

Solomon Islands Knowledge-Action-Sustainability for Resilient Villages (SOLKAS)

Annex 16: Operation and Maintenance Plan

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1 Scope for Operation and Maintenance Activities

1. The Operation and Maintenance (O&M) Plan for the Solomon Islands Knowledge Action Sustainability for Resilient Villages Project (SOLKAS) proposed GCF-funded project focusses specifically on equipment procured for activities in three project components. The SOLKAS project will work to help build community resilience via a range of actions at local, provincial and national levels to increase knowledge and awareness of climate change and its impacts, build the skills necessary to ensure rural communities have the adaptive capacity to manage unavoidable impacts and make their own informed adaptation decisions across a range of possible climate futures.

The project activities that include equipment purchased requiring an O&M plan are:

- *Component 1: Community, school and youth stakeholders have increased understanding of climate change and the ability to develop and implement locally-relevant adaptation plans*
 - Activity 1.1.3 – Increase access to and use of climate information and early warning systems at the local level.
- *Component 2: Communities and schools increase climate resilience via upgraded infrastructure, increased knowledge, enhanced food and water security, and sustainable livelihoods*
 - 2.1.2 – Support schools to increase physical resilience to the impacts of extreme weather and climate change (retrofitting and additions).
 - 2.3.1 – Support application of locally-led climate resilient agriculture innovations.
 - 2.3.2 - Establish/scale-up community, school and home-based kitchen gardens utilizing climate-resilient crops.
 - 2.3.3 – Support climate-resilient adaptations to local fisheries for food security
 - 2.3.4 – Support application of village climate resilient water resource management techniques and technologies.
- *Component 3: Communities and schools are making data-driven adaptation decisions, are supported by sub-national government with enhanced capacity, and have more climate resilient livelihoods*
 - 3.1.1 - Co-develop and deploy Climate Resilience Information Management digital toolset suite for data-driven community climate adaptation planning and decision-making

2 Management System for Undertaking O&M Activities

The O&M plan has been developed with the community-based approach of the project, ensuring ownership and the mainstreaming of climate-resilient best practices within the local community. Accordingly, O&M for the project will be carried out through a predominantly community-centred system, with support from the Solomon Islands Government.

During the procurement process, O&M will be addressed through exploring extended warranties and including O&M as part of the procurement specifications for individual project inputs. The ongoing management of O&M will be tailored to each specific location in consultation with the schools and communities and included in the adaptation plans (component 1 activity 1.2.2) and planning for the handover of project equipment to the project beneficiaries for long-term sustainability.

2.1 Main Stakeholders and Responsible Parties

The following stakeholders shall play a significant role in ensuring the effective implementation and sustainability of the climate resilient O&M practices. Stakeholder engagement is a key part of SOLKAS activity development and implementation process, including effective operation and management.

The O&M plan for the project is centered around the following key stakeholders:

1. Provincial and Ward authorities: have established networks into communities, can influence management interventions and benefit from development activities in their areas.
2. Disaster Risk Committees (DRC): Ward and village level community-led groups comprised of gender-balanced and inclusive representation of the households benefiting from project activities. Each Ward and Village is mandated to have a DRC to plan for disaster management and climate risk reduction, including assessing risks and vulnerabilities, and implementing disaster risk reduction (DRR) and climate change adaptation activities.
3. School Committees: comprised of gender-balanced representation including youth representatives from the schools benefiting from project activities.

4. Community beneficiaries: have been identified as extremely vulnerable to climate variability and extremes, which is impacting their food security and DRR effectiveness and demonstrating a deficit in adaptive capacity. Remote communities in particular receive limited training and support.

Other participants involved in O&M:

- Private sector will help to validate relevant national and local skills and capacity building mechanisms and provide access to youth-focused private sector partnerships.
- Suppliers will be accountable for O&M as per the contracts (including extended warranties) on the goods that are purchased from them.

