elements: routine monitoring against standards or performance criteria; and periodic review or evaluation. Monitoring will often focus on the effectiveness and impact of the ESMP as a whole.

During construction phase, GECO shall monitor the contractor's activities in order to verify that the management measures/procedures/specifications are implemented as contained in the ESMP. Compliance will mean that the contractor is fulfilling their contractual obligation. During operation phase, GECO will monitor facility's operations to ensure compliance with management measures in the ESMP and operation procedures. As part of this monitoring, the GECO will undertake EHS Audits, and make provisions for monitoring and evaluation. Special attention shall be given to the monitoring arrangements relating to biophysical impacts, occupational health and safety, social risks, facility operational and emergency response. GECO will require that contractors monitor, keep records and report on the following environmental, health and social issues of the proposed project.

- *Safety*: hours worked, recordable incidents and corresponding root cause analysis (lost time incidents, medical treatment cases); first aid cases, high potential near misses, and remedial and preventive activities required (for example, revised job safety analysis, new or different equipment, skills training, and so forth).
- *Environmental incidents and near misses*: environmental incidents and high potential near misses and how they have been addressed, what is outstanding, and lessons learned.
- *Major works*: those undertaken and completed, progress against project schedule, and key work fronts (work areas).
- *E&S inspections and audits*: to include date, inspector or auditor name, and records reviewed,

major findings, and actions recommended and implemented.

- *Workers*: number of workers, indication of origin (expatriate, local, nonlocal nationals), gender, age and skill level (unskilled, skilled, supervisory, professional, management).
- *Training on E&S issues*: including dates, number of trainees, and topics.
- *Footprint management*: details of any work outside boundaries or major off-site impacts caused by ongoing construction—to include date, location, impacts, and actions taken.
- *External stakeholder engagement*: highlights, including number of formal and informal meetings, and information disclosure and dissemination—to include a breakdown of women and men consulted and themes coming from various stakeholder groups, including vulnerable groups (e.g., disabled, elderly, children, etc.).
- *Details of any security risks*: details of risks the contractor may be exposed to while performing its work—the threats may come from third parties external to the project.
- *Worker grievances*: details including occurrence date, grievance, and date submitted; actions taken and dates; resolution (if any) and date; and follow-up yet to be taken—grievances listed should include those received since the preceding report and those that were unresolved at the time of that report.
- *External stakeholder e.g., community grievances*: grievance and date submitted, action(s) taken and date(s), resolution (if any) and date, and follow-up yet to be taken—grievances listed shall include those received since the preceding report and those that were unresolved at the time of that report. Grievance data shall be age and gender-disaggregated.
- Major changes to contractor's environmental and social practices.
- *Deficiency and performance management*: actions taken in response to previous notices of deficiency or observations regarding E&S performance and/or plans for actions to be taken—these should continue to be reported until GECO determines the issue is resolved satisfactorily.
- *A grievance mechanism monitoring*. A GM monitoring mechanism shall be established to ensure a better tracking and address of all grievances during each project phase.

Table 8-10: Environmental and social management plan (ESMP) for the proposed GECO Hybrid Power Plant-Gaalkacyo

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
CONSTRUCTION	Impacts on biophysical environment	Landscape and visuals	• Erect a fence around the power plant.	GECO CONTRACTOR	• Presence of a perimeter fence	One-off	As per the construction budget
		Soil, ground/surface water contamination	• Scoop and correctly dispose contaminated soil. • Care must be exercised not to spill any fossil fuels • Construction vehicles must be maintained in good state. • Contractor to develop an oil-spill containment plan. • Ensure wastewater generated is discharged into approved drainages.	GECO CONTRACTOR	• Records of any leakages from construction equipment/ vehicles. • Oil spill containment plan. • Provision of fuel/oil drip and spill trays	Monthly	3500
		Air quality (Dust)	• Suppress dust during dry periods by use of water sprays; • Stockpiles of excavated soil should be covered/palliated • Burning of woody debris & construction waste to be prohibited • Ensure all the personnel use PPEs. • Restrict speed on loose surface roads during dry or dusty conditions • Trucks moving materials to site to be covered to prevent dust emissions.	GECO CONTRACTOR	• Visual Observation of dust Provision of PPEs especially masks	Monthly	2000
		Air quality (Vehicle exhaust emissions)	• All drivers vehicles must be sensitized not leave vehicles idling. • Maintain all machinery in good to minimize GHG emissions and PM.	GECO CONTRACTOR	• Engine maintenance records • Inspection of stacks	Monthly	2500
		Noise & vibration	• Use modern equipment fitted with noise-reduction technologies • Ensure regular maintenance of machinery to reduce noise emissions. • Establish a GRM for community to report noise or vibration disturbances. • Establish a monitoring to regularly measure noise and vibration levels. • Inform nearby communities in advance about and scheduled high-noise. • Provide appropriate PPEs to workers during construction activities. • Restrict construction activities to daylight hours (e.g., 7:00 AM to 6:00 PM).	GECO CONTRACTOR	• Noise levels- Records of noise measurements done by contractor within the project area and at distances of 30m from the Hybrid power plant	Monthly	2500
		Biodiversity (Fauna)	• Site clearing work/earthwork to be done during the dry season to minimize impacts on fauna. • Vehicle movements shall be limited to designated paved/unpaved roads and maintained at 15-20 km/h. • Site preparation shall minimize clearing of	GECO CONTRACTOR	• Full implementation of biodiversity management plan for the project	Quarterly	4000

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			vegetation and topsoil. • Ensure wildlife-friendly designs for infrastructures. • Temporary-use areas shall be restored and revegetated • An ecologist shall be hired to coordinate the fauna monitoring.		• Regular biodiversity monitoring and reporting		
		Biodiversity (Flora)	• Ensure proper demarcation and delineation of the project site to be affected by construction works. • Designate access routes and parking areas • Re-vegetation including planting of trees around the plant/facility	GECO CONTRACTOR	• Number of trees cleared • Planted trees	Quarterly	4000
		Soil erosion	• Avoid groundbreaking during the seasons of high rainfall to avoid erosion. • Monitoring of areas of exposed soil during rainy seasons to ensure that any incidents of erosion are quickly controlled. • Construction related impacts like erosion and cut slope destabilizing should be addressed through landscaping and grassing, carting away and proper disposal of construction materials • Use silt traps where necessary • Monitoring of areas of exposed soil during rainy seasons to ensure that any incidents of erosion are quickly controlled. • Ensure spoil from excavations is arranged according to the various soil layers. This soil can then be returned during landscaping and then rehabilitation, in the correct order which they were removed that is top soil last	GECO CONTRACTOR	• Assess size of rills or Gulleys forming from accelerated run off from compacted areas	Quarterly	3500
		Wastes (Solid wastes)	• All hazardous products and waste should be labelled and handled properly to avoid contact with the ground • Dispose hazardous waste through an approved waste handler • Segregate waste • Provide litter collection facilities such as bins • Contractor to put in place and comply with a site waste management plan • Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of waste generated over time • Recovery of materials remains and return to stores • Re-use of materials where possible • Proper budgeting to avoid waste generation • Proper disposal of waste in line with solid waste regulation • Construction wastes to be managed in accordance with internationally accepted construction standards of a hybrid power plant	GECO CONTRACTOR	• Presence of well-maintained receptacles and centralized collection points.	Monthly	5500

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
		Wastes (Liquid wastes)	• All chemicals should be stored within the bunded areas and clearly labelled detailing the nature and quantity of chemicals within individual containers. • Create awareness for the employees on site on procedures of dealing with spills and leaks • Develop and implement a detailed Spill Prevention Plan (SPP) • Disposal of waste through septic tanks • Ensure secure storage of all hazardous materials, including fuel and oil, in compliance with local regulations. • Frequent inspection and maintenance of the generator to minimize leakages. • In case of spillage, the contractor should isolate the source of oil spill and contain the spillage using sandbags, sawdust, absorbent materials and/or other materials approved by materials. • In the event of accidental leaks, contaminated top soil should be scooped and disposed of appropriately. • Install oil-water separators in drainage systems to capture and remove oil or fuel from stormwater. • Keep accurate documentation of fuel and oil storage volumes, transfer activities, and inspection results to aid in compliance reporting and performance reviews. • Proper training for the handling and use of fuels for the operators of the power plant. • Provide sanitary waste facilities for both genders clearly marked • Refuelling and maintenance of vehicles will not take place at the construction site. • The waste oil or used oil must be disposed-off appropriately. • Vehicles and equipment must be serviced regularly and kept in good state to avoid leaks.	GECO CONTRACTOR	• Engine maintenance records • Oil spill containment plan • Presence of separate and clean washrooms for both the gents and ladies	Monthly	4000
	Impacts on infrastructure and utilities	Water consumption	• Ensure prudent use of available water • Consultations with the project local committee on water use to avoid conflicts with the community • Source and utilize a sustainable and reliable water supply for both construction and operation phase.	GECO CONTRACTOR	• Water usage records	Monthly	2000
		Energy Consumption	• Ensure responsible electricity use at the construction site through sensitization of staff to conserve electricity. • Proper planning of transportation of materials will ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts. • Complementary to these measures, they monitor energy use during construction and set targets for	GECO CONTRACTOR	• Energy consumption records	Monthly	2500

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			reduction of energy use.				
	Impacts on social environment	Archaeology and cultural heritage	• Develop and implement a Chance Finds Procedure and ensure protocols are followed. • Engage a qualified archaeologist to monitor all ground-disturbing activities to ensure early identification. • Establish a clear protocol for halting construction activities immediately if any archaeological or cultural materials are found. • If archaeological artefacts or sites are discovered, establish temporary buffer zones around these areas to protect them from further disturbance. • If chance finds are made, ensure proper documentation, including detailed records, photography, and GPS coordinates, before any further action is taken.	GECO CONTRACTOR	• Stratigraphic Soil profile reports during excavation • Fully developed artefact recovery protocols • Discovery of human burials reports during excavation. • Regulatory Compliance reporting under Somali Heritage Laws.	One-off	As per the construction budget
		Trespassing of unauthorized personnel	• Controlled access to the site only with prior approval • Fencing off the construction site to keep of unauthorized personnel • Hazard communication • Maintain records of any person who comes to site • Ensure proper barricading	GECO CONTRACTOR	• Presence of a controlled access and records of every person accessing the site	Weekly	2000
		Worker influx – incoming workforce	• Tap into the local workforce to the extent possible to reduce labour influx. • Recruit local workforce to the extent possible especially for unskilled and semi-skilled jobs. • Raise awareness among local community and workers on the need to have a good /cordial working relation • Sensitize workers regarding engagement with local community. • Establish and operationalize an effective GRM accessible to community members. • The contractor and the project/community grievance redress committee to work closely address complains raised on time. • Respect for community values/culture. • Prompt payment of workers as per the contractual agreements/terms.	GECO CONTRACTOR	• Records of employees/updated employee register. • Number of local community employees and external employees/ updated employee register.	Quarterly	4500
		Gender-based violence	• Update the existing SEA/SH Prevention and Response Action Plan, to manage the SEA/SH risks that are relevant to the subproject. • Implement a code of conduct signed by all those with physical presence on site. • Establish Workers GRM with multiple channels including SEA/H channels. • Ensure that Code conducts are singed by all employers or incorporated in the employment	GECO CONTRACTOR	• Minutes of awareness creation sessions for the community and workers on GBV-SEA/SH. • Code of conduct signed by all those with physical	Quarterly	3500

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			contracts.		presence on site. • GRM that ensures confidentiality of GBV cases in place. • Documented referral services for survivors. • Grievances raised, aggrieved persons and status on resolution etc.		
		Labour disputes	• Ensure full compliance with local labor laws. • Ensure that all workers receive clear, written contracts outlining their rights, responsibilities, wages, benefits, working hours, and terms of employment. • Establish mechanisms to guarantee fair and timely payment of wages and benefits. • Establish worker welfare committees to represent labor concerns, promote dialogue, and facilitate the resolution of potential issues. • Implement and enforce non-discrimination policies to ensure equal treatment of all workers regardless of gender and clan. • Set up a formal, transparent grievance redress mechanism to handle worker complaints and disputes in a timely manner.	GECO CONTRACTOR	• Number of grievances filed and time taken to resolve them. • Frequency of labor disputes. • Health and safety violations. • Worker turnover rate and compliance with working hours and overtime rules. • Labor law compliance audits • Worker welfare committee activities.	Quarterly	3500
		Child and forced labour	• Implement and monitor the employment register regularly. • Compliance with the national labor laws and labour management practices. • Put visible signage on site "No Jobs for children" • Do not allow children at the project site. • Adhere to the ESS 2 provisions and FRS Employment Act, which outlaws any form of forced labour. • Report any form of forced labour at the site.	GECO CONTRACTOR	• Updated employment register indicating locals employed, their ages, national identification numbers etc. • Grievances raised aggrieved persons and status on resolution etc. • Number of reported cases of forced labour.	Quarterly	3000
		Security risks	• Conduct a comprehensive risk assessment to identify security threats. • Engage local stakeholders (government, law enforcement, and communities) to understand local security concerns. • Collaborate with local law enforcement and security agencies to provide support and enhance security measures.	GECO CONTRACTOR	• Number of security incidents and response time to security incidents. • Compliance with security protocols. • Incidents of unauthorized site	Monthly	5500

