



CUVKUN

Enhanced Water Security and Community Resilience in the Adjacent
Cuvetla and Kunene Transboundary River Basins Project



Environmental and Social Management Plan (ESMP) for the Proposed Water Infrastructure Upgrading and Early Flood Warning Systems in Omusati and Oshana-Namaland Regions in Namibia

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Title	Environmental and Social Management Plan (ESMP) for the proposed Water Infrastructure Upgrading and Early Flood Warning Systems in Omusati and Ohangwena Regions	
Listed Activity	Activity 8: Water Resource Development 8.5 Construction of dams, reservoirs, levees and weirs. 8.8 Construction and other activities in watercourses within flood lines.	
Location	Ohangwena, Omusati and Oshikoto region	
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Introduction

The environmental and social management plan (ESMP) for the CUVKUN project in Namibia has been prepared as an integral component of the environmental and social impact assessment (ESIA). Its primary purpose is to outline the framework and specific measures required to avoid, minimize, mitigate, or compensate for potential adverse environmental and social impacts identified during the ESIA process. The ESMP also provides a roadmap for enhancing the positive benefits of the project, ensuring that implementation is aligned with national legislation, regulatory requirements, and international best practices for environmental and social safeguards.

The ESMP sets out the management measures to be applied across the different phases of the project design, construction, operation, and decommissioning. It details the institutional responsibilities, monitoring and reporting mechanisms, capacity-building needs, and budgetary provisions necessary to ensure effective implementation. In addition, it includes specific plans for issues such as waste management, occupational health and safety, stakeholder engagement, and grievance redress. By providing clear guidance on responsibilities and timelines, the ESMP serves as a practical tool for project implementers, regulators, and stakeholders to ensure that the CUVKUN project is carried out in an environmentally sustainable and socially responsible manner.

I. Potential impacts and mitigation measures

1.1 Impact Themes and Recommended Mitigation Measures

The ESMP has been categorised into different themes, which serve as a quick guide to the recommended ESMP remedial actions during design/preconstruction, construction, operation and decommissioning phases of the project (Tables 1 to 4).

ESMP Themes	Intervention	Monitoring aspects
A - Design/ Preconstruction Phase	Rainwater harvesting ponds / Livelihood-based watershed management	Ownership and Access Conflicts / Inter-village disputes (Negative)
	All interventions	Labour (Positive/Negative)
	Rainwater harvesting ponds	Siltation (Design of rainwater/floodwater ponds) (Negative)
	Piloting of Flood Early Warning Systems	Disaster Preparedness / Institutional Strengthening (Positive)
B – Construction Phase	Rainwater harvesting ponds / Livelihood-based watershed management	Clearing of vegetation (Negative)
	Livelihood-based watershed management	Temporary disruption of water (Negative)
	All interventions	Occupational hazards (Negative)
	Rainwater harvesting ponds	Siltation / Disease risk (Malaria) (Negative)
	Piloting of Flood Early Warning Systems; solar boreholes	Vandalism (Negative)

	All interventions (site works)	Dust and noise (Negative)
	All interventions near settlements	Community safety (Negative)
	Livelihood-based watershed management	Risk of well collapse, fall hazards, confined space risks, flooding during rains (Negative)
	Livelihood-based watershed management	Injury risk during manual handling; potential exclusion conflicts if access not managed (Negative)
	Rainwater harvesting ponds	Soil erosion and ponding if poorly built; safety hazards from livestock near works (Negative)
	All interventions (especially ponds & boreholes)	Construction waste (Negative)
	Rainwater harvesting ponds	Floodwater backwash and silt entry if poorly constructed; worker safety risks (Negative)
C – Operation Phase	Livelihood-based watershed management	Theft of Solar Panels / Maintenance & cost-sharing issues (Negative)
	Rainwater harvesting ponds	Disease risk (Malaria) (Negative)
	Livelihood-based watershed management	Over-abstraction of groundwater / Maintenance responsibilities (Negative)
	All interventions (esp. ponds & boreholes)	Increased water demand; risk of unsustainable usage (Negative)
	Livelihood-based watershed management	Water contamination (Negative)
	Piloting of Flood Early Warning Systems	Dust and noise pollution (Negative)
	Livelihood-based watershed management	Mechanical failure; reduced water access; risk of exclusion of vulnerable groups (Negative)
	Piloting of Flood Early Warning Systems	Vandalism or equipment failure; gaps in coverage (Negative)
	All interventions	Conflicts over access and allocation; inequitable decision-making (Negative)
	All interventions	Minor hazards such as fatigue or injuries (Negative)
	All interventions	Pressure on resources; risk of conflict (Negative)
D – Decommissioning Phase	Rainwater harvesting ponds	Disease risk (Malaria) / Environmental damage (Negative)
	Livelihood-based watershed management	Theft of Solar Panels / Ownership conflicts (Negative)
	All interventions	Labour / Inter-village disputes (Negative)
	Piloting of Flood Early Warning Systems	Institutional Strengthening / Inter-village disputes (Negative)
	All interventions	Environmental damage / Solid waste disposal (Negative)

SECTION A: Design/ Preconstruction Phase

Table 1: Mitigation measures pertaining to the Design/ Preconstruction Phase

	<p><u>Potential Risks:</u></p> <ul style="list-style-type: none"> ✓ Selecting locations for water points, ponds, or boreholes without full consideration of community needs may lead to unequal access, ownership conflicts, or inter-village disputes. ✓ Inappropriate choice of technology for mechanized wells, solar boreholes, or ponds can lead to high labour intensity, maintenance challenges, or equipment failure during operation. ✓ Poor design may cause siltation. ✓ Limited coverage or exclusion of vulnerable groups can reduce disaster preparedness. 				
Monitoring aspects	Objective	Measures to enhance positive impacts	Indicators for Monitoring and Compliance	Timelines	Responsible Party
Ownership and Access Conflicts / Inter-village Disputes	Ensure equitable and conflict-free access to water resources among villages and user groups	<ul style="list-style-type: none"> • Conduct participatory site selection with community representatives • Ensure inclusion of women, youth, and vulnerable groups • Establish transparent criteria for site prioritization; formalize agreements with local authorities to prevent disputes. • Ensuring that land ownership and access rights are clearly defined and agreed upon prior to project commencement. 	<ul style="list-style-type: none"> • Number of disputes recorded and resolved amicably • Functionality of inter-village water committees • % of communities satisfied with allocation/use arrangements 	Quarterly monitoring; annual review	MAWLR + Traditional Authorities + Community Water Committees

Labour	Promote fair employment practices, (no child labour), build local capacity, and safeguard worker welfare	<ul style="list-style-type: none"> • Conduct technical feasibility studies to select appropriate technology. • Evaluate local capacity and maintenance requirements. • Phase in mechanization gradually. • Provide preliminary training for local operators. • Recruitment plans that align with laws and human rights principles. 	<ul style="list-style-type: none"> • % of local labour employed in construction/operation • Number of workers trained and certified on new technology • Functionality and performance of mechanized systems • Reduction in labour-related grievances • Child labour incidents reported/confirmed (target: 0), with 100% age verification of all workers. 	<ul style="list-style-type: none"> • Quarterly monitoring • Annual skills assessment 	Project contractors + Ministry of Labour + Community Water Committees
Siltation (Design of rainwater/flood water ponds)	Prevent excessive siltation and ensure long-term functionality of water harvesting ponds	<ul style="list-style-type: none"> • Conduct hydrological and geotechnical assessments prior to pond design. • Incorporate erosion-control measures (e.g., silt traps, vegetation buffers). • Design for easy maintenance and desilting. • Consult communities on site placement to minimize erosion. • Technical designs to ensure that pond structures minimize risks of erosion and siltation. This includes 	<ul style="list-style-type: none"> • Number of ponds constructed with erosion/silt control measures. • Sediment accumulation levels (measured annually). • % of ponds functional without major desilting within 2 years. 	Annual monitoring	MAWLR + Community Water Committees + Project contractors