2.2 Roles and Responsibilities of the Stakeholders and Responsible Parties

1. Provincial and Ward authorities: will play a lead role in several O&M activities, particularly satellite and solar equipment and Fish Aggregating Devices (FADs). Project activities will facilitate training of local authorities and beneficiaries who will also be supported in accordance with O&M best practices. Site selection for FADs will include a biodiversity assessment supported by the Technical Fisheries expert and ongoing biodiversity monitoring by the Ministry of Fisheries and Marine Resources as part of their existing FAD monitoring procedures. The project activities will also facilitate the development and dissemination of pictorial and local language O&M guidance notes and manuals. The Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM), the Ministry of Fisheries and Marine Resources (MFMR), and the Ministry of Education and Human Resources Development (MEHRD) will provide on-going technical support to the Provincial and Ward authorities throughout the project timeframe and after.
2. Disaster Risk Committees (DRCs): These committees will receive equipment to enhance connectivity and early warning system infrastructure where gaps exist (installation ground-based satellite dishes with solar PV/battery) and support to establish systems to on-sell data capacity to cover costs. Project activities include training on the basic use and maintenance of this equipment. The rules and regulations for the use, management and O&M of DRC equipment will be proposed, adopted and enforced by the members themselves, through majority agreement and ensuring gender equality and inclusiveness. The DRCs will also be responsible for ongoing monitoring of the communities' O&M of project equipment including FADs, rainwater tanks and agricultural tools.
3. School Committees: will be responsible for O&M activities for the upgrades to schools including WASH systems and solar PV systems. This includes planning, selection and appointment of staff members for monitoring and effective management of school assets. Project activities will include training on the use and maintenance of this equipment. Procurement of the equipment will consider maintenance schedules with suppliers and extended warranties to support long-term O&M after the project.
4. Community beneficiaries: These will include all communities benefitting from improvements to early warning systems, food security, water resource management, FADs, seeds/ seedlings and tools. They will significantly contribute to the implementation of climate-resilient agriculture and fisheries that are suited to their local environmental and socioeconomic conditions through participatory methods to ensure that all proposed activities are entered into voluntarily and with broad community support. Provincial and Ward authorities, DRCs, local NGOs and CSOs, will support communities to ensure high quality maintenance and management of project-related improvements.

2.3 Other project activities focused on establishing the long-term O&M framework

During the six-year implementation period, the activities undertaken will aim to establish a long term, 'beyond life of project' O&M framework, including the development of Standard Operating Procedures (SOPs) for O&M on all durable goods, setting-up of systems, and building the capacity of stakeholders as well as communities for ensuring the sustainability of climate-resilient O&M practices.

The approach chosen and used will be discussed and agreed with DRCs, School Committees, Ward and Provincial Authorities, Ministry of Provincial Government and Institutional Strengthening (MPGIS) and relevant technical line ministries to ensure the approach is consultative and participatory, as well as technically robust and reflects the needs and desires of the end users – the schools and communities.

Specifically, the project will help establish and train Provincial and Ward authorities, DRCs and school committees, as well as the community members; government extension workers to provide technical expertise to help communities with development, facilitation, and assistance in designing, costing and ensuring the establishment of appropriate O&M systems. Communities will be trained in planning and implementation of effective O&M of equipment, and community groups will build their organizational capacities to utilise and manage equipment, monitor usage, and develop O&M mechanisms for any community-held or shared equipment, including capitalization strategies.

2.4 Technical Support During the Project for Setting up the O&M Framework

During the project period, technical specialists supported by both suppliers providing equipment and the Project Management Unit (PMU), will assist schools and communities in establishing and operationalizing O&M management plans. These teams will establish the basic roles and responsibilities of those managing project equipment, as well as formulate specific SOPs, where appropriate, to ensure effective implementation of O&M plans.

The shared resources include:

- Automatic Weather Station management and maintenance responsibilities for Province and Ward authorities.
- Satellite dish and solar panel management and maintenance responsibilities for DRCs and schools, including technical support to establish a system of on-selling data capacity to cover operational and maintenance costs.
- Water tank management and maintenance responsibilities to school committees, monitored by MEHRD.
- Rainwater tanks, agricultural tools and fencing materials management and maintenance responsibilities to beneficiary households/communities, monitored by DRCs
- FAD site selection to include a biodiversity assessment by a technical specialist and ongoing monitoring by government provincial staff. Establishing management and maintenance responsibilities with beneficiary communities, monitored by DRCs.
- Policy/SOP for usage and disposal of tablets.