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			• Hire licensed security personnel familiar with the area to provide 24/7 site surveillance, patrols, and monitoring. • Use surveillance systems, such as CCTV cameras and motion sensors, to monitor critical areas in real-time. • Implement strict access control protocols, including identity verification and sign-in procedures for workers. • Provide workers with ID badges and restrict entry to authorized personnel only. • Develop a security incident response plan that includes procedures for evacuation, medical emergencies, and reporting incidents. • Provide workers with security training, and protocols for responding to security threats. • Maintain constant communication and coordination with local authorities regarding security updates and developments in the region. • Prepare contingency plans for potential security scenarios, including kidnappings, armed attacks, and civil unrest. • Have security response teams on standby to address urgent security breaches or emergencies.		access. • Grievances related to security. • Community engagement on security issues. • Security risk assessments. • Coordination with local law enforcement. • Security equipment functionality. • Frequency of security audits.		
		Occupational Health and safety	• Develop and implement a comprehensive OHS plan before the commencement of the project • Use skilled personnel for activities which demand skills/technical tasks • Workers coming to the site should be knowledgeable on safety precautions to take • Provide appropriate PPE to all workers. • Undertake risk assessment by contractor of the construction activities and implement mitigation measures appropriately • Availability of equipped first aid box on site • Provide safe drinking water for workers • Engagement of trained first aider on site • Establish safety committees	GECO CONTRACTOR	• Records of any near misses, incident, and accidents. • Records of corrective actions implemented if there was an accident.	Monthly	6000
		Community health and safety risks	• Allowing migrant workers time to be with their families • Awareness creation and consultations with local communities prior and during construction on the dangers of these diseases • Ensure equal treatment of workers • Informing workers on local cultural values and health matters. • The contractor is impressed upon not to set a construction camp on site. • The contractor will provide public	GECO CONTRACTOR	• Number of awareness creation sessions conducted.	Monthly	4500

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			education/information about HIV/AIDS transmission and prevention measures.				
		Fire Hazards	• 'No smoking' signs shall be posted at the construction site • A fire risk assessment and evacuation plan should be prepared and must be posted in various points of the construction site including procedures to take when a fire is reported. • Create awareness to the construction workers on potential fire hazards • Designate an assembly point • No smoking shall be done on construction site • Provision of firefighting equipment on site during construction.	GECO CONTRACTOR	• Records of any Fire incidences • Fire equipment and evacuation plan	Weekly	3000
		Traffic risks	• Develop and implement a Traffic Management Plan (TMP). • Use traffic signs, barriers, and cones to guide and direct both construction and local traffic. • Enforce strict speed limits for construction vehicles within the construction site and along designated transport routes. • Install speed bumps or other traffic-calming measures on roads near the construction site. • Engage with local communities to raise awareness about increased construction traffic and safety measures. • Erect temporary road signs warning local road users of construction activities and increased traffic. • Designate safe parking and loading zones for construction vehicles away from main roads and community spaces.	GECO CONTRACTOR	• Number of traffic incidents. • Traffic management plan compliance. • Speed limit violations. • Traffic safety training attendance. • Community complaints related to traffic. • Emergency response time to traffic incidents. • Community awareness programs on traffic safety. • Use of alternative routes by construction vehicles.	Monthly	2000
		Risks related to Inadequate stakeholder engagement	• Update the existing SEP and make it more relevant to the subproject and the identified stakeholders. • In line with the SEP, undertake adequate consultations prior to construction and throughout the project cycle with all segments of the community and other relevant stakeholders. • Prepare and implement a GRM to deal with grievances. • The grievance redress committee to include representatives from the community. • Sensitize stakeholders on SEP and GRM.	GECO CONTRACTOR	• Availability of and implementation of the Stakeholder Engagement Plan. • Number of stakeholder consultations held • Record of stakeholder consultations held (minutes of meetings and list of participants). • Information	Quarterly	3500

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
					disclosed to whom it was disclosed (Men, women, PWD, youth, vulnerable individuals etc., methods and languages used in the disclosure (culturally appropriate and accessible), grievances raised and status on resolution etc. • Concerns raised and actions raised.		
		Inadequate grievances management	• Constitute a Local Grievances Committee is in consultation with all community segments, and incorporates the existing local dispute resolution mechanism. • Implement a worker's grievances mechanism. • Awareness on the culturally appropriate and accessible GRM to all community segments including VMGs, vulnerable individuals and households and CSOs • All reported grievances are logged, dated, processed, resolved and closed out in a timely manner. • Proportionate representation of VMGs and vulnerable individuals in the local grievances committee. • GRM provides for confidential reporting of particularly sensitive social aspects such as GBV, as well as anonymity.	GECO CONTRACTOR	• Local Grievances Committee in place, composition of committee, awareness of community and workers on project and worker GRMs, updated GRM logs, types of grievances • Availability of grievance redress process • Number of grievances reported • Number of grievances resolved in a timely manner • Number of grievances escalated to national courts and the World Bank Grievances Redress Service and Inspection Panel.	Quarterly	3500
OPERATION	Impacts on biophysical environment	Landscape and visual	• Fence off the power plant.	GECO	• Presence of a perimeter fence	One-off	As per the operation budget
		Soil, ground/surface water contamination	• Infrastructure shall be designed to ensure that contaminated run-off does not reach water source i.e., earth dam. • Contractor to develop an oil-spill containment plan as part of the emergency response plan. • No vehicle maintenance and service shall be done at project site	GECO	• Oil spill containment plan. • Provision of fuel/oil drip and spill trays	Quarterly	4500

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			• Ensure that potential sources of petro-chemical pollution are handled in such a way to reduce chances of spills and leaks.				
		Air quality (Dust)	• Trees can be planted around the plant/facility provided they do not cast shadows to the solar panels to act as wind breakers and hence decrease dust pollution • Ensure planting of grass around and within the facility compound	GECO	• Visual inspection	Monthly	1000
		Air quality (Vehicle fumes emissions)	*Vehicles* • Maintain all machinery and equipment in good working order to ensure minimum emissions of carbon monoxide, NO2, SO2 and suspended particulate matter. *Generators* • Use of diesel which is Sulphur- free to run the power producing generators to be encouraged • The stack chimney of the generators will be increased from its normal height of 3 meters to 6 meters • Invest in modern diesel generators with advanced combustion systems. • Install Diesel Particulate Filters (DPF) in each generator to trap particulate matter. • Use Selective Catalytic Reduction (SCR) to significantly reduce NOx emissions by injecting ammonia or urea into the exhaust stream. • Install Oxidation Catalysts: these catalysts to reduce carbon monoxide (CO) and volatile organic compound (VOC) emissions. • Ensure regular maintenance of diesel generators to maintain optimal efficiency, minimize fuel consumption, and reduce emissions. • Regularly monitor emissions and adjust generator performance to ensure compliance with environmental standards. • Implement strategies to reduce idling time when diesel generators are not needed or can be supplemented by the hybrid system. • Regularly report emissions data to local regulatory authorities as part of environmental compliance.	GECO	• Engine maintenance records • Inspection of stacks	Monthly	1000
		Noise & vibration	*Genset* • Install soundproof enclosures around the diesel generators • Construct barriers or walls around the generators to block or deflect sound away from sensitive areas. • Use anti-vibration mounts or isolators under the generator to minimize the transmission of	GECO	• Noise levels- Records of noise measurements done by contractor within the project area and at distances of 30m from the Hybrid power plant	Quarterly	1500

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			vibrations • Ensure regular servicing of the diesel generator to maintain its optimal function. • Install high-performance silencers on the generator's exhaust system to reduce noise emissions • Use flexible connectors on the exhaust system to reduce vibrations that can amplify noise. *BESS* • Install soundproof or acoustically treated enclosures around noisy inverters and transformers. • Use quieter, high-efficiency fans and cooling systems, or design them with lower noise outputs. • Equip the BESS unit with vibration isolators or mounts to reduce noise generated by vibrations • Install sound barriers or walls around the BESS unit to deflect or absorb noise. • Use sound-absorbing materials within the BESS unit's housing to absorb sound before it escapes. • Regularly service and maintain fans, inverters, and other equipment to ensure they operate smoothly				
		Biodiversity (Fauna)	• Ensure wildlife-friendly designs for infrastructures. • An ecologist shall be hired to coordinate the fauna monitoring. • Bird deterrents will be installed to prevent collisions with solar panels. • Post-construction monitoring will be undertaken to assess the impacts on local fauna and adapt mitigation strategies.	GECO	Full implementation of biodiversity management plan for the project Regular biodiversity monitoring and reporting	Quarterly	2500
		Biodiversity (Flora)	• Re-vegetation including planting of trees around the plant/facility	GECO	• Number of trees cleared • Planted trees	Quarterly	2500
		Soil erosion	• Monitoring of areas of exposed soil during rainy seasons to ensure that any incidents of erosion are quickly controlled. • Landscaping with grass on areas without electrical installation (lower areas) • Construct the drainage system in a way to follow natural drain of the water • Concrete only the required area and leave the rest of the land with vegetation like grass • Construct rain water harvesting system on the control buildings/office and harness into storage tanks for use	GECO	• Assess size of rills or Gulleys forming from accelerated run off from compacted areas • Provision of a drainage system and a rain water harvesting system	Quarterly	4500
		Wastes (Solid wastes)	• Provide waste handling facilities such as labelled waste bins	GECO	• Presence of well-maintained	Quarterly	4000

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			• Emphasis on prudent waste generation and give priority to reduction at source • Undertake solid waste management awareness to operators • Operator to contract a licensed waste handler to collect and dispose solid waste *Damaged solar panels and hazardous wastes* • Ensure segregation from other waste streams • All hazardous products and waste should be labelled and handled properly to avoid contact with the ground • Dispose hazardous waste through an approved waste handler		receptacles and centralized collection points.		
		Wastes (Liquid wastes)	*Sanitary wastes* • Provide sanitary waste facilities for both genders clearly marked • Disposal of waste through septic tanks *Oils from vehicles* • Refuelling and maintenance of vehicles will not take place at the construction site. • Create awareness for the employees on site on procedures of dealing with spills and leaks • Vehicles and equipment must be serviced regularly and kept in good state to avoid leaks. *Chemicals* • All chemicals should be stored within the bunded areas and clearly labelled detailing the nature and quantity of chemicals within individual containers. *Generators* • Proper storage of the oil is required to ensure no leakages • Frequent inspection and maintenance of the generator to minimize leakages. • No vehicles should be serviced or maintained at the project site. • The waste oil or used oil must be disposed-off appropriately. • Proper training for the handling and use of fuels for the operators of the power plant. • In the event of accidental leaks, contaminated top soil should be scooped and disposed of appropriately. *Accidental fuel and oil spill* • Develop and implement a detailed Spill Prevention Plan (SPP)	GECO	• Presence of separate and clean washrooms for both the gents and women. • Engine maintenance records • Oil spill containment plan • Records of all accidental spills and number of litres	Quarterly	3500

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			• Ensure that secondary containment systems are in place for all fuel storage tanks, oil storage areas, and transformers. • Conduct regular maintenance checks on fuel tanks, pipelines, transformers, generators, and other oil equipment. • Install spill and leak detection systems on fuel storage tanks, transformers, and pipelines. • Implement safe fuel handling protocols to reduce the risk of spills during fuel transfers. • Set up a routine for monitoring fuel and oil storage areas, and other fuel-handling equipment for leaks or wear. • Ensure quick clean-up of spills by designated response teams trained in handling hazardous materials. • Install oil-water separators in drainage systems to capture and remove oil or fuel from stormwater. • Establish proper waste management protocols for the disposal of used oil, fuel, and filters from equipment maintenance activities. • Implement a regular environmental monitoring program to check for any signs of contamination in soil, groundwater, and surface water near the plant. • Ensure secure storage of all hazardous materials, including fuel and oil, in compliance with local regulations. • Keep accurate documentation of fuel and oil storage volumes, transfer activities, and inspection results to aid in compliance reporting and performance reviews.				
	Impacts on infrastructure and utilities	Water consumption	• Ensure prudent use of water. • Install water-conserving automatic taps. • Any water leaks through damaged pipes and faulty taps should be fixed promptly.	GECO	• Water usage records	Monthly	2500
		Energy consumption	*Lightings* • Install an energy-efficient lighting system • Replace conventional lighting with energy-efficient LED bulbs • Utilize daylight sensors to adjust indoor lighting levels based on the amount of natural light, reducing the need for artificial lighting during the day. • Integrate lighting controls into the plant's energy management system to monitor and optimize energy use in real-time. • Conduct periodic energy audits to evaluate lighting energy consumption and identify areas for further improvement.	GECO	• Diesel Generator Usage (hours/month): • Solar Energy Generation (kWh/month): • Battery Energy Storage System (BESS) Utilization (cycles/month). • Lighting Energy Consumption (kWh/month). • Maintenance	Monthly	1000

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			Diesel generators • Implement energy-efficient technologies and practices in plant operations. • Conduct scheduled maintenance and servicing of diesel generators. • Regularly review and adjust the hybrid power system's configuration to optimize the balance between solar, BESS, and diesel power, reducing diesel generator runtime. • Ensure high quality, low-sulphur diesel is used to improve generator efficiency and reduce fuel consumption and emissions. • Implement measures to reduce unnecessary idling of diesel generators. • Provide training to operational staff on energy-efficient practices and optimal use of the hybrid system to minimize diesel reliance. • Install technologies such as diesel particulate filters (DPF) or catalytic converters to reduce the environmental impact of diesel consumption and improve overall generator efficiency.		Records for Diesel Generators. • Carbon Emissions (tons of CO2/month).		
	Impacts on social environment	Trespassing of unauthorized personnel	• Fencing off the facility to keep of community members, children and livestock from entering into the facility • Controlled access to the site only with prior approval • Maintain records of any person who comes to site	GECO	• Presence of a controlled access and records of every person accessing the site	Monthly	500
		Gender-based violence	*GBV- SEA and SH* • Update the existing SEA/SH Prevention and Response Action Plan, to manage the SEA/SH risks relevant to the subproject. • The Action Plan to be proportionate to potential SEA/SH risks, and includes measures such as awareness creation for communities and workers; identification of referral services for survivors and a GRM that ensures confidential reporting of GBV cases. • Implement a code of conduct signed by all those with physical presence on site. • Establish Workers GRM with multiple channels including SEA/H channels. • Ensure that Code conducts are singed by all employers or incorporated in the employment contracts. *Inaccessibility of project benefits to VMGs and other vulnerable individuals due to affordability challenges* • Consult VMGs and Vulnerable individuals and households on charges for sub project services and	GECO	• Minutes of awareness creation sessions for the community and workers on GBV-SEA/SH. • Documented referral services for survivors. • Interventions to enable those vulnerable access project benefits. • Number of complaints raised by VMGs/vulnerable individuals regarding access to project services.	Quarterly	•