		verifying proper siting, lining, and drainage systems to safeguard water quality and prolong pond functionality			
Disaster Preparedness / Institutional Strengthening	Strengthen institutional capacity and enhance community preparedness for flood risks	<ul style="list-style-type: none"> • Map vulnerable populations to ensure equitable coverage. • Design communication channels accessible to all (SMS, radio, sirens). • Design early warning systems with inclusive community input (women, youth, vulnerable groups). • Provide training for local institutions on O&M (Operation and Maintenance) of early warning systems. • Integration of disaster risk reduction measures into project design, including early warning systems and contingency planning. • Institutional capacity will also be assessed to ensure that relevant authorities and community structures are adequately trained and resourced to manage potential emergencies. 	<ul style="list-style-type: none"> • Number of community training sessions conducted. • % of community members reached by early warning alerts. • Functionality and maintenance records of warning systems. • Existence of institutional protocols and MoUs. 	<ul style="list-style-type: none"> • Semi-annual monitoring • Annual institutional review 	MAWLR + Directorate of Disaster Risk Management + Traditional Authorities + Community Committees

SECTION B: Construction Phase

Table 2: Mitigation measures pertaining to the Construction Phase

	<p><u>Potential Sources of Negative Impacts:</u></p> <ul style="list-style-type: none"> ✓ Vegetation clearing, excavation, and earthworks can cause habitat destruction, water contamination, long-term land degradation and soil erosion. ✓ Digging for ponds, wells, boreholes, and pipelines can generate dust, noise, and temporary disruption of water access. ✓ Worker-community interactions may cause risk of Sexual Exploitation, Abuse, and Harassment (SEAH). ✓ Labour-intensive activities may cause occupational hazards, including fatigue, minor injuries, or accidents. ✓ Temporary mosquito breeding in open water areas. ✓ Lack of security may expose equipment to vandalism. ✓ Operation of vehicles and equipment generates noise, air pollution, and dust, affecting nearby communities. ✓ Construction of early warning infrastructure may temporarily disturb communities. ✓ Well rehabilitation works (lining, desilting, and deepening), which involve excavation in confined spaces that may cause well collapse, fall hazards, and flooding during rains. ✓ Installation of fencing and well covers, where manual handling of heavy materials can cause injuries and poorly managed access controls may lead to community exclusion conflicts. ✓ Construction of livestock troughs and hard standing, which, if poorly designed or built, can cause soil erosion, ponding, and safety hazards from livestock movements around the works. ✓ Construction and rehabilitation activities, where demolition, excavation, and replacement of old infrastructure generate rubble, debris, and discarded parts ✓ Installation of drainage, collars, and elevated structures, where poor construction can lead to floodwater backwash, silt accumulation, and increased safety risks for workers. 				
Monitoring aspects	Objective	Mitigation Measures	Indicators for Monitoring and Compliance	Timelines	Responsible Party

Vegetation clearing and habitat destruction	Minimize habitat destruction, soil erosion, and loss of biodiversity during construction	<ul style="list-style-type: none"> • Restrict vegetation clearance to essential project areas only. • Clearly demarcate “no-go” zones for sensitive habitats. • Stockpile topsoil separately for later site rehabilitation. • Replant/rehabilitate disturbed areas with indigenous species after works. • Train workers on environmental protection practices. 	<ul style="list-style-type: none"> • Area (ha) cleared vs. area approved in site plan. • Number of non-compliance incidents (e.g., clearing outside demarcated areas). • % of disturbed areas rehabilitated after construction. 	During site preparation and throughout construction	Contractor (site supervisor) + Environmental Control Officer (ECO) + Project Proponent
Temporary disruption of water access	Ensure minimal disruption to community water access	<ul style="list-style-type: none"> • Schedule works to minimize disruption. • Provide alternative water sources during construction. 	<ul style="list-style-type: none"> • Number of complaints received on access, dust, or noise. 	<ul style="list-style-type: none"> • Weekly site inspections. • Quarterly audits 	Project contractors + MAWLR + Community Water Committees
Occupational hazards and labour compliance	Ensure health, safety, and welfare of workers during construction	<ul style="list-style-type: none"> • Provide occupational health and safety training. • Supply protective equipment. • Enforce work/rest cycles. • Have first aid and emergency response readily available. 	<ul style="list-style-type: none"> • Number of reported accidents/injuries. • % of workers provided with PPE. • Number of safety drills conducted. • % of workers with verified proof of age on file (target: 100%) • Number of child labour incidents 	<ul style="list-style-type: none"> • Monthly reporting 	Contractors + Ministry of Labour + MAWLR

			<p>identified/confirmed (target: 0)</p> <ul style="list-style-type: none"> • Number of labour inspections/audits completed that include age-verification checks • 		
Siltation / Disease risk (Malaria)	Prevent erosion and reduce vector-borne disease risk from pond excavation	<ul style="list-style-type: none"> • Stabilize pond embankments and surrounding soil. • Schedule construction to avoid rainy season if possible. • Design ponds with drainage and mosquito control features. • Apply larval control measures. 	<ul style="list-style-type: none"> • Sediment accumulation levels in ponds. • Number of mosquito breeding sites identified and treated. • % reduction in malaria-related complaints. 	<ul style="list-style-type: none"> • Quarterly monitoring 	Contractors + Ministry of Health + MAWLR + Community Committees
Vandalism	Safeguard infrastructure and protect community during construction	<ul style="list-style-type: none"> • Engage community prior to installation. • Install equipment in secure, tamper-resistant structures. • Assign local monitoring responsibility. • Provide awareness on system benefits. 	<ul style="list-style-type: none"> • Number of vandalism incidents reported. • Number of community safety briefings conducted. • Accident/incident records involving community members. 	<ul style="list-style-type: none"> • Monthly inspections 	Contractors + Community Committees + Traditional Authorities
Dust and noise	Minimize disturbance to communities from construction activities	<ul style="list-style-type: none"> • Implement dust suppression (water spraying). • Limit noisy activities to daytime hours. • Provide PPE to workers. 	<ul style="list-style-type: none"> • Dust and noise levels within regulatory limits. • Number of complaints recorded and resolved. 	<ul style="list-style-type: none"> • Weekly monitoring 	Project contractors + MAWLR + Environmental Officers +

		<ul style="list-style-type: none"> • Communicate the schedule to local communities in advance. 	<ul style="list-style-type: none"> • % reduction in dust/noise-related grievances over time 		Community Committees
Community Safety	Protect community members from accidents, hazards, and SEAH risks during operation	<ul style="list-style-type: none"> • Implement worker codes of conduct; conduct SEAH awareness training. • Establish community monitoring groups to oversee safety and SEAH issues. • Integrate SEAH and safety compliance into independent audits and inspections. • Maintain incident reporting and response logs for hazards, accidents, or SEAH complaints. 	<ul style="list-style-type: none"> • % of project workers who have signed and committed to a Code of Conduct. • % of audit recommendations on SEAH and safety that are implemented within agreed timelines. • Number of SEAH-related complaints and safety incidents reported and resolved within set timeframe (e.g., 30 days). 	<ul style="list-style-type: none"> • At induction; refresher every 6–12 months 	Contractor HSE Officer + Gender & Social Safeguards Specialist
Risk of well collapse, fall hazards, confined space risks, flooding during rains	Ensure safety of workers and prevent accidents during well rehabilitation	<ul style="list-style-type: none"> • Conduct risk assessment before works. • Provide confined space training and supervision. • Use safety harnesses and fall protection equipment. • Monitor weather and suspend works during heavy rains. 	<ul style="list-style-type: none"> • Number of accidents or near-miss incidents reported. 	<ul style="list-style-type: none"> • Continuous during well rehabilitation 	Contractors + OHS Officer + ECO + Project Proponent