3 Maintenance of Automatic Weather Stations

The Solomon Islands Meteorological Service (SIMS) currently has five automatic weather stations in the provinces. SOLKAS will support SIMS to procure and install three additional automatic weather stations in under-served areas (in targeted provinces). They will be fully incorporated into the existing network of weather station and include the O&M plans.

3.1 Maintenance tasks

Key tasks for the Automatic Weather Stations are likely to include:

- Regular scheduled maintenance
- Calibrating sensors
- Repair or replacement of sensors and equipment
- Regular security checks and maintenance of site

3.2 O&M Schedule

O&M schedules will be developed by SIMS during project initiation and included with the schedules for the weather stations currently managed by SIMS. Table 1 provides an estimate of the types and frequency of tasks that will be included to ensure proper O&M of automatic weather stations during the project period. Exact planning for O&M will be finalized with the suppliers of the systems once all the technical and operational specifications are known.

Table 1: O&M schedule detailing tasks and frequency for activities to be undertaken

Task	Description/Details	Frequency
Regular scheduled maintenance	Inspection of equipment in accordance with manufacturers guidelines.	As per manufacturer specifications

Task	Description/Details	Frequency
Calibrating sensors	To ensure accurate data is being recorded. Completed with an annual maintenance check.	Annual or as per manufacturer specifications
Repair or replacement of sensors and equipment	For damaged or faulty equipment, during annual inspection or immediately when detected at other times.	As required
Maintenance of site	Appointed community member to provide oversight and maintenance of site	Weekly and as required

3.3 Funding of O&M activities for automatic weather stations

A total of USD 89,200 is expected to be incurred for O&M of the automatic weather stations during the project period. All O&M costs will be included with MECDM's O&M budget and schedule for the current weather stations managed by SIMS. Within the 10-year post project period O&M is expected to be incurred for a total of USD 234,150. Full replacement of the equipment is expected to be incurred within the 10-year post project period at an estimated cost of USD 18,252 per automatic weather station. This will be the responsibility of the government as represented by SIMS.

4 Maintenance of satellite and solar PV systems

Schools and DRCs with identified gaps will receive improvements to enhance access to renewable energy and community Early Warning System infrastructure, including installation of small satellite dishes and solar PV systems. Improvements to support this will include:

- Installation and maintenance of satellite dishes with solar power – plus establish system for on-selling data to cover long term operational and maintenance costs
- Installation and maintenance of solar PV systems for energy.

Additional note: Save the Children understands the risk of forced and child labour with procurement of solar PV systems. Save the Children will manage this risk through the procurement process. Suppliers are assessed against set criteria and as Save the Children are committed to the sustainability of our supply chain, sustainability assessment criteria (including modern day slavery) are included in the supplier selection process.

4.1 Maintenance tasks

Technical specialists will assist DRCs and School committees in establishing basic O&M management plans for key equipment. These plans will establish the basic roles and responsibilities of those managing project equipment, as well as formulate SOPs, where appropriate, to ensure effective implementation of O&M plans. Key tasks are likely to include:

- Oversight of supplier installation of satellite dishes and solar systems by qualified engineers
- Periodic cleaning of satellite dishes and solar systems
- Satellite line and connection inspections
- Emergency contingency plans for the protection and safe storage of equipment in the event of natural hazards (such as cyclones and flooding)

4.2 O&M Schedule

Table 2: O&M schedule detailing tasks and frequency for activities to be undertaken

Task	Description/Details	Frequency
Installation of satellite dishes and solar power	Installation of satellite dishes and solar equipment (power source, transmission line, etc.)	One-time by suppliers
Periodic cleaning of satellite dishes and associated solar	Periodic basic cleaning and inspection to ensure effective on-going operation.	Quarterly
Satellite line and connection inspections	Periodic basic cleaning and inspection to ensure effective on-going operation.	As per manufacturer or installation

		company specifications
Emergency contingency plans	Develop and implement details plans on what, whom, by when protective actions need to be taken to safeguard equipment. For example, follow Early Warning System waring for cyclones, dismantling and storing satellite dishes and equipment.	Triggered by SIMS & NDMO EWS alerts

4.3 Funding of O&M activities for satellite and solar PV systems

A total of USD 233,226 is expected to be incurred for O&M to maintain and operate satellite dishes and solar PV. USD 66,726 will be incurred during the project period (2023-2029) and USD 166,500 will be incurred post project. During the procurement process for the satellite dishes and solar PV, options for extended warranty and service agreements will be explored with the suppliers to finance O&M and replacement part costs during the project period. Regular O&M and replacement costs outside of the warranty and service agreement will be funded through the project O&M budget during the project period and resources raised by on-selling data. Technical support will be provided to DRCs to establish the system of on-selling data capacity from the satellite dishes to cover operational and maintenance costs and address long-term sustainability.