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			put in place specific interventions to ensure the vulnerable equally access project benefits.				
		Labour disputes	• Ensure all employees have clear and legally binding employment contracts that outline their rights, responsibilities, wages, and benefits to prevent misunderstandings. • Establish an accessible, transparent grievance mechanism for workers to voice their concerns or disputes. • Maintain open communication between management and workers. • Ensure full compliance with national labour laws. • Implement fair and transparent disciplinary procedures. • Promote equal opportunities and non-discriminatory practices in hiring, promotion, and compensation to avoid conflicts. • Set up a monitoring system to track and evaluate labour relations, allowing for early detection of potential disputes and timely intervention. • Conduct regular worker feedback surveys to gauge satisfaction and identify any emerging concerns that could lead to disputes.	GECO	• Number of Labour Disputes Raised (disputes/month): • Grievances Resolved Within Agreed Timeframe (percentage): • Worker Turnover Rate (percentage). • Number of Grievances Filed Regarding Wages or Compensation (grievances/month). • Number of Labour Dispute Awareness Campaigns (number/year).	Quarterly	1500
		Child and forced labour	• Compliance with the national labor laws and labour management practices. • Put visible signage on site “No Jobs for children” • -Do not allow children at the project site. • Adhere to the ESS 2 provisions and FRS Employment Act, which outlaws any form of forced labour. • Report any form of forced labour at the site.	GECO	• Number of child labour incidents reported (incidents/month). • Number of forced labour incidents reported (incidents/year). • Grievances related to child or forced labour (number of grievances/year). • Community outreach and awareness campaigns on child labour (campaigns/year). • Compliance with international labour standards (compliance level). • Social audits conducted (number of audits/year). • Local community feedback on	Quarterly	1500

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
					employment practices (satisfaction level).		
		Security risks	• Monitor local security developments and adjust security protocols accordingly. • Maintain a secure perimeter with robust fencing of the site • Use remote monitoring where feasible, with a centralized control room for real-time surveillance and immediate response. • Enforce strict access control measures, ensuring that only authorized personnel can enter the facility. • Deploy trained security personnel to guard the site 24/7. • Continue engaging local communities to foster positive relationships and minimize hostility. • Maintain and regularly update a comprehensive security incident response plan • Maintain close coordination with local law enforcement and security agencies • Implement a rigorous vetting process for all employees to minimize the risk of insider threats. • Develop and periodically review contingency plans for worst-case scenarios, such as armed attacks, civil unrest, or natural disasters.	GECO	• Number of security incidents reported (incidents/month): • Number of security audits conducted (audits/year): • Community engagement activities held (number/year): • Incidents of violence or threats against staff (number/year). • Collaboration with local law enforcement (number of meetings/year). • Number of partnerships established with security and NGOs (active partnerships).	Monthly	1500
		Risks related to poor or inadequate stakeholder engagement (Conflict)	*Risks related to Inadequate stakeholder engagement* • Update the existing SEP to make it more relevant to the subproject and the identified stakeholders. • Timely and prior disclosure of project all project information, including project instruments, the full rights and entitlements of project affected persons, sub-project positive and negative impacts and opportunities, proposed subproject budget. • In line with the SEP, undertake adequate consultations prior to construction and throughout the project cycle with all segments of the community and other relevant stakeholders. • Prepare and implement a grievance redress mechanism to deal with grievances. • The grievance redress committee to include representatives from the community. • Sensitize stakeholders on SEP and GRM. *Inadequate grievances management* • Employ from the community to the extent possible • Engage the community members and other stakeholders in a timely manner • Work closely with the GRM committee members in	GECO	• Availability of and implementation of the Stakeholder Engagement Plan. • Number of stakeholder consultations held • Record of stakeholder consultations held (minutes of meetings and list of participants). • Availability of grievance redress process.	Biannually	2500

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			solving the conflicts • Solve all conflicts/grievances at the earliest time possible • Ensure all grievances are logged and closed • Monitoring the pattern of grievances to come up will long term measures				
		Occupational health and Safety	• Ensure only qualified staff are employed to work in the facility • All workers operating the project site must be equipped with appropriate and adequate person protective equipment (PPE) such as; safety footwear, helmet among others. • Operators must be skilled on firefighting management • Annual EHS audits should be done	GECO	• Provision of PPEs and WIBA cover • Environmental audit reports	Weekly	500
		Community health and safety risks	*Public Health Impacts* • Informing workers on local cultural values and health matters. • Allowing migrant workers time to be with their families • Ensure equal treatment of workers. *Shocks and electrocutions* • Inspect the wiring of the houses before connecting power • Safety awareness campaigns to the community before connection of power on safety precautions such as: • Require community to engage a certified technician to do wiring in the premises • Use of quality materials while wiring • Refraining from individual illegal extensions of power lines to other houses • Observing safety measures while using electricity such as not touching sockets and switches with wet hands or wiping with wet cloths • Keeping off all electricity infrastructure e.g., not tying livestock on electric poles, no cutting earth wires that run along some electric poles, not interfering with sockets or switches • Reporting any electric wire/conductors if found fallen on the ground • Report any incident regarding electricity at the local office –staff in charge of operating the power plant. *Public Health Impacts –HIV/AIDs* • Sensitize workers and the community on prevention and mitigation of HIV/AIDS and other sexually transmitted diseases, through staff	GECO	• Number of awareness creation sessions conducted. • Records of awareness sessions conducted • Incidences report • Number of awareness creation sessions conducted.	Monthly	250

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			awareness and awareness campaigns for the community • Allowing migrant workers time to be with their families				
		Fire hazards	• The power plant must contain firefighting equipment (Portable fire extinguishers) of recommended standards and in key strategic points, including diesel generators, fuel storage areas, BESS locations, etc. • Detection/alarm systems that can detect fire should be and installed • A fire evacuation plan should be prepared and posted at strategic points and should include procedures to take when a fire is reported. • Workers especially operators of the plant must be trained on fire management • 'No smoking' signs shall be posted within the power plant area • A fire Assembly point should be identified and marked	GECO	• Provision of serviced fire equipment, evacuation plan and safety signages • Records of fire safety training	Weekly	1500
DECOMMISSIONING	Impacts on biophysical environment	Landscape and visual	• Create a comprehensive decommissioning plan that includes strategies for minimizing visual impacts on the landscape. • Implement a revegetation plan using native plants and vegetation to restore the natural landscape and improve visual aesthetics. • Ensure proper management and disposal of all debris and waste materials to prevent visual pollution in the surrounding landscape. • Conduct regular clean-up and maintenance of the site to remove any debris or unsightly materials, ensuring a tidy landscape. • Install informational signs explaining the decommissioning process and future land use plans, promoting transparency and community understanding. • Provide regular updates to stakeholders on decommissioning progress and visual impacts, ensuring ongoing communication and involvement.	GECO CONTRACTOR	• Photographic documentation: • Vegetation health monitoring: • Number of complaints: • Soil erosion assessment: • Public awareness programs participation. • Community engagement metrics.	One-off	As per the decommissioning budget
		Biological environment	• Develop habitat protection plans that outline specific measures to protect sensitive habitats, such as wetlands, flora, and fauna during decommissioning. • Implement erosion and sediment control measures to protect soil and water quality, preventing sediment runoff into adjacent habitats. • Plan for revegetation and habitat restoration using native plant species after decommissioning to promote biodiversity and ecosystem recovery.	GECO CONTRACTOR	• Biodiversity surveys. • Community engagement records. • Erosion and sedimentation rates. • Flora and fauna species lists. • Habitat quality assessments.	Monthly	1000

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			• Monitor and manage invasive species during and after decommissioning to prevent their spread into disturbed areas. • Implement measures to control noise and vibration during decommissioning to minimize disturbance to local wildlife. • Ensure proper disposal of waste materials to prevent pollution and harm to the biological environment. • Engage with local communities to raise awareness about the importance of protecting the biological environment during decommissioning. • Work with environmental specialists and conservation organizations to develop and implement effective mitigation measures. • Develop detailed site restoration plans that include objectives, timelines, and responsibilities for restoring biological habitats post-decommissioning.		• Invasive species monitoring. • Vegetation health monitoring.		
		Solid Waste Generation	• Demolition contractor to adhere to the various manufacturer's guidelines and requirements regarding demolition and disposal • Segregation of waste in order to separate hazardous waste from non-hazardous waste and other streams of waste • Provision of facilities for proper handling and storage of demolition materials to reduce the amount of waste caused by damage or exposure to the elements • Adequate collection and storage of waste on site • Safe transportation to the disposal sites / designated area • Hazardous waste must be disposed by approved waste handler	GECO CONTRACTOR	• Presence of well-maintained receptacles and centralized collection points	Weekly	3500
		Liquid Waste Generation	• Conduct a comprehensive assessment to identify and categorize all sources of liquid waste generated during decommissioning. • Develop a detailed liquid waste management plan outlining procedures for the collection, storage, treatment, and disposal of liquid wastes. • Establish temporary storage facilities for liquid wastes to prevent leaks or spills and ensure safe handling until proper disposal. • Whenever possible, use environmentally friendly materials and products that generate less hazardous liquid waste during decommissioning. • Ensure that all liquid wastes are disposed of in accordance with local regulations and environmental standards, using licensed waste disposal facilities.	GECO CONTRACTOR	• Liquid waste generation quantities. • Soil contamination assessments. • Incidence of spills and leaks. • Liquid waste management plan compliance. • Public reporting and complaints. • Community engagement metrics. • Volume of	Weekly	2500

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			• Provide training for staff on liquid waste handling, storage, and emergency response procedures to minimize risks. • Identify opportunities for the reuse or recycling of liquid waste materials, where feasible, to minimize waste generation. • Engage with the local community to inform them about liquid waste management practices and promote awareness of environmental protection. • Maintain accurate records of liquid waste management activities, including quantities generated, treatment methods, and disposal locations. • Prepare for emergencies related to liquid waste, including establishing an emergency contact list and response procedures. • Maintain an inventory of chemicals and hazardous substances to prevent unnecessary waste generation and facilitate proper management.		recovered reusable liquids.		
		Noise and vibration	• Install portable barriers to shield compressors and other small stationary equipment where necessary. • Use quiet equipment (i.e., equipment designed with noise control elements). • Co-ordinate with relevant agencies in case the noise produced will require a license. • Limit pickup trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use and encourage workers to shut off vehicle engines whenever possible. • Demolish mainly during the day when most of the neighbours are out working.	GECO CONTRACTOR	• Noise levels- Records of noise measurements done by contractor within the project area and at distances of 30m from the project site	Weekly	1000
		Air quality (dust)	• Use water sprays or misting systems to dampen surfaces and reduce dust generation, particularly on unpaved roads and active work areas. • Implement soil stabilization techniques, such as using binders or applying vegetation, to minimize dust from disturbed soil areas. • Enforce speed limits for vehicles operating on-site and on access roads to reduce dust emissions from vehicle traffic. • Use tarps or other coverings to protect stockpiles of loose materials from wind erosion and dust generation. • Engage with local communities to inform them about decommissioning activities and measures being taken to control dust emissions. • Conduct regular inspections to identify potential sources of dust emissions and ensure that mitigation measures are effectively implemented.	GECO CONTRACTOR	• Community complaints and feedback. • Cumulative dust impact assessment. • Effectiveness of dust control measures. • Health impact assessments. • Long-term dust emission trends. • Post-activity dust clean-up reports. • Public awareness programs participation. • Soil and vegetation dust monitoring.	Weekly	1200

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			• Plan for site rehabilitation after decommissioning to restore vegetation cover, which can help prevent dust generation in the long term.		• Traffic patterns and impact assessment. • Visual assessment of dust levels.		
		Air quality (vehicle & machinery fumes)	• Use high-quality fuels with lower sulphur content to minimize emissions from vehicles and generators. • Implement a regular maintenance schedule for all vehicles and generators to ensure they operate efficiently and emit fewer fumes. • Optimize generator operation by running them only when necessary and using them at optimal loads to reduce emissions. • Implement policies to minimize idling time for vehicles and generators, encouraging operators to turn off engines when not in use. • Provide training for drivers and equipment operators on eco-driving practices that reduce fuel consumption and emissions. • Establish an air quality-monitoring program to track emissions from vehicles and generators and ensure compliance with local regulations. • Engage with local communities to inform them about emissions reduction efforts and address any concerns related to air quality. • Conduct scheduled checks to ensure that exhaust systems and emission control devices are functioning correctly. • Establish a reporting system for emissions data to track progress and compliance with environmental standards.	GECO CONTRACTOR	• Community complaints and feedback. • Cumulative emission impact assessment: • Environmental compliance audits. • Health impact assessment reports. • Long-term emission trends. • Maintenance records of vehicles.	Weekly	1200
	Impacts on Infrastructure & Utilities	Water Consumption	• Conduct a comprehensive assessment to evaluate water needs for decommissioning activities and identify opportunities for reduction. • Develop a water management plan that outlines strategies for minimizing water consumption throughout the decommissioning process. • Implement systems to recycle and reuse water for various tasks, such as dust suppression, equipment washing, and site clean-up. • Provide training for personnel on water conservation practices and the importance of minimizing water use during decommissioning. • Engage with local communities to raise awareness about water conservation efforts and the importance of sustainable water management. • Use temporary storage solutions to manage water supplies efficiently and reduce waste. • Implement measures to prevent leaks and spills from water storage and distribution systems.	GECO CONTRACTOR	• Community feedback • Compliance with water usage regulations: • Impact on local water resources: • Mitigation measure implementation records. • Water consumption efficiency • Water recycling rates: • Water usage quantities and supply.	Weekly	2000