		<ul style="list-style-type: none"> • Implement emergency rescue procedures for confined spaces. 			
Injury risk during manual handling; potential exclusion conflicts if access not managed	Reduce worker injuries and prevent community conflicts	<ul style="list-style-type: none"> • Provide manual handling training and lifting aids. • Supply PPE (gloves, boots, helmets) for handling materials. • • Clearly demarcate construction zones to control access. • • Engage communities to inform them of restricted areas and alternative access. 	<ul style="list-style-type: none"> • Number of injuries reported. • Number of community complaints regarding access. • Compliance with access control measures. 	<ul style="list-style-type: none"> • Throughout installation of fencing and covers 	Contractors + ECO + Community Leaders + Project Proponent
Soil erosion and ponding if poorly built; safety hazards from livestock near works	Prevent soil erosion, ponding, and protect workers and livestock	<ul style="list-style-type: none"> • Properly design and compact troughs and hard standing areas. • Install temporary fencing to prevent livestock access during construction. • Stabilize surrounding soils and provide drainage channels. • Conduct safety awareness for workers on site. 	<ul style="list-style-type: none"> • Number of erosion or ponding incidents. • Number of livestock-related accidents. • % of sites properly stabilized and fenced. 	<ul style="list-style-type: none"> • During construction of troughs and hard standing 	Contractors + ECO + MAWLR + Community Committees
Construction waste, such as rubble and the handling of old parts	Ensure proper disposal, reduce pollution and safety hazards	<ul style="list-style-type: none"> • Segregate waste (metal, rubble, packaging). • Reuse/recycle materials where possible. • Dispose waste at approved landfill. • Keep site clean and hazard-free. 	<ul style="list-style-type: none"> • Volume of waste properly disposed at approved sites. • % of waste recycled/reused. 	<ul style="list-style-type: none"> • Continuous during construction 	Contractors + Local Authority Waste Management + ECO

			<ul style="list-style-type: none"> • Number of waste-related incidents recorded. 		
Floodwater backwash and silt entry if poorly constructed; worker safety risks	Prevent flooding, siltation, and ensure safe working conditions	<ul style="list-style-type: none"> • Design drainage, collars, and elevated structures to handle peak flows. • Stabilize soil around structures and provide silt traps. • Provide PPE and safety training for elevated works. • Inspect works after heavy rains and repair as needed. 	<ul style="list-style-type: none"> • Number of flood or siltation incidents. • Number of worker accidents related to drainage works. • % of structures meeting design and safety standards. 	<ul style="list-style-type: none"> • During installation and post-heavy rain inspections 	Contractors + ECO + Project Engineer + MAWLR

SECTION C: Operation Phase

Table 3: Mitigation measures pertaining to the Operation Phase

<p><u>Potential Sources of Impacts:</u></p> <ul style="list-style-type: none"> ✓ Poorly managed maintenance can result in theft or vandalism of equipment, or conflict over cost-sharing responsibilities. ✓ Standing water or poorly maintained ponds may become mosquito breeding sites, increasing malaria risk. ✓ Over-abstraction of groundwater; equipment failure; inequitable access. ✓ Increased water demand; risk of unsustainable usage. ✓ Dust and emissions from maintenance vehicles and activities. ✓ Solar pumps and pressurized storage systems, where mechanical failure, poor maintenance, or unequal access can reduce water supply and potentially exclude vulnerable community members. ✓ Vandalism of hydrometric stations and early warning systems, equipment failure, or insufficient coverage can reduce system reliability and compromise community preparedness. ✓ Conflicts over access, inequitable decision-making, and unclear roles can undermine fair water allocation and management. ✓ Minor hazards such as fatigue or injuries from routine maintenance of infrastructure (labour). ✓ Pressure on resources; risk of conflict 					
Monitoring aspects	Objective	Mitigation Measures	Indicators for Monitoring and Compliance	Timelines	Responsible Party
Theft of Solar Panels / Maintenance & cost-sharing issues	Ensure sustainable operation of solar-powered infrastructure and equitable cost-sharing	<ul style="list-style-type: none"> • Install anti-theft devices (locks, alarms). • Engage local watch groups. • Establish clear cost-sharing agreements. • Conduct community awareness campaigns on 	<ul style="list-style-type: none"> • Number of theft/vandalism incidents. • % of solar panels functional. • Number of maintenance reports submitted. 	<ul style="list-style-type: none"> • Bi-annual inspections • Annual review 	MAWLR + Local Authorities + Community Water Committees

		ownership and responsibilities.	<ul style="list-style-type: none"> Community satisfaction on cost-sharing arrangements. 		
Disease risk (Malaria)	Minimize malaria risk	<ul style="list-style-type: none"> Regular pond maintenance and drainage. Larval control measures. Health education campaigns. 	<ul style="list-style-type: none"> Number of mosquito breeding sites identified and treated. Incidence of malaria cases in surrounding communities. 	<ul style="list-style-type: none"> Quarterly monitoring 	MAWLR + Ministry of Health + Community Water Committees
Over-abstraction of ground water / Maintenance responsibilities	Ensure reliable, equitable access to water and proper maintenance of systems	<ul style="list-style-type: none"> Establish water use quotas. Monitor water levels. Implement routine equipment maintenance. Provide training for operators. Inclusive governance through community water committees. 	<ul style="list-style-type: none"> % of water points operational. Number of maintenance activities conducted as scheduled. Community satisfaction surveys on water access. 	<ul style="list-style-type: none"> Monthly checks Bi-annual review 	MAWLR + Community Water Committees + Local Operators
Increased water demand; risk of unsustainable usage	Enable sustainable water use for domestic and livelihood activities	<ul style="list-style-type: none"> Promote water-efficient irrigation practices. Monitor consumption; encourage crop planning and rotation. Include water use rules in community governance frameworks. 	<ul style="list-style-type: none"> % of households reporting adequate water supply. Trends in water consumption per community. Crop yields or livestock productivity linked to water use. 	<ul style="list-style-type: none"> Quarterly monitoring 	MAWLR + Community Water Committees + Local Operators

Water Contamination	Ensure water quality is safe for domestic and livelihood use	<ul style="list-style-type: none"> • Implement proper feed and fertilizer management. • Maintain regular pond cleaning. • Monitor water quality. • Introduce aeration if needed. • Educate farmers on sustainable aquaculture practices. 	<ul style="list-style-type: none"> • Water quality test results. • Number of contamination incidents recorded. • % of households reporting safe water access. 	<ul style="list-style-type: none"> • Quarterly monitoring • Annual review 	MAWLR + Community Water Committees + Ministry of Health
Dust and Noise Pollution	Minimize nuisance and health impacts from operation activities	<ul style="list-style-type: none"> • Control dust during maintenance. • Minimize vehicle emissions through scheduling and maintenance. • Monitor air quality. • Raise community awareness on safe practices. 	<ul style="list-style-type: none"> • Measured dust and noise levels. • Number of community complaints on dust/noise. • % of complaints resolved within defined timeframe. 	<ul style="list-style-type: none"> • Weekly monitoring • Quarterly reporting 	MAWLR + Project contractors + Community Water Committees
Mechanical failure; reduced water access; risk of exclusion of vulnerable groups	Ensure reliable water supply and equitable access to all community members	<ul style="list-style-type: none"> • Conduct regular maintenance of solar pumps and pressurized storage systems. • Provide backup systems where feasible. • Monitor usage to prevent over-extraction. • Engage community committees to ensure fair allocation. 	<ul style="list-style-type: none"> • % of operational pumps and storage systems. • Number of service interruptions recorded. • Number of complaints from vulnerable groups. 	<ul style="list-style-type: none"> • Monthly checks; Bi-annual review 	MAWLR + Community Water Committees + Local Operators