5 Maintenance of upgraded WASH systems, climate-resilient agriculture and fisheries initiatives, and water resource management

The SOLKAS project will work with highly vulnerable and remote schools and communities to engage in safety assessments and participatory, locally-led adaptation planning processes, to develop resilience-building action plans. Schools with priority actions identified under the school safety assessment for coping with water shortages and flooding will be supported with upgrading WASH infrastructure. For communities with key activities identified in Community Resilience Plans to increase food security and water resource management; a range of low-tech equipment and/or tools will be provided to support climate-resilient agriculture and fisheries initiatives, and water resources. The high priority adaptation actions identified via the community-level adaptation planning processes, will be supported by government technical line ministries such as the Ministry of Education and Human Resources Development (MEHRD), the Ministry of Agriculture and Livestock (MAL), Ministry of Rural Development (MRD), Ministry of Fisheries and Marine Resource (MFMR) and the Ministry of Provincial Government and Institutional Strengthening (MPGIS). Inputs will include:

- Upgraded WASH systems – water tanks
- Agricultural tools
- Fencing materials
- Fish Aggregating Devices (FAD)
- Rainwater harvesting tanks

Accordingly, during the project period,

- i) Technical specialists and local authorities will be responsible for:
 - Survey community needs for accompanying equipment
 - Biodiversity assessment for FAD site selection and ongoing monitoring
 - Quick and timely disbursement of input equipment to beneficiary communities
 - Training and support towards long-term use, O&M of materials and equipment
 - Monitoring the implementation of the use of equipment for the right purpose.
- ii) Target communities will be supported with replacement parts, refresher training and upskilling as needed.
- iii) Demonstration training on O&M will also be done by the equipment providers during installation and the subsequent warranty period.
 - Communities will be supported to take responsibility for ownership and sustainability of the equipment to officially cover the O&M cost themselves, which are expected to be negligible, post-project.

5.1 Maintenance tasks

Technical specialists supported by the government ministries, including MPGIS will assist Ward and Province officials in establishing basic O&M management plans. These plans will establish the basic roles and responsibilities of those managing project equipment, as well as formulate SOPs, where appropriate, to ensure

effective implementation of O&M plans. The expected tasks towards the maintenance of the equipment include:

- Regular maintenance and monitoring of water tanks
- Regular maintenance and monitoring of FADs
- Replacement parts for damaged or faulty equipment/tools
- Refresher training and upskilling for O&M of equipment

5.2 O&M Schedule

Table 3: O&M schedule detailing tasks and frequency for activities to be undertaken

Task	Description/Details	Frequency
Biodiversity assessment for FAD site selection	To identify any critical or natural habitats and establish baseline for any sites in natural habitats.	Before any FAD installation
Repair or replacement parts for equipment	For any damaged or faulty equipment/tools – agricultural, fencing and FAD.	As required
Regular maintenance and monitoring of water tanks	WASH systems and rainwater storage – operation and maintenance as specified by the manufacturer/supplier. Monitoring of correct usage.	Quarterly or as specified
Regular maintenance and monitoring of FADs	Inspection of equipment (aggregator, surface floats, ropes and hardware) for corrosion, damage, accumulation of unwanted materials. Removal of entangled fishing line. Biodiversity monitoring.	Monthly
Refresher training and upskilling	For equipment O&M and correct usage	As required

5.3 Funding of O&M activities for WASH systems, climate-resilient agriculture and fisheries initiatives, and water resource management

The total costs for O&M is estimated at USD 2,508,065. This is near exclusively through the replacement of tools and materials after multiple years of use towards the end of the project.