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			• Provide periodic updates to stakeholders and the community on water management practices and progress in reducing consumption.				
	Impacts on social environment	Occupational health and safety	• Conduct a thorough occupational health and safety risk assessment to identify hazards associated with decommissioning activities. • Create a comprehensive occupational health and safety management plan outlining procedures, responsibilities, and protocols to mitigate identified risks. • Ensure that all workers are equipped with appropriate PPE, such as helmets, gloves, goggles, and respiratory protection, to minimize exposure to hazards. • Conduct regular safety inspections of the worksite to identify and address potential hazards promptly. • Establish clear emergency response procedures for incidents such as fires, chemical spills, and medical emergencies, and ensure all workers are trained in these procedures. • Develop and enforce safe work practices and standard operating procedures for decommissioning tasks, including equipment handling, dismantling, and waste disposal. • Provide first aid facilities and ensure that trained personnel are available to respond to medical emergencies on-site. • Implement measures to control noise and vibration levels during decommissioning activities, such as using quieter equipment and scheduling high-noise activities appropriately. • Ensure that all contractors and subcontractors adhere to the same occupational health and safety standards as the main contractor.	GECO CONTRACTOR	• Incident reporting and tracking. • Health and safety training participation. • Personal protective equipment (PPE) compliance. • Safety audits and inspections. • First aid response records. • Compliance with safety regulations. • Incident investigation reports.	Daily	250
		Gender-based violence	• Update the existing SEA/SH Prevention and Response Action Plan, to manage the SEA/SH risks that are relevant to the subproject. • The Action Plan to be proportionate to potential SEA/SH risks, and includes measures such as awareness creation for communities and workers; identification of referral services for survivors and a GRM that ensures confidential reporting of GBV cases. • Implement a code of conduct signed by all those with physical presence on site. • Establish Workers GRM with multiple channels including SEA/H channels. • Ensure that Code conducts are singed by all employers or incorporated in the employment contracts.	GECO CONTRACTOR	• Minutes of awareness creation sessions for the community and workers on GBV-SEA/SH. • Code of conduct signed by all those with physical presence on site. • GRM that ensures confidentiality of GBV cases in place. • Documented referral services for survivors.	Weekly	1000

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
					• Grievances raised, aggrieved persons and status on resolution etc.		
		Inadequate grievances management	• Constitute a Local Grievances Committee is in consultation with all community segments, and incorporates the existing local dispute resolution mechanism. • Implement a worker's grievances mechanism. • All reported grievances are logged, dated, processed, resolved and closed out in a timely manner. • Proportionate representation of VMGs and vulnerable individuals in the local grievances committee. • GRM provides for confidential reporting of particularly sensitive social aspects such as GBV, as well as anonymity.	GECO CONTRACTOR	• Local Grievances Committee in place, composition of committee, awareness of community and workers on project and worker GRMs, updated GRM logs, types of grievances • Availability of grievance redress process • Number of grievances reported • Number of grievances resolved in a timely manner • Number of grievances escalated to national courts and the World Bank Grievances Redress Service and Inspection Panel.	Weekly	1200
		Risks related to Inadequate stakeholder engagement	• Conduct a comprehensive stakeholder mapping exercise to identify all relevant stakeholders, including local communities, government agencies, NGOs, and other affected parties. • Develop a stakeholder engagement strategy that outlines the objectives, methods, and timelines for engaging with different stakeholders throughout the decommissioning process. • Organize public consultations and forums to solicit feedback from stakeholders, ensuring their voices are heard and concerns are addressed. • Invest in building the capacity of local communities and stakeholders to engage in the decommissioning process effectively, providing training and resources as needed. • Collaborate with local leaders and community organizations to facilitate trust-building and effective engagement with the community. • Provide regular updates and reports to stakeholders on the progress of decommissioning activities and how stakeholder feedback has	GECO CONTRACTOR	• Frequency of stakeholder meetings. • Documentation of stakeholder concerns. • Follow-up actions on feedback. • Community representation in decision-making. • Collaboration with local organizations. • Long-term engagement strategies.	Weekly	1000

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			influenced decisions. • Ensure that women and vulnerable groups are actively involved in stakeholder engagement processes, addressing any barriers they may face in participation.				
		Labour disputes	• Ensure all employees have clear and legally binding employment contracts that outline their rights, responsibilities, wages, and benefits to prevent misunderstandings. • Establish an accessible, transparent grievance mechanism for workers to voice their concerns or disputes. • Maintain open communication between management and workers. • Ensure full compliance with national labour laws. • Implement fair and transparent disciplinary procedures. • Promote equal opportunities and non-discriminatory practices in hiring, promotion, and compensation to avoid conflicts. • Set up a monitoring system to track and evaluate labour relations, allowing for early detection of potential disputes and timely intervention. • Conduct regular worker feedback surveys to gauge satisfaction and identify any emerging concerns that could lead to disputes.	GECO CONTRACTOR	• Number of Labour Disputes Raised (disputes/month): • Grievances Resolved Within Agreed Timeframe (percentage): • Worker Turnover Rate (percentage). • Number of Grievances Filed Regarding Wages or Compensation (grievances/month). • Number of Labour Dispute Awareness Campaigns (number/year).	Weekly	1000
		Child and forced labour	• Adhere to the ESS 2 provisions and FRS Employment Act, which outlaws any form of forced labour. • Report any form of forced labour at the site. • Compliance with the national labor laws and labour management practices. • Put visible signage on site "No Jobs for children" • -Do not allow children at the project site.	GECO CONTRACTOR	• Number of reported cases of forced labour. • Updated employment register indicating locals employed, their ages, national identification numbers etc. • Grievances raised, aggrieved persons and status on resolution etc.	Weekly	500
		Security risks	• Conduct a thorough security risk assessment to identify potential threats and vulnerabilities associated with the decommissioning activities. • Create a comprehensive security plan that outlines specific measures, protocols, and responsibilities for ensuring site security during decommissioning. • Employ trained security personnel to monitor the site, control access, and respond to security incidents as they arise. • Establish partnerships with local law enforcement	GECO CONTRACTOR	• Incident reports. • Access control measures. • Response time to security incidents. • Training of security personnel. • Community security awareness programs.	Daily	1000

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			and security agencies to enhance overall security coordination and response. • Engage with local communities to build trust and cooperation, encouraging them to report suspicious activities or security concerns. • Implement strict access control procedures to limit entry to authorized personnel only, including the use of identification badges or passes. • Develop and communicate an emergency response plan that outlines procedures for handling security incidents, including evacuation protocols. • Develop a crisis communication plan to inform stakeholders and the community about security incidents promptly and transparently. • Provide training on risk mitigation strategies for all personnel involved in the decommissioning activities.		• Stakeholder feedback on security. • Analysis of security trends. • Feedback from security personnel.		
		Community health and safety risks	• Conduct a comprehensive assessment to identify potential health and safety risks to the local community during the decommissioning process. • Create a health and safety management plan that outlines strategies for minimizing risks and protecting community health during decommissioning activities. • Develop and communicate an emergency response plan that includes protocols for medical emergencies, environmental incidents, and community evacuations if necessary. • Engage with local communities regularly to gather feedback, address concerns, and provide updates on decommissioning activities and safety measures. • Implement measures to minimize noise pollution during decommissioning. • Develop a traffic management plan to control vehicle movement to and from the site, reducing risks of accidents and ensuring safe access for the community. • Implement dust suppression measures, such as regular watering of the site, to minimize dust emissions that can affect community health. • Ensure proper waste management practices to prevent contamination of land and water resources, which could affect community health. • Implement sustainable decommissioning practices that prioritize community health and safety while minimizing environmental impacts. • Establish a feedback mechanism that allows community members to report health and safety	GECO CONTRACTOR	• Health incident reports. • Community health assessments. • Feedback mechanisms for community concerns. • Community satisfaction surveys. • Communication of health risks. • Injury rate monitoring. • Environmental health audits. • Documentation of community feedback.	Weekly	500

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
			concerns related to the decommissioning process.				
		Fire hazards	• Conduct a comprehensive fire risk assessment to identify potential fire hazards associated with decommissioning activities and materials. • Create a fire safety plan that outlines prevention measures, emergency response protocols, and responsibilities for all personnel involved in decommissioning. • Provide fire safety training for all workers, covering fire prevention, emergency procedures, and the proper use of firefighting equipment. • Ensure the availability of adequate firefighting equipment, such as fire extinguishers, hoses, and water sources, in easily accessible locations throughout the site. • Store flammable materials in designated, secure areas away from ignition sources, following appropriate storage guidelines. • Establish firebreaks or cleared areas around the site to help prevent the spread of fire. • Use clear signage to indicate fire exits, assembly points, and locations of firefighting equipment throughout the site. • Minimize the accumulation of combustible waste materials on-site and establish a routine waste removal process. • Establish communication and coordination with local fire services to ensure a rapid response in case of a fire emergency. • Ensure an adequate supply of water is readily available for firefighting purposes, including water tanks or ponds if necessary.	GECO CONTRACTOR	• Fire incident reports. • Fire risk assessments. • Documentation of fire hazards. • Monitoring of flammable materials storage. • Documentation of community feedback on fire safety.	Daily	500
		Traffic risks	• Develop and implement a Traffic Management Plan (TMP). • Use traffic signs, barriers, and cones to guide and direct both construction and local traffic. • Enforce strict speed limits for construction vehicles within the construction site and along designated transport routes. • Install speed bumps or other traffic-calming measures on roads near the construction site. • Engage with local communities to raise awareness about increased construction traffic and safety measures. • Erect temporary road signs warning local road users of construction activities and increased traffic. • Designate safe parking and loading zones for construction vehicles away from main roads and community spaces.	GECO CONTRACTOR	• Number of traffic incidents. • Traffic management plan compliance. • Speed limit violations. • Traffic safety training attendance. • Community complaints related to traffic. • Emergency response time to traffic incidents. • Community awareness programs on traffic safety.	Daily	500

PROJECT PHASE	IMPACT CATEGORY	DESCRIPTION	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY	MONITORING INDICATOR	MONITORING FREQUENCY	ESTIMATED COSTS (US$)
					• Use of alternative routes by construction vehicles.		
Total							**138,600**

9.0. Stakeholder Analysis, Public Consultations and Disclosure

9.1. OVERVIEW

The stakeholder consultation process for the proposed GECO hybrid power plant project in Gaalkacyo City, Somalia, aimed to gather and address stakeholders' concerns, expectations, and feedback. This process was part of ESIA good practice and a requirement for the World Bank's environment and social standards (ESS10). Stakeholders were defined as individuals or groups potentially affected by the project or influencing it directly or indirectly. The process was fair and inclusive, using tools like questionnaires, key informant interview guides, and focused group discussion guides. The stakeholders' engagements focused on two main categories of stakeholders: potentially affected communities, which are people and organizations directly affected by the project, and other interested parties and stakeholder groups including women who are considered vulnerable due to cultural norms in rural areas.

9.2. OBJECTIVES OF THE STAKEHOLDER CONSULTATIONS

The key objectives of the stakeholder consultation process were:

- To inform stakeholders about the proposed GECO hybrid power plant project, including its scope, potential adverse impacts, and benefits.
- To gather stakeholder concerns, opinions, and expectations regarding the project.
- To understand community dynamics, relations, and the broader social and economic context of the communities and the possible impacts of this Project.
- To build a constructive dialogue between the project developers and local communities, government entities, and other interested parties.
- To ensure that stakeholder input is incorporated into project planning and implementation, in compliance with best practices and regulatory requirements.
- To facilitate transparency and inclusive participation of community members in the project so they can voice their concerns and views regarding the project design and its project impacts, and to ask questions.

9.3. THE STAKEHOLDERS

As part of the Environmental and Social Impact Assessment (ESIA) for the proposed hybrid power plant in Gaalkacyo, a comprehensive stakeholder engagement process was conducted, involving a diverse range of participants from both public and private organizations as well as individuals based in the city. Stakeholders included local government representatives, community leaders, private sector players, civil society organizations, and residents directly or indirectly affected by the project. The discussions highlighted varied perspectives, with stakeholders raising concerns about potential environmental and social impacts, including land use, resource management, and community well-being. However, there was broad support for the project, contingent on the effective implementation of a robust Environmental and Social Management Plan (ESMP) to mitigate potential adverse effects and maximize the project's benefits. The following were the key stakeholders engaged during the exercise:

- Relevant Galmudug State entities: Representatives from the Ministry of Environment and Climate Change, Ministry of Health, Gaalkacyo South Local Government, amongst others.
- Women and youth groups
- Medical services providers – Health workers representative
- Waste Management Operators representative
- Gender activists
- Local business operators
- Community elder representative
- Education sector representative – A school principal and a university professor
- Environmental activists
- Religious and cultural leaders: Leaders who influence social dynamics in Gaalkacyo City.

9.4. APPROACH AND METHODOLOGY

The consultation process was conducted through a combination of structured questionnaires, key informant interviews and focus group discussions. HD Expert teams in close collaboration with the GECO and local communities' representatives facilitated the consultations. Information about the proposed

power plant was disseminated to ensure all participants had a clear understanding of the project's scope and objectives.