Vandalism or equipment failure; gaps in coverage	Maintain integrity and functionality of hydrometric and early warning systems	<ul style="list-style-type: none"> • Install tamper-resistant equipment and secure enclosures. • Conduct routine inspections and maintenance. • Train local operators and assign monitoring responsibilities. • Expand coverage where gaps exist. 	<ul style="list-style-type: none"> • Number of vandalism or equipment failure incidents. • % of stations functional. • Number of gaps identified and addressed. 	<ul style="list-style-type: none"> • Monthly inspections; Annual review 	MAWLR + Local Authorities + Community Water Committees
Conflicts over access and allocation; inequitable decision-making	Promote fair, transparent, and inclusive water governance	<ul style="list-style-type: none"> • Establish clear community water use rules. • Train committee members on equitable allocation. • Implement grievance mechanisms for disputes. • Hold regular meetings with all stakeholder groups, including vulnerable populations. 	<ul style="list-style-type: none"> • Number of conflicts reported and resolved. • % of households satisfied with water governance. • Number of committee meetings held. 	<ul style="list-style-type: none"> • Quarterly monitoring; Annual review 	MAWLR + Community Water Committees + Local Authorities
Minor hazards such as fatigue or injuries	Ensure occupational health and safety of personnel during operation	<ul style="list-style-type: none"> • Provide OHS training and refresher courses. • Enforce proper rest breaks and workload management. • Supply PPE for all operational staff. • Maintain first aid kits and emergency procedures on site. 	<ul style="list-style-type: none"> • Number of injuries or incidents reported. • % of staff trained and using PPE. • Number of safety drills conducted. 	<ul style="list-style-type: none"> • Monthly monitoring; Annual review 	Local Operators + Contractors + MAWLR

<p>Pressure on resources; risk of conflict</p>	<p>Manage water demand sustainably and prevent community conflicts</p>	<ul style="list-style-type: none"> • Monitor water levels and consumption trends. • Implement water use quotas during dry periods. • Promote water-efficient practices for households and small-scale farming. • Engage community committees in planning and communication. 	<ul style="list-style-type: none"> • Water consumption per household/community. • Number of water-related conflicts reported. • Compliance with water use quotas. 	<ul style="list-style-type: none"> • Continuous monitoring; Quarterly review 	<p>MAWLR + Community Water Committees + Local Authorities</p>
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SECTION D: Decommissioning Phase

Table 4: Mitigation measures pertaining to the Decommissioning Phase

<p><u>Potential Sources of Impacts:</u></p> <ul style="list-style-type: none"> ✓ Removal of ponds, pipelines, boreholes, and solar panels may cause soil disturbance, land degradation, and localized habitat destruction. ✓ Redistribution of solar panels, pumps, or other equipment may lead to theft, loss, or ownership conflicts among communities. ✓ Loss of employment for caretakers or operators can reduce income and create community dissatisfaction. ✓ Disbanding of community water committees may weaken local governance, resulting in inter-village disputes. ✓ Improper handling of waste materials can degrade soil and water quality. 					
Monitoring aspects	Objective	Mitigation Measures	Indicators for Monitoring and Compliance	Timelines	Responsible Party
Disease Risk (Malaria) / Environmental Damage	<ul style="list-style-type: none"> • Minimize vector-borne disease risk and environmental degradation after decommissioning 	<ul style="list-style-type: none"> • Drain ponds or fill with soil if no longer used. • Maintain temporary water circulation if ponds remain. • Conduct health awareness campaigns on mosquito control. • Restore vegetation on embankments. 	<ul style="list-style-type: none"> • Number of mosquito breeding sites identified and treated. • Hectares of land rehabilitated. • Incidence of malaria in surrounding communities. 	Quarterly monitoring for 1-year post-decommissioning	MAWLR + Ministry of Health + Community Water Committees
Theft of Solar Panels /	<ul style="list-style-type: none"> • Prevent theft and ensure equitable 	<ul style="list-style-type: none"> • Create transparent redistribution plans. 	<ul style="list-style-type: none"> • Number of theft or dispute incidents. 	During decommissioning	MAWLR + Community Water Committees +

Ownership Conflicts	redistribution of assets	<ul style="list-style-type: none"> • Involve community representatives. • Track assets. • Provide security during relocation. 	<ul style="list-style-type: none"> • % of equipment successfully redistributed. • Existence of formal agreements signed by stakeholders. 	and 3 months post-redistribution	Traditional Authorities
Dust and noise pollution	<ul style="list-style-type: none"> • Reduce air and noise pollution in nearby communities 	<ul style="list-style-type: none"> • Limit noisy operations to daytime hours • Use water or other dust suppression techniques • Maintain machinery to reduce emissions. • Review waste practices monthly and adjust procedures if needed. 	<ul style="list-style-type: none"> • Complaints log • Dust levels at boundary points • Work schedule records 	Daily inspections during construction Weekly complaint reviews	Site Manager
Labour / Inter-village Disputes	<ul style="list-style-type: none"> • Minimize conflicts and ensure fair closure of employment for local workers 	<ul style="list-style-type: none"> • Provide advance notice and consultation to all affected workers. • Involve affected personnel in decommissioning activities. • Offer training for new roles. • Mediate inter-village discussions on any 	<ul style="list-style-type: none"> • Number of labour disputes recorded and resolved. • % of workers receiving final payments on time. • Satisfaction level of communities / workers with the decommissioning process. 	During decommissioning	MAWLR + Contractors + Community Water Committees + Traditional Authorities

		disputes over work or compensation.			
Institutional Strengthening / Inter-village Disputes	<ul style="list-style-type: none"> • Ensure continued governance and conflict resolution capacity post-decommissioning 	<ul style="list-style-type: none"> • Transition responsibilities gradually. • Provide training on conflict resolution and local water management. • Formalize handover procedures and governance roles. • Maintain advisory support during the early post-decommissioning phase. • Strengthen community water committees to manage remaining or redistributed assets. 	<ul style="list-style-type: none"> • Functionality of water committees after decommissioning. • Number of conflicts reported/resolved. • % of community representatives trained in governance. 	During decommissioning, follow-up 6 months post-closure	MAWLR + Community Water Committees + Traditional Authorities
Environmental Damage / Solid Waste Disposal	<ul style="list-style-type: none"> • Minimize environmental impacts from leftover materials and infrastructure removal 	<ul style="list-style-type: none"> • Properly remove and dispose of pipelines, equipment, and other infrastructure. • Segregate, recycle, or safely dispose of solid waste. 	<ul style="list-style-type: none"> • Volume of waste is safely disposed of or recycled. • Area of land rehabilitated. • Number of environmental 	During decommissioning, follow up in 3-6 months	MAWLR + Contractors + Community Water Committees + Environmental Officers

		<ul style="list-style-type: none">• Restore drainage channels.• Re-vegetate disturbed areas/ rehabilitate disturbed land.	incidents reported during decommissioning.		
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2. Environmental implementation and monitoring

2.1 ESMP Implementation Plan- Overview

The purpose of this ESMP Implementation and Monitoring Plan is to ensure that all project phases (design, construction, operation, and decommissioning) are executed in accordance with the Environmental and Social Management Plan (ESMP), national legislation, and international best practices.

Objectives:

- To ensure effective integration of ESMP measures into daily project activities.
- To clearly assign roles and responsibilities for ESMP implementation.
- To monitor the performance of mitigation and management measures.
- To ensure compliance with the Environmental Clearance Certificate (ECC), relevant environmental legislation, and sector guidelines.
- To provide a basis for adaptive management by incorporating lessons learned.

2.2 Monitoring and Reporting

Monitoring will be carried out continuously throughout the project lifecycle to ensure compliance and early identification of potential environmental or social risks.

Bi-annual monitoring reports prepared by the ECO or an appointed consultant, submitted to MEFT.