Project Period: USD 2,008,731 The O&M of the equipment will largely be carried out by school committees and community beneficiaries. As a result, the O&M cost is expected to be minimal for the government as well as communities during the project period. Replacement costs have been included in the purchase cost for minor repairs or replacement parts that can be managed by the community or schools for the water tanks, agricultural tools and fencing, using locally available materials. Costs for full replacement of agricultural tools during the project period have been included and will be managed by each Ward. O&M of the FADs is estimated at USD 111,127 and is included in the project budget.

Post project period: USD 499,334 With the O&M management plans in place, the community beneficiaries will manage the ongoing O&M for long-term use and sustainability of equipment supporting livelihoods in the community. If full replacement is required it is expected that the majority of beneficiary communities will eventually manage to entirely self-fund such costs for repairs and replacements through revenue raised by using this equipment. O&M of the FADs will be managed by the community in liaison with the MFMR to ensure ongoing sustainability of the equipment and biodiversity monitoring.

6 Maintenance of tablets for the Climate Resilience Information Management System

To support the use of the Climate Resilience Information Management System for data-driven community climate adaptation planning and decision-making, the SOLKAS project will provide tablets to identified schools and village DRCs.

6.1 Maintenance tasks

- Regular software updates for tablets

- Repair or replacement for tablet - broken screens, malfunctioning device
- SOP for usage and disposal of tablets

6.2 O&M Schedule

While O&M schedules will be developed during project initiation with the support of school committees and DRCs, Table 1 provides an estimate of the types and frequency of tasks that will be included to ensure proper O&M of the tablets during the project period.

Table 4: O&M schedule detailing tasks and frequency for activities to be undertaken

Task	Description/Details	Frequency
Software update for tablets	Alert on tablet settings – internet connection required	As required by manufacturer
Repair or replacement for tablets	For broken screens or malfunctioning devices	As required
Monitoring usage of tablet	Ensure usage policies are agreed and followed	Quarterly
Disposal after useful life	SOP to be developed for the project	Every three years

6.3 Funding of O&M activities for tablets

A total of USD 329,225 is expected to be incurred for O&M to repair or replace broken tablets. During the project period full replacement costs after 3 years of useful life have been included. Costs for protective cases have been included to reduce the number of damaged tablets and additional tablets have been budgeted to cover 10% loss and damage. Given the limited useful life of small electronic equipment, this equipment is not expected to last long beyond the life of the project with or without maintenance. Therefore, there will be no cost allocated to O&M of this equipment beyond the project.

7 Design Lifespan and replacement assumptions for equipment.

The following tables (Table 5 and Table 6) provide details on expected lifespan of equipment for the project and estimated major replacements expenses that are expected to be incurred post project implementation up to the year 2038.

Table 5: Assumption for the replacement frequency of equipment

Equipment type	Expected useful life
Automatic Weather Stations	10 years
Tablet	3 years
Satellite dish	10 years
Solar PV system	15-20 years
Water tank (school WASH system)	20 years
Rainwater harvesting tank	20 years
FAD	8-10 years

Table 6 below details the replacement cycles for various equipment, the timing of when replacement costs are likely to be incurred and the assumption for financing of such costs.

Table 6: Description of Major Repairs/Replacements

Replacements	Timing	Financing assumption
Automatic Weather Stations	Within the 10-year post-project period	Costs would be provided by the government
Tablets	Within the 6-year project period	100% of costs would be provided by the project
Satellite dish	Within the 10-year post-project period	100% of costs would be provided by revenue raised through on-selling data.
Solar panel	Within the 10-year post-project period	Costs would be provided by the government, school committees and through on-selling data for solar panels associated with satellite dishes
Water tank (school WASH system)	After post-project period	Warranty period will cover costs
Rainwater harvesting tank	After post-project period	Warranty period will cover costs
Agricultural tools, fencing	Within the 6-year project period	100% of costs for replacement equipment provided within project period
FAD	Within the 10-year post-project period	Costs would be provided by the government and communities through revenue raised through improved fishing outcomes

8 Financial summary

The estimated O&M plan costs have been proposed for a timespan of 16 years, which includes the 6-year project implementation period (2023-2029) and a 10-year period subsequent to project completion (2029-2038) for practical considerations. O&M activities are expected to be undertaken both during project implementation and post project completion.