9.5. SUMMARY OF KEY FEEDBACKS FROM STAKEHOLDERS

The individual stakeholders' views are as summarized in Table (9-1). The proposed hybrid power plant by GECO was met with an overwhelmingly positive reception from stakeholders, who view it as a critical step towards addressing the region's energy needs and fostering economic development. They expressed their appreciation for the project's potential to enhance energy reliability, reduce dependence on non-renewable energy sources, and create employment opportunities. However, they underscored the importance of the proponent (GECO) fully implementing the Environmental and Social Management Plan (ESMP) and establishing an effective Grievance Redress Mechanism (GRM) during all project phases. These measures were seen as essential to ensuring that the project's benefits are maximized while potential environmental and social risks are mitigated, fostering trust and long-term sustainability.

More specifically, the public consultation exercise yielded outcomes summarised below:

(i) *General support for the project:* Most stakeholders expressed their agreement and support for the proposed hybrid power plant, recognizing the potential benefits it will bring in terms of improved access to affordable and clean energy, job creation, and enhanced local economic development. However, there were variations of different strengths in the opinions when analysed across gender, as there were feelings that the project will only directly benefit GECO from economic perspective (See Annex 11).

(ii) *Land activity of the project site:* Project area in general is used mainly for grazing activities, but users consulted did not express any objection and stated that there are similar alternatives areas in Gaalkacyo District that can be used for the same purposes and that the Project does not have any specific different values.

(iii) *Existence of cultural sites:* There are no sacred sites or cultural heritage sites near the project area.

(iv) *Existence of wildlife:* No wildlife conservation concern occur at the proposed site. Additionally, the project area has undergone anthropogenic habitats modifications over the years. However, pockets of vegetation dominated mainly by *Acacia reficiens* and *Salvadora persica*, still occur at the proposed project site.

(v) *Land use conflicts:* No conflicts over land/land ownership was expressed.

(vi) *Expectations for regular information sharing:* Stakeholders demand transparent, ongoing communication from GECO during construction and operation phases of the project. They emphasize the importance of timely updates on construction activities, potential disruptions, and environmental and social performance, and expect clear channels of communication.

(vii) *Expectations on social responsibility programmes (SRP):* implementation of SRP by GECO that focuses on community development projects (that addresses women groups as well) as well community needs (health, education, sanitation, water supply, transport, etc.).

(viii) *Concerns about potential disruptions*: They expect that GECO will implement mitigation measures and keep them informed of any significant changes or delays.

(ix) *Employment opportunities*: Local stakeholders, particularly youth and women's groups, emphasized the need for job creation as a significant benefit of the project. They expressed an interest in local recruitment, training, and skills development opportunities provided by the project during both the construction and operational phases.

(x) *Environmental and social performance*: Some stakeholders called for regular monitoring and reporting on the plant's environmental footprint, including any impacts on water resources, air quality, and land use.

Table 9-1: Summary of the individual stakeholders' comments as documented during the ESIA study for the proposed GECO Hybrid Power Plant - Gaalkacyo

#	Stakeholder category	Summary of the comments
1	Ministry of Environment and Climate Change – Puntland State	The representative expressed support for the project, recognizing its potential to address energy challenges and promote sustainable development in the region. She highlighted the importance of adhering to national environmental regulations and international standards throughout the project lifecycle. Additionally, she stressed the need for robust environmental monitoring, proper waste management, and the implementation of climate-resilient measures to mitigate any adverse environmental and social impacts. The Ministry's input underscored their commitment to balancing development with environmental stewardship.
2	Ministry of Health – Puntland State	The Ministry of Health welcomed the project, acknowledging its potential to improve local livelihoods and access to energy, which can indirectly enhance public health services. However, the Ministry emphasized the importance of addressing potential health risks associated with the project, such as air quality impacts, noise pollution, and worker influx. The

#	Stakeholder category	Summary of the comments
		representative highlighted the need for measures to prevent the spread of communicable diseases, ensure occupational health and safety for workers, and protect community health. Additionally, the representative stressed the importance of including health considerations in the Environmental and Social Management Plan (ESMP) to ensure the well-being of local communities throughout the project's lifecycle.
3	Representative Gaalkacyo South Local Government	The representative expressed support for the project, citing its potential to stimulate local economic growth, create job opportunities, and enhance energy access in the area. He highlighted the importance of involving the local government in all stages of the project to ensure alignment with regional development plans and to address community concerns effectively. The representative also emphasized the need for the project proponent to prioritize local employment, implement proper land-use planning, and ensure compliance with environmental and social safeguards to minimize potential adverse impacts on local communities and resources.
4	Women groups	The representative from women's groups voiced their cautious support for the project, acknowledging its potential to improve energy access, support economic activities, and enhance the quality of life in their communities. They emphasized the importance of ensuring gender inclusivity in project planning and implementation, including creating employment opportunities for women and supporting women-owned businesses. Concerns were raised about potential social risks, such as gender-based violence (GBV) and community health issues, due to worker influx, especially during construction. The representative called for robust measures in the Environmental and Social Management Plan (ESMP) to safeguard women's rights, promote equitable benefits, and establish clear grievance redress mechanisms to address any gender-specific concerns that may arise.
5	Youth groups	The representatives from youth groups expressed strong support for the project, highlighting its potential to create much-needed employment opportunities and foster skill development among young people in the region. They stressed the importance of prioritizing youth involvement in job allocation, vocational training, and capacity-building programs linked to the project. Concerns were raised about potential social risks, such as limited access to resources, and the youth groups emphasized the need for effective mitigation measures to safeguard their livelihoods and future prospects.
6	Medical services providers – Health workers representative	The representative expressed conditional support for the project, recognizing its potential to improve infrastructure and energy access, which could enhance healthcare delivery. However, he emphasized the need for proactive measures to address potential health risks associated with the project, including the spread of communicable diseases due to worker influx and exposure to pollution during construction and operation. The representative called for collaboration between the project proponent and local healthcare facilities to strengthen public health systems, provide health awareness programs for the community, and ensure adequate medical preparedness to address any emergencies arising from project activities.
7	Waste Management Operators representative	He welcomed the project, acknowledging its potential to boost local economic activities and create new opportunities within the waste management sector. He emphasized the importance of establishing a comprehensive waste management plan to handle both solid and liquid waste generated during the construction, operation, and decommissioning phases. The representative highlighted the need for collaboration with local waste management operators to ensure environmentally sound disposal practices, recycling initiatives, and capacity building. Additionally, he urged the proponent to adopt sustainable practices that align with existing waste management regulations and to integrate waste minimization strategies into the project's Environmental and Social Management Plan (ESMP).
8	Gender activists	She expressed cautious support for the project, recognizing its potential to enhance community development and energy access. However, she emphasized the importance of integrating gender equality measures into the project's planning and implementation phases. Key concerns included ensuring women's participation in decision-making, creating equitable employment opportunities, and addressing risks such as gender-based violence (GBV) and discrimination that may arise during the project lifecycle. The activist called for the inclusion of specific gender-sensitive provisions in the Environmental and Social Management Plan (ESMP), robust monitoring frameworks, and accessible grievance mechanisms to safeguard women's rights and promote inclusivity.
9	Local business operators representative	He expressed strong support for the project, recognizing its potential to improve the reliability of energy supply, reduce operational costs, and foster economic growth in the region. He emphasized the need for the project to ensure that businesses, particularly small and medium enterprises (SMEs), have access to affordable and stable electricity, which would enhance productivity and attract further investment. However, he also raised concerns about potential disruptions during the construction

#	Stakeholder category	Summary of the comments
		phase and urged the proponent to develop mitigation strategies to minimize any negative impacts on local business activities. Additionally, the business operators called for the establishment of clear communication channels to ensure their ongoing engagement throughout the project lifecycle.
10	Community elder representative	He raised concerns about the potential loss of grazing land, and impacts on livelihoods during the construction phase. He emphasized the importance of ensuring that the project provides tangible benefits to the local population, such as employment opportunities, compensation for affected families, and improved infrastructure. He called for strong community engagement and the implementation of effective grievance mechanisms to address any social or environmental issues that may arise.
11	Education sector representative – A school principal and a university professor	The representatives expressed support for the project, recognizing its potential to improve access to reliable energy, which could enhance the quality of education in local schools. They highlighted the importance of ensuring that schools and educational facilities benefit from the stable electricity supply, which would enable the use of modern teaching tools and improve learning environments. The representatives also called for investment in education-related initiatives, such as skills training and capacity building for local youth, to help prepare them for employment opportunities linked to the project.
12	Environmental activists	The representatives expressed cautious support for the project, acknowledging its potential to contribute to sustainable energy solutions. However, he voiced concerns about the potential environmental impacts, particularly related to land use, and water resources during the construction and operational phases. The activist emphasized the need for rigorous environmental monitoring and the implementation of best practices to mitigate any adverse effects on the local ecosystem.
13	Religious and cultural leaders	Expressed general support for the project, recognizing its potential to bring about socio-economic development and improve the quality of life through enhanced energy access. However, he emphasized the need for the project to consider the moral and ethical implications of its environmental and social impacts. The representative urged the proponent to ensure that the project respects local cultural and religious values, particularly with regard to land use. He also called for the inclusion of community consultation processes that are inclusive of religious leaders to help guide the project's alignment with the values of the local population.

9.6. COMMITMENTS BY GECO

The proponent (GECO) is fully committed to ensuring that the project is developed in a manner that is environmentally responsible, socially inclusive, and economically beneficial to the local community. It recognizes the importance of minimizing environmental impacts, rigorously adhering to the highest standards of environmental and social management throughout all phases of the project. It has pledged to implement a comprehensive Environmental and Social Management Plan (ESMP), which includes measures to address community concerns, promote local employment, ensure gender equality, and safeguard public health and safety. Overall, GECO is committed to maintaining open and transparent communication with all stakeholders, fostering meaningful consultations, and providing accessible grievance redress mechanisms.

10.0. Conclusion and Recommendations

10.1. CONCLUSION

Conclusion and recommendations

Conclusion

(iii) The report reveals that negative social and environmental impacts associated with the proposed project can be mitigated, and positive impacts enhanced for the benefit the local community and all other stakeholders. It expected that the project proponent, GECO, and the contractors would adhere to the implementation of the environmental and social management plan as proposed in this report. Additionally, the proponent will obtain necessary permits, adhere to all relevant laws and regulatory frameworks during all the project phases, and more importantly engage qualified personnel. The ESIA analysis shows that the proposed power plant will have positive impacts on the FGS, Galmudug State governments, and residents, including increased clean energy, employment, investment, and improved living standards. However, it also poses potential negative impacts like noise, dust, soil erosion, and social risks. To this end, an Environmental and Social Management Plan (ESMP) outlining project activities, impacts, mitigation plans, and monitorable indicators, with implementation timelines and cost estimates will have to be implemented by the proponent.

(iv) A monitoring plan has been developed identifying environmental performance indicators. The project will generate socio-economic benefits, and the stakeholders have consulted, indicating it is long overdue project. Potential adverse impacts are possible to mitigate, with most assessed as low to medium low. The many environmental and social impacts will be temporary, especially during construction phase, and will be manageable through prudent implementation measures as proposed in the ESMP. Overall, the project will be designed, constructed, operated and decommissioned according to the best industry practices and environmental sustainability. Additionally, all mitigation measures as proposed in this ESIA will be integrated to ensure enhanced compliance with state and federal laws and procedures, best international practices, and more importantly in compliance with the World Bank's ESF. Overall, the project is considered beneficial and important for society and the environment, and a worthy investment.

10.2. RECOMMENDATION

(i) It is strongly recommended that the MoEWR and GECO make a concerted effort in particular, to implement the ESMP provided herein. Following the commissioning of the project, statutory EHS Audits shall be carried out in compliance with the national laws and WB requirements. The environmental performance of the site operations shall be evaluated against the recommended measures and targets laid out in this report.