Reports will include:

- Summary of monitoring results.
- Compliance status with ESMP measures.
- Non-compliance events and corrective actions taken.
- Photographic evidence, data logs, and stakeholder engagement records.
- Recommendations for improving ESMP implementation.

All monitoring records and reports will be maintained on-site and made available for regulatory inspections and audits.

2.3 Auditing and Review

Internal audits will be conducted annually by the Environmental Control Officer (ECO) or independent auditors to verify compliance with and the overall effectiveness of the ESMP. In addition, regulatory inspections will be carried out by the Ministry of Environment, Forestry and Tourism (MEFT) as required under the conditions of the Environmental Clearance Certificate (ECC). The ESMP Implementation and Monitoring Plan will be reviewed periodically and updated where necessary, taking into account findings from audits and inspections, changes in project design or operations, as well as updates in national legislation and international best practices.

ESMP IMPLEMENTATION AND MONITORING

Tables 1 and 2 present the Environmental and Social Management Plan (ESMP) implementation and monitoring framework for the CUVKUN pilot sites across the full project life cycle, including design/pre-construction, construction, operation, and decommissioning. The tables link key activities to potential environmental and social risks, indicate the assigned significance levels, and outline the mitigation measures and monitoring actions required to prevent, minimise, or manage impacts. Together, they provide a practical tool for guiding day-to-day implementation, oversight, and reporting by the project, contractors, community structures, and relevant authorities.

The costs of ESMP mitigation measures are embedded within the overall pilot project implementation modalities and will be financed through the same budget and delivery arrangements used for design, construction, operation, and decommissioning activities. Specifically, mitigation actions linked to stakeholder engagement, SEAH/GRM implementation, capacity-building, routine monitoring and reporting, and independent audits will be covered under the CUVKUN Project (Safeguards/ESMP/Capacity budget line). All construction-phase environmental and social controls such as dust and noise management, waste handling, spill prevention, provision of PPE, site demarcation, and rehabilitation of disturbed areas will be included in the contractors' Works Contractor (BoQ / ESMP obligations) and implemented as part of contractual compliance requirements. During operation, routine mitigation measures (e.g., minor safety provisions, community watch arrangements, basic upkeep and maintenance actions) will be sustained through the Community O&M Fund (user fees / committee fund) as part of local governance and cost-recovery arrangements. In addition, complementary measures that rely on public systems such as vector control and health messaging, disaster risk management coordination, and technical backstopping for hydrology and early warning operations will be supported through Member State / Local Authorities (in-kind / programme support). Together, these funding streams ensure that mitigation is not treated as a separate add-on, but fully integrated into pilot planning, implementation, and long-term sustainability.

Table 1: Project Phase, Activities, Risks, Mitigation Measures, Mitigation Cost and Source of Funds

Project Phase	Activity	Risk Description	Significance Level	Mitigation Measure	Cost of Mitigation (USD)	Source of Funds
Design/ Preconstruction Phase	Site selection for water points	Unequal access, ownership conflicts	Low	<ul style="list-style-type: none"> • Conduct participatory site selection with community representatives • Ensure inclusion of women, youth, and vulnerable groups • Establish transparent criteria for site prioritization; formalize agreements with local authorities to prevent disputes. • Ensuring that land ownership and access rights are clearly defined and agreed upon prior to project commencement. 	Embedded in pilot project activities	Pilot project budget
	Planning mechanized wells / solar boreholes	High labour intensity if inappropriate tech selected	Low	<ul style="list-style-type: none"> • Conduct technical feasibility studies to select appropriate technology. • Evaluate local capacity and maintenance requirements. • Phase in mechanization gradually. • Provide preliminary training for local operators. • Recruitment plans that align with laws and human rights principles 	200 (training of local operators) – all other costs embedded in pilot project activities	Pilot project budget

	Rainwater/floodwater ponds design	Siltation if ponds poorly designed	Low	<ul style="list-style-type: none"> • Conduct hydrological and geotechnical assessments prior to pond design. • Incorporate erosion-control measures (e.g., silt traps, vegetation buffers). • Design for easy maintenance and desilting. • Consult communities on site placement to minimize erosion. • Technical designs to ensure that pond structures minimize risks of erosion and siltation. This includes verifying proper siting, lining, and drainage systems to safeguard water quality and prolong pond functionality 	500 (hydrological & geotechnical assessment) via national department - - all other costs embedded in pilot project activities	Pilot project budget
	Early warning system design	Limited coverage or exclusion of vulnerable groups	Low	<ul style="list-style-type: none"> • Map vulnerable populations to ensure equitable coverage. • Design communication channels accessible to all (SMS, radio, sirens). • Design early warning systems with inclusive community input (women, youth, vulnerable groups). • Provide training for local institutions on O&M (Operation and Maintenance) of early warning systems. 	500 (O&M training) -- all other costs embedded in pilot project activities	

				<ul style="list-style-type: none"> • Integration of disaster risk reduction measures into project design, including early warning systems and contingency planning. • Institutional capacity will also be assessed to ensure that relevant authorities and community structures are adequately trained and resourced to manage potential emergencies 		
Construction Phase	Clearing of vegetation, soil erosion, and accidental spills of fuel or chemicals during construction	Habitat destruction, water contamination, long-term land degradation	Moderate	<ul style="list-style-type: none"> • Restrict vegetation clearance to essential project areas only. • Clearly demarcate “no-go” zones for sensitive habitats. • Stockpile topsoil separately for later site rehabilitation. • Replant/rehabilitate disturbed areas with indigenous species after works. • Train workers on environmental protection practices. 	- Embedded in contractor activities	Pilot project budget
	Installation of wells / solar boreholes	Temporary disruption of water	Moderate	<ul style="list-style-type: none"> • Schedule works to minimize disruption. • Provide alternative water sources during construction. 	-	Pilot project budget
	Training and engagement of local labour	Fatigue or minor injuries	Moderate	<ul style="list-style-type: none"> • Provide occupational health and safety training. • Supply protective equipment. • Enforce work/rest cycles. 	- Embedded in implementing	Pilot project budget

				<ul style="list-style-type: none"> • Have first aid and emergency response readily available. 	contractor budget	
	Pond excavation and construction	Soil erosion, temporary mosquito breeding Minor disturbance to community	Moderate	<ul style="list-style-type: none"> • Stabilize pond embankments and surrounding soil. • Schedule construction to avoid rainy season if possible. • Design ponds with drainage and mosquito control features. • Apply larval control measures. 	- Embedded in implementing contractor budget	Pilot project budget
	Installation of early warning infrastructure	vandalism risk begins	Moderate	<ul style="list-style-type: none"> • Engage community prior to installation. • Install equipment in secure, tamper-resistant structures. • Assign local monitoring responsibility. • Provide awareness on system benefits. 	- Embedded in implementing contractor budget	Pilot project budget
	Increased dust and noise levels due to construction activities	Community disturbance, respiratory issues, complaints	Moderate	<ul style="list-style-type: none"> • Implement dust suppression (water spraying). • Limit noisy activities to daytime hours. • Provide PPE to workers. • Communicate the schedule to local communities in advance. 	- Embedded in implementing contractor budget	Pilot project budget
	Worker-community interactions	Risk of Sexual Exploitation, Abuse, and Harassment (SEAH); conflicts over access and allocation	Moderate	<ul style="list-style-type: none"> • Implement worker codes of conduct; conduct SEAH awareness training. • Establish community monitoring groups to oversee safety and SEAH issues. 	500 SEAH Training)	Pilot project budget