During the implementation period, O&M expenses will be incurred for equipment procured for activities 1.1.3, 2.1.2, 2.2.1, 2.2.2, 2.2.3, 2.2.4 and 3.1.1. Post project activities, which include regular O&M and major repairs/replacement, are expected to be carried out by the respective stakeholders on a regular basis or as per the planned schedule. Post-project replacement costs are expected to be incurred based on the lifespans of the equipment.

Financing for the O&M plan during project implementation will be determined through the procurement process, exploring extended warranties, service agreements and including O&M as part of the procurement for individual project inputs. GCF financing will be employed for the effective implementation of the climate resilient O&M practices. The ongoing cost of O&M will be included in the community and school adaption plans so they are tailored to each specific location.

Co-financing and post project commitment: The EEs and line ministries have agreed to establish robust and sustainable O&M plans in consultation with the Provinces, Wards, DRCs and school committees, ensuring the needs of the end users are met. The relevant line ministries have committed to including, if needed, ongoing ministry budget to support recurrent costs.

Community financing: Community contributions will be in the form of cash (i.e. recurring costs for minor repairs, regular maintenance, and sharing of replacement costs) as well as in-kind (i.e. labor costs for undertaking monitoring and repairs, installation and replacement, peer-to-peer cooperative support). Community financing will be mobilized through the DRCs that will drive the implementation and monitoring of the O&M activities.

Table 7 below shows the year-wise forecasts for the annual O&M costs associated with the SOLKAS activities.

Table 7: Cost estimation of O&M

Activity No	Description	Funding Source	Project period (6 years)						Post project period (10 years)										Project Period Total	Post project Total	Project Duration Total
			2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	(2023-2028)	(2028-2038)	(2023 - 2038)
1.1.3	Regular O&M activities including minor repair works or replacement parts – Automatic Weather Stations	Govt.	-	-	22,300	22,300	22,300	22,300	22,300	22,300	22,300	22,300	22,300	24,530	24,530	24,530	24,530	24,530	89,200	234,150	323,350
1.1.3 2.1.2	Regular O&M activities including minor repair works or replacement parts - satellite dish, solar PV	GCF	-	5,610	13,012	14,804	16,650	16,650	-	-	-	-	-	-	-	-	-	-	66,726	166,500	233,226
		Govt	-	-	-	-	-	-	16,650	16,650	16,650	16,650	16,650	16,650	16,650	16,650	16,650	16,650			
2.1.2	Regular O&M activities including minor repair works or replacement – water tanks	GCF			1,038	2,077	3,146	3,146	-	-	-	-	-	-	-	-	-	-	9,407	-	9,407
2.3.1 2.3.2	Regular O&M activities including minor repair works or replacement - agricultural tools, fencing materials	GCF	-	-	-	9,631	993,033	877,667	-	-	-	-	-	-	-	-	-	-	1,880,331	-	-
2.3.3	Regular O&M activities including minor repair works or replacement parts - FAD	GCF	-	-	15,606	31,212	31,836	32,473			-	-	-	-	-	-	-	-	111,127	362,681	473,809
		Govt							33,122	33,785	34,461	35,150	35,853	36,570	37,301	38,047	38,808	39,584			
2.3.4	Regular O&M activities including minor repair works, replacement parts – rainwater tanks	GCF	-	-	-	1,573	3,146	3,146	-	-	-	-	-	-	-	-	-	-	7,866	-	7,866
2.1.2 2.3.1 2.3.2 2.3.3 2.3.4	Community contribution to maintain equipment post project	Community	-	-	-	-	-	-	12,480	12,730	12,984	13,244	13,509	13,779	14,055	14,336	14,622	14,915	-	136,653	136,653
3.1.1	Regular O&M activities including minor repair works, replacement – tablets	GCF		12,614	12,614	12,614	277,508	13,875	-	-	-	-	-	-	-	-	-	-	329,225		329,225
Total for O&M			-	18,224	64,570	94,211	1,347,620	969,258	84,552	85,464	86,395	87,344	88,312	91,529	92,536	93,563	94,611	95,679	2,493,882	899,984	3,393,866