(ii) On the basis of the findings from this ESIA, the following specific recommendations are made:

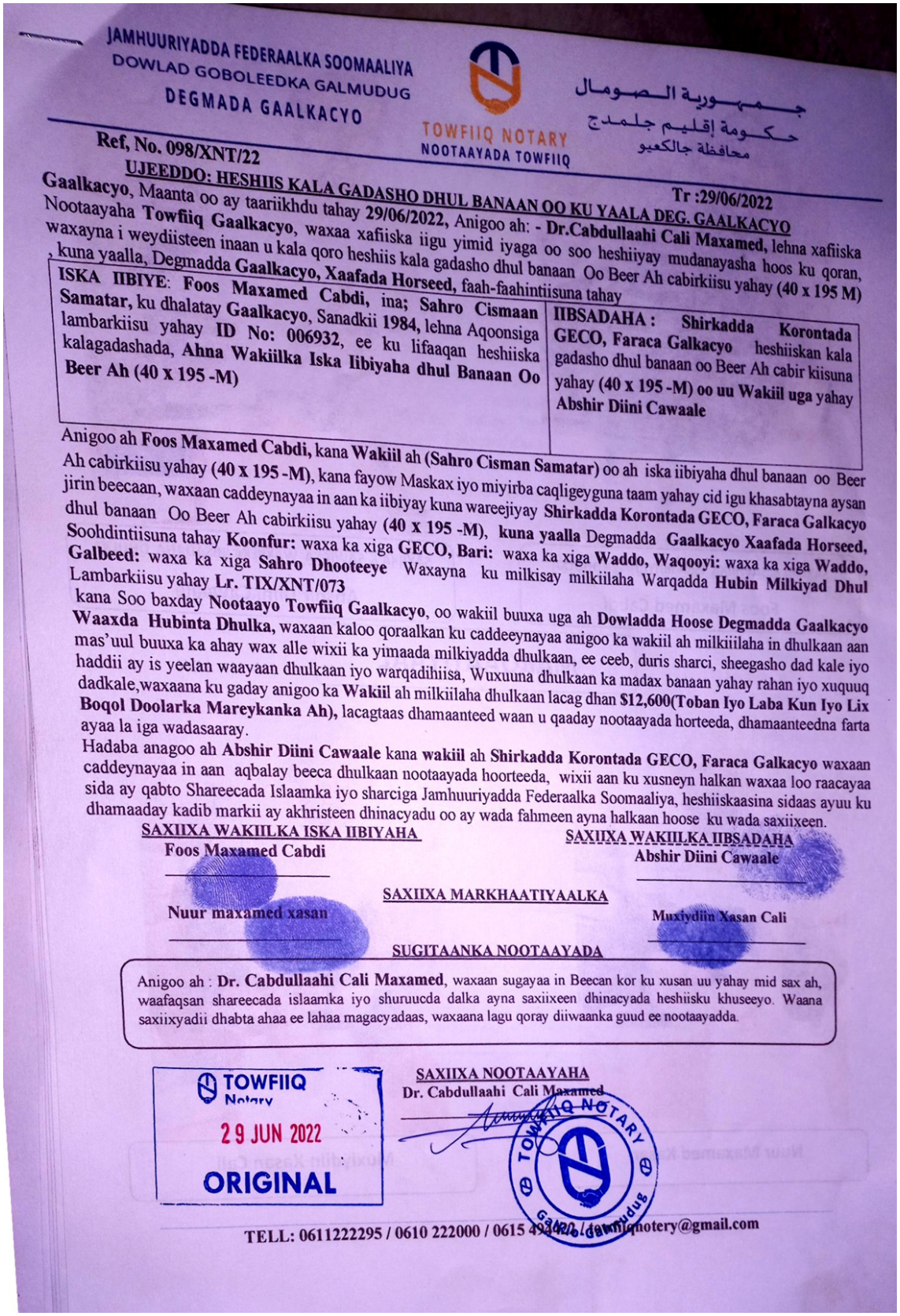
- (i) Adherence to the mitigation measures as spelt out in the ESMP and monitoring of the same is mandatory to ensure environmental and social sustainability of the project.
- (j) Contractor to ensure grievance redress mechanism is established and operational before commencement of the construction works.
- (k) Contractor to undertake habitat restoration programmes through planting of indigenous vegetation in all cleared areas to promote environmental sustainability provided such restorations do not negatively affect the solar PV generation capacity. All restoration activities to use local indigenous flora.
- (l) Cultivate and maintain a good working relationship with the community members, and all other relevant stakeholders. This should be a long-term endeavor during all project phases.
- (m) Diligence on the part of the contractor and proper supervision by the MoEWR and GECO is crucial for mitigating the potential impacts and ensuring environmental, health, safety, and efficient operation of the project.
- (n) EHS Audits shall be carried annually or as prescribed by the FGS Authority during the operational phase.
- (o) Ensure social inclusion of the vulnerable groups by paying attention to the most vulnerable. When opportunities arise of, say employment, ensure they are given the high considerations they deserve.
- (p) The GECO and the contractor shall adhere to relevant legal and regulatory framework to ensure compliance and success of the project

10.3. AUTHORIZATION OPINION

This ESIA report provides enough information for decision-making on the project's continuation. It has shown that the proponent has preferred alternatives and technological alternatives are generally acceptable. The ESIA has also helped identify the environmental and social impacts during all the project phase, including the essential mitigation measures. The proposed project is not in conflict with any of the existing legislations and regulatory frameworks, and achieved favourable social appeal from a cross-section of stakeholders engaged as part of the ESIA study. Based on environmental and social grounds as outlined in this report, the applicant's proposal should be considered for approval, provided all negative impacts mitigation measures as proposed are implemented. It is further expected that the proponent (MoEWR/GECO) will own the entire implementation of this ESIA including monitoring and reporting.

11.0. Annexes

ANNEX 11.1. LAND OWNERSHIP DOCUMENT FOR THE PROPOSED PROJECT SITE



JAMHUURIYADDA FEDERAALKA SOOMAALIYA
DOWLAD GOBOLEEDKA GALMUDUG
DEGMADA GAALKACYO

TOWFIIQ NOTARY
NOOTAAYADA TOWFIIQ

جمهورية الصومال
حكومة إقليم جلمدج
محافظة جالكعيو

Ref, No. 098/XNT/22 **Tr :29/06/2022**

UJEEDDO: HESHIIS KALA GADASHO DHUL BANAAN OO KU YAALA DEG. GAALKACYO

Gaalkacyo, Maanta oo ay taariikhdu tahay **29/06/2022**, Anigoo ah: - **Dr.Cabdullaahi Cali Maxamed,** lehna xafiiska Nootaayaha **Towfiiq Gaalkacyo**, waxaa xafiiska iigu yimid iyaga oo soo heshiiyay mudanayasha hoos ku qoran, waxayna i weydiisteen inaan u kala qoro heshiis kala gadasho dhul banaan Oo Beer Ah cabirkiisu yahay **(40 x 195 M)** , kuna yaalla, Degmadda **Gaalkacyo, Xaafada Horseed,** faah-faahintiisuna tahay

ISKA IIBIYE: **Foos Maxamed Cabdi,** ina; **Sahro Cismaan Samatar,** ku dhalatay **Gaalkacyo**, Sanadkii **1984,** lehna Aqoonsiga lambarkiisu yahay **ID No: 006932**, ee ku lifaaqan heshiiska kalagadashada, **Ahna Wakiilka Iska Iibiyaha dhul Banaan Oo Beer Ah (40 x 195 -M)**	**IIBSADAHA : Shirkadda Korontada GECO, Faraca Galkacyo** heshiiskan kala gadasho dhul banaan oo Beer Ah cabir kiisuna yahay **(40 x 195 -M) oo uu Wakiil uga** yahay **Abshir Diini Cawaale**

Anigoo ah **Foos Maxamed Cabdi,** kana **Wakiil** ah **(Sahro Cisman Samatar)** oo ah iska iibiyaha dhul banaan oo Beer Ah cabirkiisu yahay **(40 x 195 -M)**, kana fayow Maskax iyo miyirba caqligeyguna taam yahay cid igu khasabtayna aysan jirin beecaan, waxaan caddeynayaa in aan ka iibiyay kuna wareejiyay **Shirkadda Korontada GECO, Faraca Galkacyo** dhul banaan Oo Beer Ah cabirkiisu yahay **(40 x 195 -M)**, **kuna yaalla** Degmadda **Gaalkacyo Xaafada Horseed, Soohdintiisuna tahay Koonfur:** waxa ka xiga **GECO, Bari:** waxa ka xiga **Waddo, Waqooyi:** waxa ka xiga **Waddo, Galbeed:** waxa ka xiga **Sahro Dhooteeye** Waxayna ku milkisay milkiilaha Warqadda **Hubin Milkiyad Dhul** Lambarkiisu yahay **Lr. TIX/XNT/073**

kana Soo baxday **Nootaayo Towfiiq Gaalkacyo**, oo wakiil buuxa uga ah **Dowladda Hoose Degmadda Gaalkacyo Waaxda Hubinta Dhulka,** waxaan kaloo qoraalkan ku caddeeynayaa anigoo ka wakiil ah milkiilaha in dhulkaan aan mas'uul buuxa ka ahay wax alle wixii ka yimaada milkiyadda dhulkaan, ee ceeb, duris sharci, sheegasho dad kale iyo haddii ay is yeelan waayaan dhulkaan iyo warqadihiisa, Wuxuuna dhulkaan ka madax banaan yahay rahan iyo xuquuq dadkale,waxaana ku gaday anigoo ka **Wakiil** ah milkiilaha dhulkaan lacag dhan **$12,600(Toban Iyo Laba Kun Iyo Lix Boqol Doolarka Mareykanka Ah),** lacagtaas dhamaanteed waan u qaaday nootaayada horteeda, dhamaanteedna farta ayaa la iga wadasaaray.

Hadaba anagoo ah **Abshir Diini Cawaale** kana **wakiil** ah **Shirkadda Korontada GECO, Faraca Galkacyo** waxaan caddeynayaa in aan aqbalay beeca dhulkaan nootaayada hoorteeda, wixii aan ku xusneyn halkan waxaa loo raacayaa sida ay qabto Shareecada Islaamka iyo sharciga Jamhuuriyadda Federaalka Soomaaliya, heshiiskaasina sidaas ayuu ku dhamaaday kadib markii ay akhristeen dhinacyadu oo ay wada fahmeen ayna halkaan hoose ku wada saxiixeen.

SAXIIXA WAKIILKA ISKA IIBIYAHA
Foos Maxamed Cabdi

SAXIIXA WAKIILKA IIBSADAHA
Abshir Diini Cawaale

SAXIIXA MARKHAATIYAALKA

Nuur maxamed xasan

Muxiydiin Xasan Cali

SUGITAANKA NOOTAAYADA

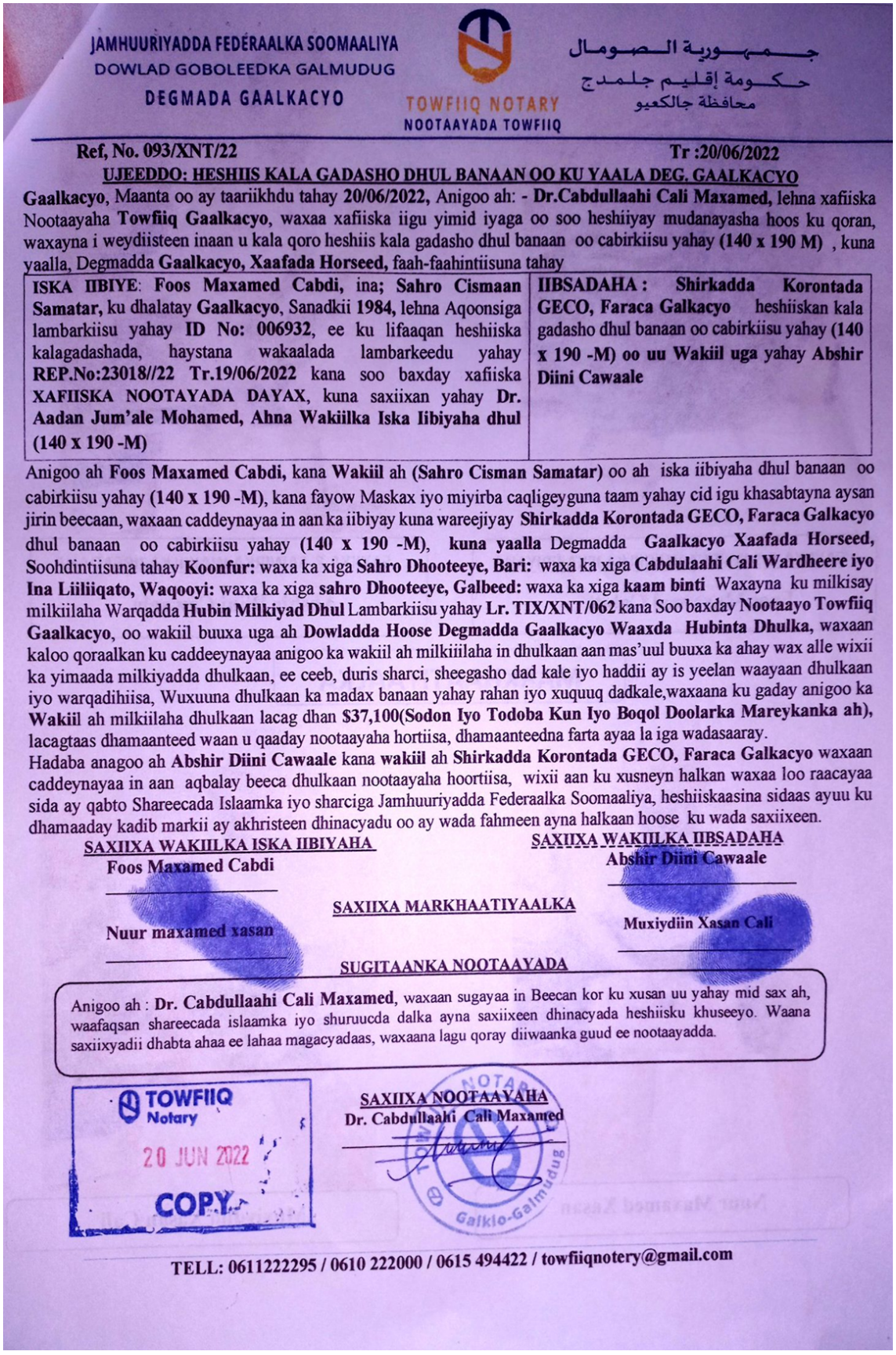
Anigoo ah : **Dr. Cabdullaahi Cali Maxamed**, waxaan sugayaa in Beecan kor ku xusan uu yahay mid sax ah, waafaqsan shareecada islaamka iyo shuruucda dalka ayna saxiixeen dhinacyada heshiisku khuseeyo. Waana saxiixyadii dhabta ahaa ee lahaa magacyadaas, waxaana lagu qoray diiwaanka guud ee nootaayadda.