				<ul style="list-style-type: none"> • Integrate SEAH and safety compliance into independent audits and inspections. • Maintain incident reporting and response logs for hazards, accidents, or SEAH complaints. 		
	Well rehabilitation works (lining, desilting, deepening)	Risk of well collapse, fall hazards, confined space risks, flooding during rains	Moderate	<ul style="list-style-type: none"> • Conduct risk assessment before works. • Provide confined space training and supervision. • Use safety harnesses and fall protection equipment. • Monitor weather and suspend works during heavy rains. • Implement emergency rescue procedures for confined spaces. 	- Embedded in implementing contractor budget	Pilot project budget
	Installation of fencing and well covers	Injury risk during manual handling; potential exclusion conflicts if access not managed	Moderate	<ul style="list-style-type: none"> • Provide manual handling training and lifting aids. • Supply PPE (gloves, boots, helmets) for handling materials. • Clearly demarcate construction zones to control access. • Engage communities to inform them of restricted areas and alternative access. 	- Embedded in implementing contractor budget	Pilot project budget
	Construction of livestock troughs and hard standing	Soil erosion and ponding if poorly built; safety hazards from livestock near works	Moderate	<ul style="list-style-type: none"> • Properly design and compact troughs and hard standing areas. • Install temporary fencing to prevent livestock access during construction. 	- Embedded in implementing contractor budget	Pilot project budget

				<ul style="list-style-type: none"> Stabilize surrounding soils and provide drainage channels. Conduct safety awareness for workers on site. 		
	Construction and rehabilitation activities	Construction waste, such as rubble and the handling of old parts	Low	<ul style="list-style-type: none"> Segregate waste (metal, rubble, packaging). Reuse/recycle materials where possible. Dispose waste at approved landfill. Keep site clean and hazard-free. 	- Embedded in implementing contractor budget	Pilot project budget
	Installation of drainage, collars, and elevated structures	Floodwater backwash and silt entry if poorly constructed; worker safety risks	Moderate	<ul style="list-style-type: none"> Design drainage, collars, and elevated structures to handle peak flows. Stabilize soil around structures and provide silt traps. Provide PPE and safety training for elevated works. Inspect works after heavy rains and repair as needed. 		
Operation Phase	Routine maintenance and local operation	Theft/vandalism of solar panels; disputes over cost-sharing	Low	<ul style="list-style-type: none"> Install anti-theft devices (locks, alarms). Engage local watch groups. Establish clear cost-sharing agreements. Conduct community awareness campaigns on ownership and responsibilities. 	1000 (Community campaign)	Pilot project budget
	Operation of ponds	Malaria risk	Low	<ul style="list-style-type: none"> Regular pond maintenance and drainage. Larval control measures. 	-	Relevant national

				<ul style="list-style-type: none"> • Health education campaigns. 		department
	Operation of mechanized boreholes	Over-abstraction of groundwater; equipment failure; inequitable access	Moderate	<ul style="list-style-type: none"> • Establish water use quotas. • Monitor water levels. • Implement routine equipment maintenance. • Provide training for operators. • Inclusive governance through community water committees. 	500 (Training for operators)	Pilot project budget & Relevant national department
	Household and small-scale farming use of water	Increased water demand; risk of unsustainable usage	Moderate	<ul style="list-style-type: none"> • Promote water-efficient irrigation practices. • Monitor consumption; encourage crop planning and rotation. • Include water use rules in community governance frameworks. 	- Embedded in implementing contractor budget	Pilot project budget
	Water Pollution/contamination	Excess feed, fertilizers, and fish waste from aquaculture can increase nutrient loads, causing eutrophication, oxygen depletion, and harmful algal blooms.	Low	<ul style="list-style-type: none"> • Implement proper feed and fertilizer management. • Maintain regular pond cleaning. • Monitor water quality. • Introduce aeration if needed. • Educate farmers on sustainable aquaculture practices. 	- Embedded in implementing contractor budget	Pilot project budget & Relevant national department
	Air quality	Dust and emissions from maintenance	Low	<ul style="list-style-type: none"> • Control dust during maintenance. 	200 Community awareness	Pilot project budget &

		vehicles and activities		<ul style="list-style-type: none"> Minimize vehicle emissions through scheduling and maintenance. Monitor air quality. Raise community awareness on safe practices. 		Relevant national department
	Solar pumps & pressurized storage	Mechanical failure; reduced water access; risk of exclusion of vulnerable groups	Moderate	<ul style="list-style-type: none"> Conduct regular maintenance of solar pumps and pressurized storage systems. Provide backup systems where feasible. Monitor usage to prevent over-extraction. Engage community committees to ensure fair allocation. 	-	Relevant national department
	Hydrometric stations / early warning systems	Vandalism or equipment failure; gaps in coverage	Low	<ul style="list-style-type: none"> Install tamper-resistant equipment and secure enclosures. Conduct routine inspections and maintenance. Train local operators and assign monitoring responsibilities. Expand coverage where gaps exist. 	-	Pilot project budget & Relevant national department
	Community water & governance committees	Conflicts over access and allocation; inequitable decision-making	Moderate	<ul style="list-style-type: none"> Establish clear community water use rules. Train committee members on equitable allocation. Implement grievance mechanisms for disputes. 	-	Pilot project budget & Relevant national department

				<ul style="list-style-type: none"> • Hold regular meetings with all stakeholder groups, including vulnerable populations. 		
	Routine maintenance of infrastructure (labour	Minor hazards such as fatigue or injuries	Low	<ul style="list-style-type: none"> • Provide OHS training and refresher courses. • Enforce proper rest breaks and workload management. • Supply PPE for all operational staff. • Maintain first aid kits and emergency procedures on site. 	100 OHS training	Pilot project budget & Relevant national department
	Increased water demand during dry periods	Pressure on resources; risk of conflict	Moderate	<ul style="list-style-type: none"> • Monitor water levels and consumption trends. • Implement water use quotas during dry periods. • Promote water-efficient practices for households and small-scale farming. • Engage community committees in planning and communication. 	-	Pilot project budget & Relevant national department
Decommissioning Phase	Dismantling ponds	Abandoned ponds may cause mosquito habitats or land degradation	Moderate	<ul style="list-style-type: none"> • Drain ponds or fill with soil if no longer used. • Maintain temporary water circulation if ponds remain. • Conduct health awareness campaigns on mosquito control. • Restore vegetation on embankments. 	-	Relevant national department
	Equipment redistribution / solar panels	Ownership conflicts or	Moderate	<ul style="list-style-type: none"> • Create transparent redistribution plans. 	-	Relevant national

		theft, if not managed		<ul style="list-style-type: none"> • Involve community representatives. • Track assets. • Provide security during relocation. 		department
	Dust and emissions from maintenance vehicles and activities	Dust and noise pollution	Low	<ul style="list-style-type: none"> • Limit noisy operations to daytime hours • Use water or other dust suppression techniques • Maintain machinery to reduce emissions. • Review waste practices monthly and adjust procedures if needed. 	-	Relevant national department
	Loss of employment for caretakers / operators	Labour / Inter-village Disputes	Low	<ul style="list-style-type: none"> • Provide advance notice and consultation to all affected workers. • Involve affected personnel in decommissioning activities. • Offer training for new roles. • Mediate inter-village discussions on any disputes over work or compensation. 	-	Relevant national department
	Abandonment of community water committees	Institutional Strengthening / Inter-village Disputes	Low	<ul style="list-style-type: none"> • Transition responsibilities gradually. • Provide training on conflict resolution and local water management. • Formalize handover procedures and governance roles. 	-	Relevant national department

				<ul style="list-style-type: none"> • Maintain advisory support during the early post-decommissioning phase. • Strengthen community water committees to manage remaining or redistributed assets. 		
	Removal of pipelines / water infrastructure	Environmental Damage / Solid Waste Disposal	Low	<ul style="list-style-type: none"> • Properly remove and dispose of pipelines, equipment, and other infrastructure. • Segregate, recycle, or safely dispose of solid waste. • Restore drainage channels. • Re-vegetate disturbed areas/ rehabilitate disturbed land. 	-	Relevant national department