TOWFIIQ Notary
29 JUN 2022
ORIGINAL

SAXIIXA NOOTAAYAHA
Dr. Cabdullaahi Cali Maxamed

TOWFIIQ NOTARY Gaalkacyo Somalia

TELL: 0611222295 / 0610 222000 / 0615 49[illegible] / [illegible]notery@gmail.com



JAMHUURIYADDA FEDERAALKA SOOMAALIYA
DOWLAD GOBOLEEDKA GALMUDUG
DEGMADA GAALKACYO

TOWFIIQ NOTARY
NOOTAAYADA TOWFIIQ

جـــمـهـــوريـة الـــصـــومـال
حـكـــومة إقـلـيـم جـلـمـدج
محافظة جالكعيو

Ref, No. 093/XNT/22 **Tr :20/06/2022**

UJEEDDO: HESHIIS KALA GADASHO DHUL BANAAN OO KU YAALA DEG. GAALKACYO

Gaalkacyo, Maanta oo ay taariikhdu tahay **20/06/2022,** Anigoo ah: - **Dr.Cabdullaahi Cali Maxamed,** lehna xafiiska Nootaayaha **Towfiiq Gaalkacyo**, waxaa xafiiska iigu yimid iyaga oo soo heshiiyay mudanayasha hoos ku qoran, waxayna i weydiisteen inaan u kala qoro heshiis kala gadasho dhul banaan oo cabirkiisu yahay **(140 x 190 M)** , kuna yaalla, Degmadda **Gaalkacyo, Xaafada Horseed,** faah-faahintiisuna tahay

ISKA IIBIYE: **Foos Maxamed Cabdi,** ina; **Sahro Cismaan Samatar,** ku dhalatay **Gaalkacyo**, Sanadkii **1984,** lehna Aqoonsiga lambarkiisu yahay **ID No: 006932**, ee ku lifaaqan heshiiska kalagadashada, haystana wakaalada lambarkeedu yahay **REP.No:23018//22 Tr.19/06/2022** kana soo baxday xafiiska **XAFIISKA NOOTAYADA DAYAX**, kuna saxiixan yahay **Dr. Aadan Jum'ale Mohamed, Ahna Wakiilka Iska Iibiyaha dhul (140 x 190 -M)**	**IIBSADAHA : Shirkadda Korontada GECO, Faraca Galkacyo** heshiiskan kala gadasho dhul banaan oo cabirkiisu yahay **(140 x 190 -M) oo uu Wakiil uga** yahay **Abshir Diini Cawaale**

Anigoo ah **Foos Maxamed Cabdi,** kana **Wakiil** ah **(Sahro Cisman Samatar)** oo ah iska iibiyaha dhul banaan oo cabirkiisu yahay **(140 x 190 -M),** kana fayow Maskax iyo miyirba caqligeyguna taam yahay cid igu khasabtayna aysan jirin beecaan, waxaan caddeynayaa in aan ka iibiyay kuna wareejiyay **Shirkadda Korontada GECO, Faraca Galkacyo** dhul banaan oo cabirkiisu yahay **(140 x 190 -M), kuna yaalla** Degmadda **Gaalkacyo Xaafada Horseed,** Soohdintiisuna tahay **Koonfur:** waxa ka xiga **Sahro Dhooteeye, Bari:** waxa ka xiga **Cabdulaahi Cali Wardheere iyo Ina Liiliiqato, Waqooyi:** waxa ka xiga **sahro Dhooteeye, Galbeed:** waxa ka xiga **kaam binti** Waxayna ku milkisay milkiilaha Warqadda **Hubin Milkiyad Dhul** Lambarkiisu yahay **Lr. TIX/XNT/062** kana Soo baxday **Nootaayo Towfiiq Gaalkacyo**, oo wakiil buuxa uga ah **Dowladda Hoose Degmadda Gaalkacyo Waaxda Hubinta Dhulka,** waxaan kaloo qoraalkan ku caddeeynayaa anigoo ka wakiil ah milkiilaha in dhulkaan aan mas'uul buuxa ka ahay wax alle wixii ka yimaada milkiyadda dhulkaan, ee ceeb, duris sharci, sheegasho dad kale iyo haddii ay is yeelan waayaan dhulkaan iyo warqadihiisa, Wuxuuna dhulkaan ka madax banaan yahay rahan iyo xuquuq dadkale,waxaana ku gaday anigoo ka **Wakiil** ah milkiilaha dhulkaan lacag dhan **$37,100(Sodon Iyo Todoba Kun Iyo Boqol Doolarka Mareykanka ah),** lacagtaas dhamaanteed waan u qaaday nootaayaha hortiisa, dhamaanteedna farta ayaa la iga wadasaaray.

Hadaba anagoo ah **Abshir Diini Cawaale** kana **wakiil** ah **Shirkadda Korontada GECO, Faraca Galkacyo** waxaan caddeynayaa in aan aqbalay beeca dhulkaan nootaayaha hoortiisa, wixii aan ku xusneyn halkan waxaa loo raacayaa sida ay qabto Shareecada Islaamka iyo sharciga Jamhuuriyadda Federaalka Soomaaliya, heshiiskaasina sidaas ayuu ku dhamaaday kadib markii ay akhristeen dhinacyadu oo ay wada fahmeen ayna halkaan hoose ku wada saxiixeen.

SAXIIXA WAKIILKA ISKA IIBIYAHA
Foos Maxamed Cabdi

SAXIIXA WAKIILKA IIBSADAHA
Abshir Diini Cawaale

SAXIIXA MARKHAATIYAALKA

Nuur maxamed xasan

Muxiydiin Xasan Cali

SUGITAANKA NOOTAAYADA

Anigoo ah : **Dr. Cabdullaahi Cali Maxamed**, waxaan sugayaa in Beecan kor ku xusan uu yahay mid sax ah, waafaqsan shareecada islaamka iyo shuruucda dalka ayna saxiixeen dhinacyada heshiisku khuseeyo. Waana saxiixyadii dhabta ahaa ee lahaa magacyadaas, waxaana lagu qoray diiwaanka guud ee nootaayadda.

TOWFIIQ Notary
20 JUN 2022
COPY

SAXIIXA NOOTAAYAHA
Dr. Cabdullaahi Cali Maxamed

NOOTAAYADA Galkio-Galmudug

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ANNEX 11.2. PUBLIC CONSTULTATION QUESTIONNAIRES

Annex 11-2(a)-PC-Questionnaires-GECO-FGD-ESIA

Annex 11-2(b)-PC-FGD-ESIA Attendance List-GECO-2024

Annex 11-2(c)-PC-Questionnaires-ESIA-GECO-GBV-

Annex 11-2(d)- PC-Questionnaires=ESIA-GECO-KII-2024

ANNEX 11.3. FOCUS GROUP DISCUSSIONS OUTCOMES

Environmental and Social Assessment Checklist

Project Name: NEPCO	District/City: Gaalkacyo
Project Location: Puntland	Nature/Size: ESP
Type of activity: (Hybrid power plant)	
Name & Signature of Evaluator: Ahmed Jaamae	Date of Field Evaluation: 6 June 2024

Item		Appraisal	Risk / Significance rating					
		Yes/No	None	Low	Moderate	Substantial	High	Unknown
1. Environmental Screening (ESS3 and ESS6)								
Will the project generate the following impacts?								
1.1	Loss of trees	Yes			x			
1.2	Soil erosion/siltation in the area	No						
1.3	Pollution to land by diesel, oils etc.	Yes		X				
1.4	Dust emissions	Yes			x			
1.5	Solid and liquid wastes	Yes			x			
1.5	Borrow pits and pools of stagnant water	No						
1.6	Rubble/heaps of excavated soils	No						
1.7	Emergence of wildfire	yes		x				
1.8	Invasive tree species	Yes		x				
1.9	Long term depletion of water	No						
1.10	Exposure to hazardous chemicals including PCBs	Yes		x				
1.11	Nuisance from noise or smell	Yes		X				
1.12	Loss of soil fertility	No						
1.13	Generation of hazardous waste including solar batteries	Yes			x			
1.14	Cross through, located within or nearby environmentally sensitive areas (e.g., national parks, intact natural forests, wetlands, etc.)?	No						
1.15	Cause poor water drainage and increase the risk of water-related diseases such as malaria or bilharzias?	No						
1.16	Risk of exposing the workers to extremely hazardous working conditions.	Yes		x				
2. Social Screening (ESS5)								
Will the project generate the following negative social and economic impacts?								
2.1	Loss of land by households	No						
2.2	Loss of properties –houses, structures	No						
2.3	Loss of perennial trees, fruit trees by households	No						
2.4.	Loss of crops by people	No						
3. ESS2, ESS4, ESS5, ESS7, ESS8								
3.1	Loss of access to grazing area	No						
3.2	Impact heritage site, graveyard land	No						
3.3	Conflicts over use of local water resources	No						
3.4	Disruption of important pathways, footpath/roads	Yes		x				
3.5	Loss of communal facilities – mosques	No						
3.6	Loss of livelihood system	No						
3.7	Risk of encouraging child labour	No						
3.8	Risk of workers to extreme exposure for GBV	No						
3.9	Spread of HIV/AIDS and other STI's	No						
3.10	Risk of GBV/SEA/SH to the affected communities	No						
3.11	Risk associated with Security personnel	No						
4: Impacts on Historically underserved groups/Ethnic minorities		No						

Categorisation & Recommendations:
After compiling the above, determine which risk category the sub-project falls under based on the environmental risk categories: High, Substantial, Moderate and Low risk. If the sub-project falls under "Substantial, Moderate or low" risk categories, proceed to identify the category of the sub-project based on the National EIA guidelines issued.

World Bank ESF Categorisation

Category	Details
High Risk	Sub-project of the Somalia Electricity Sector Recovery Project (SESRP) likely to fall under "High Risk" rating. In the likely event that subproject falls under "High Risk" the Environmental and social Assessment should be conducted in accordance with the World Bank Environmental and Social Standards (ESSs) by preparing an ESIA study report.
Substantial Risk	Sub-project of the Somalia Electricity Sector Recovery Project (SESRP) likely to fall under "Substantial Risk" rating. In the likely event that subproject falls under "Substantial Risk" the Environmental and Social Assessment of the subproject should be conducted in accordance with any requirements of the ESSs that the Bank deems relevant to such subprojects by preparing an ESIA study report.

Moderate Risk	Environmental and Social Assessment of the subproject should be conducted in accordance with any requirements of the ESSs that the Bank deems relevant to such subprojects by preparing an ESMP.
Low Risk	Sub-project is not subject to environmental assessment as no potential impacts are anticipated.

Focus Group Discussion Guide – Youths/Associations

FGD Youth /Association		
Facilitator Instructions: The purpose of the meeting is to gather information on the socio-economic situation of the youth in terms of participation in decision-making, employment, recreation and aspirations. There should be no more than 10 participants. Keep the discussion focused and please probe for explanations for responses (what, where, when, why, how). Take many pictures. The Federal Government of Somalia has secured a grant from the World Bank to implement the Somali Electricity Sector Recovery Project (SESRP). The Ministry of Energy and Water Resources (the MoEWR) implement the SESRP. The Project Development Objective is to increase access to lower-cost and cleaner electricity supply in the project areas and to re-establish the electricity supply industry. We are conducting an environmental and social impact study for Component 1 of the project, focusing on the sub-transmission and distribution network reconstruction, reinforcement, and operations efficiency in the major load centres of Mogadishu and Hargeisa. The purpose of this study is to collect comprehensive information to comprehend the potential impacts of the project and solicit feedback from stakeholders.		
Section A: General Information		Responses
1	Date and time of meeting	6th June 2024
2	Name of facilitators (inc note taker)	Ahmed Jaamae
3	Region/District	Mudug , Gaalkacyo
4	Name of Village	
5	Number/gender of participants	Males: 11
Section B: The Project		
1	Have you heard of the project before? How/when/where (if not please explain) Do you feel that you understand the project?	We have heard about the project but we lack adequate information about the proposed expansion of the GECO Power Plant. As for our understanding of the project, we would need more information on its scope, objectives, and expected impacts to fully comprehend how it will address energy needs in Gaalkacyo, particularly in terms of its reliance on solar, battery energy storage systems (BESS), and diesel. Without clear communication or access to detailed resources about the project, we feel that our understanding is limited.
2	What do you think could be the positive impacts of the project on youth, so that people benefit?	We expect reliable supply of electricity at affordable costs.
3	What other impacts to you think that the project could have on the youth and communities?	We expect the quality of life to improve with the enhanced supply of electricity with many residents being connected.
4	How do you think that the project could minimize or avoid negative impacts?	Ensure proper environmental management, especially management of electronic wastes
5	Do you have any questions/comments regarding the project?	The locals need to be prioritized in job opportunities created because of the project implementation.
Section C: Overview		
1.	If a youth group - When was your youth group established? Why was it established?	We do not have a formal youth group, and operate mainly as friends in our neighbourhoods. None
2.	What are the key priorities among the youth? What are the main issues faced? Why?	Employment opportunities to be created and youths employed in gainful employments. This can be achieved with enhanced security in Gaalkacyo.
3.	To what extent do the youth play a role in decision-making? Do they feel that their voices are heard? What are the main areas where they would like their opinions to be heard?	Minimal. Youths are rarely engaged. Elders make most decisions.
4.	What programmes are in place to help the youth? How successful have they been?	No focused programmes in the Galmudug State sector of Gaalkacyo.
Section D: Education		
1.	How many of the youth have completed secondary education?	No accurate data is available.
2.	How many of the youth have been to vocational school and have qualifications? What subjects do these apply?	None
3.	What skills do the youth feel they have that enable them to work?	Technical and vocational skills, IT skills, entrepreneurial skills.
Section E: Unemployment		
1.	How many of the youth do not have a full-time salaried job?	No accurate data is available.
2.	Why do the unemployed youth not have a job? What are they doing to find a job? Are there any barriers to finding work? What are these?	Lack of investments leading to job creation.
Section F: Employment		
1.	How many of the youth are working? How many are self-employed and how much work for an employer?	No data is available but it was reported that many of the youths are in informal employment.
2.	What are the main jobs that the youth have?	Not described
Section G: Aspirations		

1.	What aspirations/goals do the youth have? How are they planning to achieve those goals? What, if any, are the main barriers to achieving their goals? How can they overcome these barriers?	Better technical training and other vocational trainings for self-employment.
Section H: Recreation		
1.	What do the youth do in their spare time? Where do they go?	Not clearly described but most are engaged in sporting activities.
2.	Do they feel that they have an active social life or is there more that needs to be done to encourage them to engage in recreational/social activities? Explain response	Majority of the youth are idle, and are not engaged in employment. This has led to increase in crime.
Section I: Please insert any observations/comments regarding the meeting here		
1.	Comments/observations (what went well/not so well, was everyone participating, were there any vulnerabilities, how motivated were the youth to participated during the meeting?)	The youth valued their participation in project talks and proposed frequent meetings with varied community groups to promote inclusive engagement, emphasising the equal worth of youth views.