Table 2: Project Phase, Monitoring Aspects, Indicators, Tools, Frequency, Agents and Costs

Project Phase	Monitoring Aspect	Monitoring Indicator	Tools and techniques	Monitoring Frequency	Monitoring Agent	Estimated cost (USD)
Design/ Preconstruction Phase	Ownership and Access Conflicts / Inter-village Disputes	<ul style="list-style-type: none"> • Number of disputes recorded and resolved amicably • Functionality of inter-village water committees • % of communities satisfied with allocation/use arrangements 	Community consultation records; dispute resolution logs; satisfaction surveys	Quarterly monitoring; annual review	MAWLR + Traditional Authorities + Community Water Committees	-

Project Phase	Monitoring Aspect	Monitoring Indicator	Tools and techniques	Monitoring Frequency	Monitoring Agent	Estimated cost (USD)
	Labour	<ul style="list-style-type: none"> • % of local labour employed in construction/operation • Number of workers trained and certified on new technology • Functionality and performance of mechanized systems • Reduction in labour-related grievances 	Employment records; training certificates; technology performance tests; grievance redress logs	Quarterly monitoring Annual skills assessment	Project contractors + Ministry of Labour + Community Water Committees	1,100/yr
	Siltation (Design of rainwater/floodwater ponds)	<ul style="list-style-type: none"> • Number of ponds constructed with erosion/silt control measures. • Sediment accumulation levels (measured annually). • % of ponds functional without major desilting within 2 years. 	Engineering design review; sediment depth measurements; pond inspection checklists	Annual monitoring	MAWLR + Community Water Committees + Project contractors	Embedded in implementing contractor budget
	Disaster Preparedness / Institutional Strengthening	<ul style="list-style-type: none"> • Number of community training sessions conducted. • % of community members reached by early warning alerts. • Functionality and maintenance records of warning systems. 	Training attendance records; SMS/EWS system tests; institutional audit reports; MoU review	Semi-annual monitoring Annual institutional review	MAWLR + Directorate of Disaster Risk Management + Traditional Authorities + Community Committees	-

Project Phase	Monitoring Aspect	Monitoring Indicator	Tools and techniques	Monitoring Frequency	Monitoring Agent	Estimated cost (USD)
		<ul style="list-style-type: none"> Existence of institutional protocols and MoUs. 				
Construction Phase	Vegetation clearing and habitat destruction	<ul style="list-style-type: none"> Area (ha) cleared vs. area approved in site plan. Number of non-compliance incidents (e.g., clearing outside demarcated areas). % of disturbed areas rehabilitated after construction. 	Site inspection forms; GPS mapping; photo documentation	During site preparation and throughout construction	Contractor (site supervisor)+ Environmental Control Officer (ECO) +Project Proponent	Embedded in implementing contractor budget
	Temporary disruption of water access	<ul style="list-style-type: none"> Number of complaints received on access, dust, or noise. 	Grievance redress mechanism (GRM); complaint logs; water access checklists	<ul style="list-style-type: none"> Weekly site inspections. Quarterly audits 	Project contractors + MAWLR + Community Water Committees	Embedded in contractor site supervision + GRM (BoQ / ESMP obligations)
	Occupational hazards	<ul style="list-style-type: none"> Number of reported accidents/injuries. % of workers provided with PPE. Number of safety drills conducted. 	Safety audit checklists; PPE compliance logs; accident reports	Monthly reporting	Contractors + Ministry of Labour + MAWLR	Embedded in contractor HSE plan (BoQ / ESMP obligations)

Project Phase	Monitoring Aspect	Monitoring Indicator	Tools and techniques	Monitoring Frequency	Monitoring Agent	Estimated cost (USD)
	Siltation / Disease risk (Malaria)	<ul style="list-style-type: none"> • Sediment accumulation levels in ponds. • Number of mosquito breeding sites identified and treated. • % reduction in malaria-related complaints. 	Sediment depth measurement; larval surveys; community health reports	Quarterly monitoring	Contractors + Ministry of Health + MAWLR + Community Committees	800/yr
	Vandalism	<ul style="list-style-type: none"> • Number of vandalism incidents reported. • Number of community safety briefings conducted. • Accident/incident records involving community members. 	Incident logs; security patrol reports; community meeting minutes	Monthly inspections	Contractors + Community Committees + Traditional Authorities	100/month (during construction period)
	Dust and noise	<ul style="list-style-type: none"> • Dust and noise levels within regulatory limits. • Number of complaints recorded and resolved. • % reduction in dust/noise-related grievances over time 	Noise meters; dust gauges; complaints register	Weekly monitoring	Project contractors + MAWLR + Environmental Officers + Community Committees	Embedded in contractor supervision
	Community Safety (SEAH)	<ul style="list-style-type: none"> • % of project workers who have signed and committed to a Code of Conduct. • % of audit recommendations on SEAH and safety that are implemented within 	Signed CoCs; SEAH audit checklists; incident registers; training attendance	At induction; refresher every 6–12 months	Contractor HSE Officer + Gender & Social Safeguards Specialist	500

Project Phase	Monitoring Aspect	Monitoring Indicator	Tools and techniques	Monitoring Frequency	Monitoring Agent	Estimated cost (USD)
		<p>agreed timelines.</p> <ul style="list-style-type: none"> Number of SEAH-related complaints and safety incidents reported and resolved within set timeframe (e.g., 30 days). Number of accidents or near-miss incidents reported. 				
	Risk of well collapse, fall hazards, confined space risks, flooding during rains	<ul style="list-style-type: none"> Number of accidents or near-miss incidents reported. % of workers trained in confined space safety. Number of works suspended due to rain. 	Safety inspection logs; training certificates; rainfall monitoring	Continuous during well rehabilitation	Contractors + OHS Officer + ECO + Project Proponent	core controls embedded in HSE plan
	Injury risk during manual handling; potential exclusion conflicts if access not managed	<ul style="list-style-type: none"> Number of injuries reported. Number of community complaints regarding access. Compliance with access control measures. 	Accident records; grievance redress logs; supervision checklists	Throughout installation of fencing and covers	Contractors + ECO + Community Leaders + Project Proponent	Embedded in implementing contractor budget / ECO supervision (BoQ)
	Soil erosion and ponding if poorly built; safety hazards from livestock near works	<ul style="list-style-type: none"> Number of erosion or ponding incidents. Number of livestock-related accidents. % of sites properly 	Site inspections; photo monitoring; fencing audit reports	During construction of troughs and hard standing	Contractors + ECO + MAWLR + Community Committees	Embedded in implementing contractor

Project Phase	Monitoring Aspect	Monitoring Indicator	Tools and techniques	Monitoring Frequency	Monitoring Agent	Estimated cost (USD)
		stabilized and fenced.				budget / ECO supervision (BoQ)
	Construction waste, such as rubble and the handling of old parts	<ul style="list-style-type: none"> • Volume of waste properly disposed at approved sites. • % of waste recycled/reused. • Number of waste-related incidents recorded. 	Waste manifests; disposal site receipts; visual inspections	Continuous during construction	Contractors + Local Authority Waste Management + ECO	Embedded in contractor waste management plan (BoQ / ESMP obligations)
	Floodwater backwash and silt entry if poorly constructed; worker safety risks	<ul style="list-style-type: none"> • Number of flood or siltation incidents. • Number of worker accidents related to drainage works. • % of structures meeting design and safety standards. 	Structural quality audits; safety inspection logs; post-rainfall site checks	During installation and post-heavy rain inspections	Contractors + ECO + Project Engineer + MAWLR	Embedded in contractor BoQ + Engineer/ECO inspections
Operation Phase	Theft of Solar Panels / Maintenance & cost-sharing issues	<ul style="list-style-type: none"> • Number of theft/vandalism incidents. • % of solar panels functional. • Number of maintenance reports submitted. 	Maintenance logs; security patrols; household surveys	<ul style="list-style-type: none"> • Bi-annual inspections Annual review	MAWLR + Local Authorities + Community Water Committees	-