Focus Group Discussion Guide - Female

FGD Female		
Facilitator Instructions: The purpose of the meeting is to gather information on women's role in the household, livelihoods/jobs, health issues, challenges, perceptions on quality of life, and education options for children, health care and project perceptions. Introduce yourselves, the project and explain the purpose of the meeting. Gather a representative sample of a maximum of 10 women that include a combination of youth, elderly and disabled where appropriate. Keep the discussion focused and please probe for explanations for responses (what, where, when, why, how). Take lots of pictures. Ensure everyone participates in the discussion. The Federal Government of Somalia has secured a grant from the World Bank to implement the Somali Electricity Sector Recovery Project (SESRP). The Ministry of Energy and Water Resources (the MoEWR) implement the SESRP. The Project Development Objective is to increase access to lower-cost and cleaner electricity supply in the project areas and to re-establish the electricity supply industry. We are conducting an environmental and social impact study for Component 1 of the project, focusing on the sub-transmission and distribution network reconstruction, reinforcement, and operations efficiency in the major load centres of Mogadishu and Hargeisa. The purpose of this study is to collect comprehensive information to comprehend the potential impacts of the project and solicit feedback from stakeholders. *Show the participants the layouts/models*		
Section A: General Information		Responses
6	Date and time of meeting	6th June 2024
7	Name of facilitators (inc note taker)	Aisha Ali Abdala
8	Name of Region Region/District	Mudug, Gaalkacyo,
9	Number of participants	6
10	Describe the demographics / composition of the group (age range, ethnicity and any vulnerabilities)	Age range was between 25 and 40 and all Somali. All speak Somalia but are from different clans.
11	Number of female-headed households in the group? What is the main reason for this?	Not provided. Representation from a diverse background, including single mothers.
Section B: The Project		
6	Have you heard of the project before? How/when/where Do you feel that you understand the project? (if not please provide an explanation and show the site map)	Heard about the proposed project but not much information is available.
7	What is your view on the project? How do you think that the project could affect women in the community positively and negatively?	The proposed expansion of power generation by GECO will lead to more power supply, and possibly at affordable costs to many households.
8	How do you think that the project could minimize or avoid negative impacts on women and the community?	Ensure employment opportunities for women.
Section C: Role of Women		
1	What roles do women typically undertake in the community? Please consider this in terms of the home and livelihoods. How many hours a day do women work? What time do they typically start and finish their daily activities?	Women assume important tasks in the household, including as childrearing, financial management, and contributing to the family's stability, often working long hours and even outside the home.
2	Do you think that men and women have equal opportunities in the community, workplace and education?	Gender inequalities affect the community, the workplace, and education, limiting women's participation in governance, public policy, and social activism. Women confront limited work opportunities and societal expectations, whereas men pursue careers in construction, technology, and management. Education options are limited to sectors deemed appropriate for women, and girls bear additional domestic obligations.
3	What resources do women mainly have control of compared to men? (e.g. land, assets, equipment) Please explain response	Women traditionally have less influence over resources than men do. Women often control the daily household budget and have decision-making power over basic household spending.
4	Do women feel safe in the community? Are there any particular crimes that are common in the community? Have you experienced any conflicts in the community? Explain responses	Yes. But they also raised concerns regarding GBV Yes, mostly brought about by insecurity.
5	How do women receive information about local issues and developments, news etc. in the community?	Information is received informally but occasionally through the social media platforms.

6	Do women rely on each other for support? What type of support? (e.g. childcare, someone to talk to, income generation etc.).	Yes, women support one other by providing childcare and other domestic activities.
Section D: Institutions / Community Development		
1	How are women represented in the community (e.g. is there a female head/leader who champions their interest)? Do women contribute in decision making within the community? Are women represented at important meetings? If not, do men discuss decisions with you?	Female heads and leaders are actively addressing gender and youth issues within the Somali community, despite facing challenges due to societal norms.
2	Do you have any women's traditional/cultural groups? What are they called? What is the purpose of these groups?	Yes, women's groups exist with most involved in social welfare issues that affect mainly domestic issues.
3	Are there any other local associations in the area that they are aware of? If so, which ones.	No
4	Are any Non-Governmental Organisations working here? If yes – which ones and what do they do? How successful have the projects been?	Yes, there are many national and international organizations operate in the Galmudug Sector of Gaalkacyo.
Section E: Economy/Income Generation		
1	What could women do to have greater economic opportunities in this area?	Get more involved in socio-economic programmes
2	Do you have access to a bank/credit/savings account? If so, is it your own personal account or a joint account? Do women have their own money at disposal? What do they spend it on most frequently?	Participants varied in their financial status, with some holding local bank accounts and others operating small enterprises, relying on family or husbands for support.
3	Does your family receive support from remittance or other support from family members working elsewhere?	Yes, some participants mentioned receiving remittance from relatives abroad.
Section F: Land Use		
1	What the main land based activities that women undertake?	Housework is a common activity among women but other also operate small businesses.
2	What are the main crops that you grow? What % are for household consumption and what % do you sell? If you sell crops, where do you sell them?	Data not provided.
3	What are the main animals that people keep in the community? Is this a subsistence activity or an income-generating activity?	Large stocks (camel, goats, sheep), and small stock comprising mainly of poultry.
4	Do you collect natural resources (e.g. timber, herbs, firewood and roofing, fruits, etc.) for subsistence and domestic use? Where do you get these? Explain the uses. Explore issues related to charcoal production as well as commercial extraction of natural resources	Participants do not collect firewood or other timber; however, some rural residents may rely on it due to its scarcity in major cities.
5	Where does the community buy and sell agricultural produce? How far is the nearest market? What is the name of the market?	There is a meat and vegetable market in Gaalkacyo where people can sell and buy vegetables, meat, and other animal products. Marketplaces around town. People take tuk-tuks to the market to shop.
6	Have you experienced any conflicts in the community in relation to land? Who was involved? What was the issue? How was it resolved? Are conflicts frequent? (explain response)	Yes, insecurity associated with insurgent groups.
Section G: Education, Literacy and Training		
1	How would you describe accessibility and quality of education for children in your community? How far are they (KM)? what are the names/levels of schools accessed	Education is costly, and privately owned schools are often more expensive than public ones. Access to schools is variable in terms of distances but most school going children are able to access schools in Gaalkacyo City.
2	Do most females in the community go to school? What level do they generally complete up to? Explain responses. Are there factors that prevent girls from continuing education? Has anyone in the community complete vocational training or university? What subjects? (Explore issues of girl child work/labour verses education.	Few girls finish secondary school, and even fewer seek vocational training or higher education. Those who have typically studied disciplines linked to education, healthcare, or business, which are generally regarded as more "appropriate" for women.
3	Can girls/women in the community generally read and write?	Literacy rates among women is still low.
Section H: Health		
1	How and where do you access healthcare? Do the services available meet your needs?	The availability and quality of healthcare services in Gaalkacyo are limited by inadequate infrastructure, a shortage of medical professionals, and a lack of essential medical supplies. While some services can meet basic health needs, there are significant gaps in advanced medical care, emergency services, and specialized treatments. Socio-economic barriers and the high cost of private healthcare, making it challenging for many, particularly in rural areas, to receive adequate medical attention, further hinder access to healthcare.
2	What are the top 3 health problems that girls and women face in the settlement? Please explain the reason for each of the health issues Are there any particular times of the year where these issues are more challenging than others?	Maternal health complications are prevalent due to limited access to healthcare, early marriages, and nutritional deficiencies, with the dry season exacerbating these issues due to reduced access to services and food insecurity. Reproductive health problems stem from a lack of awareness, stigma around contraception, and the practice of female genital mutilation (FGM), which are compounded during periods of displacement or flooding, especially during the rainy season. Malnutrition is widespread, driven by food insecurity, poverty, and cultural practices that prioritize male family members' nutrition, with the dry season further aggravating the problem as droughts lead to food

		shortages. These health issues are most challenging during the dry months, when healthcare access, food availability, and resources are most limited.
3	Are there any environmental issues that affect health in the community (e.g. water quality, sanitary conditions etc?) Please explain	Poor potable water due to a reliance on ground hard water from boreholes, which is typically of poor quality.
4	If someone in the household is ill, how do you usually treat him/her? How do you treat sick elderly, children, men and women? Are there any disabled people in the community that require care?	Yes, they are treated and are always taken care of by families

Section I: Access to Water						
1	Where do you get your water for drinking, cooking, bathing and for livestock?		Description of water source	Walking distance from dwelling (KM)	Collection method (if applicable)	Description of quality/colour/taste/smell
		Drinking:	Borehole	Out of the town	Piped	Hard water
		Cooking:	Borehole	Out of the town	Piped	Hard water
		Washing dishes:	Borehole	Out of the town	Piped	Hard water
		Bathing:	Borehole	Out of the town	Piped	Hard water
		Livestock:	Borehole	Out of the town	Piped	Hard water
		Irrigation:				
2	Do you have to treat drinking water? If so, how?		No			
3	If the community has a borehole, do they know when it was installed? Who installed it? How deep it is. How is it operated?		No			
4	Is anyone in the community or a community water committee responsible for managing boreholes or other water sources in the community? Who? How well does this work?		No			

Section J: Sanitation and Hygiene		
1	What type of toilet facilities do households have? (E.g. community or private/household, ventilated pit latrine, un-ventilated pit latrine, completely in the ground, no latrine/use the bush etc.)	Yes, there are pit latrines and sceptics of different types
2	Do the toilet facilities have light?	Not many have lights
Hygiene & Waste		
3	How / where do people dispose of household waste? (Burn, dump, put in the river or sea, other - specify)	It is collected by a company and some throw away to streets

Section K: Access to Power				
1	What energy source do you use? Where each of these sources are these located (e.g. grid connection from the house, firewood, charcoal, kerosene, gas, solar etc.?	Type	Source of energy/power	Location
		Lighting:	GECO	In town
		Keeping warm:		
		Cooking:	Gas, firewood, charcoal	
		Heating water:	none	
		Charging mobile phones:	Solar, GECO	
		Cooling food:	GECO	
2	Do you face any challenges regarding access to power? Please explain?		Yes. Many households are not connected because the connections are quite expensive that the moment.	

Section L: Transport and Communication		
1	What are the main forms of transportation used within the community? Please describe the quality/accessibility of transportation in the community	Vehicles
2	Is there telecommunication services in the area	Use GOLIS telecom services
Section M: Cultural heritage		
1	What are the sacred/ historical or religious sites in the area? Are these accessible to women? Where are they located?	None known
2	What are the main festivals or rituals undertaken in the community by women? Give details	International women's day and Eid festivals and some other days that people celebrate

ANNEX 11.4. PHOTOGRAPHIC LOG – STAKEHOLDERS ENGAGEMENT

Photo 4: View of the HD enumerator with the representative of waste management companies in Gaalkacyo City during the ESIA study

Photo 5: View of the HD enumerator with the Gaalkacyo South Local Government official - Galmudug State in Gaalkacyo City during the ESIA study

Photo 6: View of the HD enumerator with the representative of the Ministry of Health Official - Galmudug State in Gaalkacyo City during the ESIA study

Photo 7: View of the HD enumerator with the representative of the Ministry of Environment and Climate Change – Galmudug State in Gaalkacyo City during the ESIA study

Photo 8: View of the HD enumerator with the representative of the local business owners in Gaalkacyo City during the ESIA study

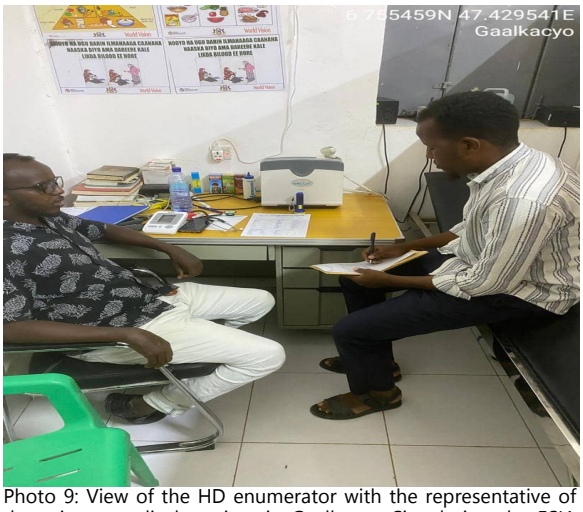

Photo 9: View of the HD enumerator with the representative of the private medical services in Gaalkacyo City during the ESIA study

Photo 10: View of focus group discussions with the representatives of the youth groups in Gaalkacyo City during the ESIA study

Photo 11: View of focus group discussions with the representatives of the women groups in Gaalkacyo City during the ESIA study

Photo 12: View of the HD enumerator with the local community representatives in Gaalkacyo City during the ESIA study