Project Phase	Monitoring Aspect	Monitoring Indicator	Tools and techniques	Monitoring Frequency	Monitoring Agent	Estimated cost (USD)
		<ul style="list-style-type: none"> Community satisfaction on cost-sharing arrangements. 				
	Disease risk (Malaria)	<ul style="list-style-type: none"> Number of mosquito breeding sites identified and treated. Incidence of malaria cases in surrounding communities. 	Larval surveys; health facility records	Quarterly monitoring	MAWLR + Ministry of Health + Community Water Committees	-
	Over-abstraction of ground water / Maintenance responsibilities	<ul style="list-style-type: none"> % of water points operational. Number of maintenance activities conducted as scheduled. Community satisfaction surveys on water access. 	Pump performance logs; community surveys; groundwater monitoring	<ul style="list-style-type: none"> Monthly checks Bi-annual review 	MAWLR + Community Water Committees + Local Operators	-
	Increased water demand; risk of unsustainable usage	<ul style="list-style-type: none"> % of households reporting adequate water supply. Trends in water consumption per community. Crop yields or livestock productivity linked to water use. 	Household surveys; water meters; agricultural yield surveys	Quarterly monitoring	MAWLR + Community Water Committees + Local Operators	-
	Water Contamination	<ul style="list-style-type: none"> Water quality test results. Number of contamination incidents recorded. % of households reporting safe water access. 	Laboratory water testing; incident logs; HH surveys	<ul style="list-style-type: none"> Quarterly monitoring Annual review 	MAWLR + Community Water Committees + Ministry of Health	-

Project Phase	Monitoring Aspect	Monitoring Indicator	Tools and techniques	Monitoring Frequency	Monitoring Agent	Estimated cost (USD)
	Dust and Noise Pollution	<ul style="list-style-type: none"> Measured dust and noise levels. Number of community complaints on dust/noise. % of complaints resolved within defined timeframe. 	Noise/dust meters; GRM logs; site inspections	<ul style="list-style-type: none"> Weekly monitoring Quarterly reporting	MAWLR + Project contractors + Community Water Committees	Embedded in routine maintenance supervision + GRM (no separate cost)
	Mechanical failure; reduced water access; risk of exclusion of vulnerable groups	<ul style="list-style-type: none"> % of operational pumps and storage systems. Number of service interruptions recorded. Number of complaints from vulnerable groups. 	Maintenance logs; service records; community feedback	Monthly checks; Bi-annual review	MAWLR + Community Water Committees + Local Operators	-
	Vandalism or equipment failure; gaps in coverage	<ul style="list-style-type: none"> Number of vandalism or equipment failure incidents. % of stations functional. Number of gaps identified and addressed. 	Incident registers; functionality tests; inspection checklists	Monthly inspections; Annual review	MAWLR + Local Authorities + Community Water Committees	-
	Conflicts over access and allocation; inequitable decision-making	<ul style="list-style-type: none"> Number of conflicts reported and resolved. % of households satisfied with water governance. Number of committee meetings held. 	Dispute resolution records; satisfaction surveys; committee minutes	Quarterly monitoring; Annual review	MAWLR + Community Water Committees + Local Authorities	-

Project Phase	Monitoring Aspect	Monitoring Indicator	Tools and techniques	Monitoring Frequency	Monitoring Agent	Estimated cost (USD)
	Minor hazards such as fatigue or injuries	<ul style="list-style-type: none"> Number of injuries or incidents reported. % of staff trained and using PPE. Number of safety drills conducted. 	Safety records; PPE checklists; drill reports	Monthly monitoring; Annual review	Local Operators + Contractors + MAWLR	600/yr
	Pressure on resources; risk of conflict	<ul style="list-style-type: none"> Water consumption per household/community. Number of water-related conflicts reported. Compliance with water use quotas. 	Water meter readings; dispute logs; committee records	Continuous monitoring; Quarterly review	MAWLR + Community Water Committees + Local Authorities	-
Decommissioning Phase	Disease Risk (Malaria) / Environmental Damage	<ul style="list-style-type: none"> Number of mosquito breeding sites identified and treated. Hectares of land rehabilitated. Incidence of malaria in surrounding communities. 	Site inspections; larval surveys; health records	Quarterly monitoring for 1-year post-decommissioning	MAWLR + Ministry of Health + Community Water Committees	-
	Theft of Solar Panels / Ownership Conflicts	<ul style="list-style-type: none"> Number of theft or dispute incidents. % of equipment successfully redistributed. Existence of formal agreements signed by stakeholders. 	Incident reports; redistribution records; MoUs	During decommissioning and 3 months post-redistribution	MAWLR + Community Water Committees + Traditional Authorities	-

Project Phase	Monitoring Aspect	Monitoring Indicator	Tools and techniques	Monitoring Frequency	Monitoring Agent	Estimated cost (USD)
	Dust and noise pollution	<ul style="list-style-type: none"> Complaints log Dust levels at boundary points Work schedule records 	Noise/dust meters; site inspections; GRM logs	Daily inspections during construction Weekly complaint reviews	Site Manager	Embedded in decommissioning contractor / site manager supervision (BoQ)
	Labour / Inter-village Disputes	<ul style="list-style-type: none"> Number of labour disputes recorded and resolved. % of workers receiving final payments on time. Satisfaction level of communities / workers with the decommissioning process. 	Payroll audits; grievance logs; exit surveys	During decommissioning	MAWLR + Contractors + Community Water Committees + Traditional Authorities	200 (lump sum: exit surveys + grievance handling support)
	Institutional Strengthening / Inter-village Disputes	<ul style="list-style-type: none"> Functionality of water committees after decommissioning. Number of conflicts reported/resolved. % of community representatives trained in governance. 	Committee minutes; training records; follow-up surveys	During decommissioning, follow-up 6 months post-closure	MAWLR + Community Water Committees + Traditional Authorities	-
	Environmental Damage / Solid Waste Disposal	<ul style="list-style-type: none"> Volume of waste is safely disposed of or recycled. Area of land rehabilitated. 	Waste disposal receipts; site inspections; rehabilitation records	During decommissioning, follow up in 3–6 months	MAWLR + Contractors + Community Water Committees +	-

Project Phase	Monitoring Aspect	Monitoring Indicator	Tools and techniques	Monitoring Frequency	Monitoring Agent	Estimated cost (USD)
		<ul style="list-style-type: none"> Number of environmental incidents reported during decommissioning. 			Environmental Officers	

2.4 Adaptive Management Mechanism

To effectively address unforeseen environmental or social impacts during the project lifecycle, an adaptive management framework will be implemented. This framework involves continuous monitoring, evaluation, and adjustment of project activities to ensure that potential negative impacts are minimized and positive outcomes are enhanced. Key components include:

1. **Monitoring and Reporting:** Regular collection of environmental and social data to track project performance against established indicators.
2. **Impact Assessment:** Periodic review of monitoring data to identify emerging or unanticipated impacts.
3. **Responsive Measures:** Development and implementation of corrective actions to mitigate identified impacts, including adjustments to project design, operations, or community engagement strategies.
4. **Stakeholder Engagement:** Continuous communication with affected communities, local authorities, and other stakeholders to incorporate feedback and local knowledge into management decisions.
5. **Documentation and Learning:** Maintaining records of adaptive measures taken, lessons learned, and best practices to improve future project interventions.

This approach ensures the project remains responsive, sustainable, and socially responsible, while fostering a culture of continuous improvement.



CUVKUN

Enhanced Water Security and Community Resilience in the
Adjacent Cuvu & Kunene Transboundary River Basins

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