Inclusive and Disaster Resilient Shelter Guide

Urban Informal Settlements, Honiara, Solomon Islands

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Habitat for Humanity® Fiji

RMIT UNIVERSITY

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Cover illustration: Photo of villagers walking on the CAUSE Bridge in Aekafo-Feraladoa settlement, Solomon Islands. (Photo credit: John Clemo)

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ABOUT THE AHP AND DISASTER READY PROGRAM

About the AHP

The Australian Humanitarian Partnership (AHP) is a five-year (2017-2022) partnership between the Australian Government and Australian Non-Government Organisations (NGOs). Through the AHP, partners focus efforts on disaster preparedness and response. For each response, the partnership selects the best placed NGOs to respond to those in need, in a timely, cost efficient and effective way.

About Disaster READY Program

Disaster READY is an AUD 50 million disaster preparedness and resilience program that is implemented by AHP partners and their local networks across the Pacific and Timor-Leste. It draws on the deep networks and partnerships developed by Australian NGOs in the region to support Pacific communities and governments to better prepare for and respond to disasters.

The program focuses on ensuring specific groups, including women, people with disabilities and children, are included and accounted for in disaster preparedness, management and risk reduction activities. Disaster READY is being implemented in Fiji, Vanuatu, Solomon Islands, Papua New Guinea and Timor-Leste. The five main objectives are shown in the table below.

Table 1: AHP objectives to attain the goal of strengthening local humanitarian capability and community resilience to natural hazards.

1	Communities are better prepared for rapid and slow onset disasters.
2	The rights and needs of women, people with disabilities, youth and children, are being met in disaster preparedness and response at all levels.
3	Government, NGOs, the private sector and communities coordinate more effectively for inclusive disaster preparedness and response.
4	National NGOs and faith-based organisations have more influence and capacity in the country's humanitarian system.
5	AHP NGOs work effectively together and with other relevant stakeholders.

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Living on the edge of the ocean. Location: Kukum Fishing Village, Honiara (Photo credit: Lorraine Livia)

FOREWORD

Message from Solomon Islands Red Cross

As co-leader of the national shelter sub-committee, the Solomon Islands Red Cross welcomes this new inclusive and disaster resilient shelter guide that has been developed for Solomon Islands by Habitat for Humanity and RMIT University.

Based on a philosophy of assisted self-recovery, the Guide targets actions that can be done not only by formal shelter responders but also by local community members themselves. This recognises the many skill sets and traditional knowledge that exist within our local communities. By also addressing the shelter needs of groups who are often marginalised in decision-making processes, e.g. informal settlements and people with disabilities, the Guide promotes an inclusive approach to promoting housing that is more resilient to the impact of extreme events.

Solomon Islanders are being faced by many challenges. Guidance that empowers communities with the principles and techniques to strengthen their housing is a valuable additional tool in the shelter response tool box. The Guide will help to strengthen institutional responses in Solomon Islands and act as an encouragement to all shelter responders to assist local actions across the preparedness, response, and recovery spectrum.

Clement Manuri
Secretary General

11 December 2021

ACKNOWLEDGEMENTS

This Inclusive and Climate Resilient Shelter Guide: Informal Settlements in Honiara, Solomon Islands, is funded by the Australian Government through the Australian Humanitarian Partnership (AHP). The Guide has been developed as part of a four-year umbrella project titled *Pacific Shelter Catalogue and Guidelines: Cataloguing Best Practice Shelter Processes for Pacific Disaster Responses*, an initiative of AHP's Disaster READY program. Habitat for Humanity Fiji was funded to develop Shelter Guides for the three Pacific countries of Fiji, Vanuatu and Solomon Islands, with RMIT University sub-contracted to undertake analysis and develop the Shelter Guide for Solomon Islands.

The RMIT team acknowledges that this project would not have been possible during COVID-19 travel restrictions without the efforts of local partners based in Honiara. The work of the local team in collaboration with knowledge shared by community leaders and members form the cornerstone of this project. Local engagement was made possible due to the on-going relationship built through RMIT's involvement with the UN-Habitat 'Climate Resilient Honiara' project since 2019.

Last, but not least, we acknowledge the pro-bono time provided by all the advisory group members, peer-review team members, and the significant in-kind contribution by RMIT staff. Details of the project approach are shown in Appendix 1.

EXECUTIVE SUMMARY

This Shelter Guide has been developed as part of a regional suite of guides covering Fiji, Vanuatu, and Solomon Islands. Whilst this Guide for Solomon Islands complements the others, it also adds critical insights by focusing on the particular needs of those living in urban informal settlements and the realities of residents who often act as first responders. The main sections of the Guide are structured to the three key stages of the Disaster Risk Management cycle: Preparedness, Response, and (longer-term) Recovery.

One of the key messages from a local perspective, is the abundance of carpentry skills in the community, along with knowledge of traditional practice. Most needed is the sharing of technical expertise and examples of best practice building techniques to allow people to strengthen their own houses against disasters. This includes guidance on key construction features, along with training in principles and techniques for shelter resilience. 'Train the Trainer' activities, using existing training organisations, in collaboration with Solomon Islands Government, are one potential way to strengthen local capacities. Training activities should aim to provide assistance or support to people according to their needs, rights and capacities throughout the disaster risk management cycle.

A concept of 'incremental housing' emerged as part of the local narrative; that residents only add to their houses as and when money and resources become available. This reality in informal settlements lends itself to the principle of a 'core space': at least one room or minimum space (new or existing), which is strengthened for multi-hazard resilience. Ideally, the arrangements would include eating and sleeping, as well as having access to sanitation services that are safe and dignified.

Findings from community workshops held in case study informal settlements indicated a necessary emphasis on self-help principles, and that self-recovery would be the most common local response following a disaster. The Guide targets technical and procedural options, comparable to various kit-of-parts that are potentially available to the responder community to actively support a process of 'assisted' self-recovery.

'Tie Down from Bottom Up' is the central message of this Guide. The key structural features to be targeted for increased shelter resilience starts from the ground up with anchored footings; then ties, straps, and bracings to secure the structural frame. The Guide provides details on how to improve each of these critical construction elements. The use of suitable local materials, rather than reliance on imported ones, is also recommended as these are more easily available, often cheaper and more sustainable, and contribute to the local economy. It is acknowledged that there is a preference for materials that are stronger and longer lasting.

In terms of the national responder community, the National Disaster Management Office (NDMO), the shelter subcommittee (co-led by the Ministry of Infrastructure and Development and Solomon Islands Red Cross), and Provincial Disaster Officers (seconded from the NDMO) all have critical roles to play in responding to disasters. Reinvigorating efforts by all those in the shelter sector to better support preparedness actions, on-going capacity strengthening activities and longer-term recovery would help to improve local disaster resilience. From a bottom-up perspective, the presence of active village or community 'disaster committees' are needed to prepare for, and respond to, emergencies. Improved lines of communication and collaboration between these committees and members of the responder community are vital.

ABBREVIATIONS AND ACRONYMS

AHP	Australian Humanitarian Partnership
ARC	Australian Red Cross
CDC	Community Development Committee
CRRC	Climate and Risk Resilience Committee
CSO	Civil Society Organisation
DFAT	Department of Foreign Affairs and Trade
DRC	Disaster Risk Committee – at Ward and Village Level
DSA	Detailed Sector Assessment
ELRHA	Enhancing Learning and Research for Humanitarian Assistance
FBO	Faith-based Organisation
HCC	Honiara City Council
GEDSI	Gender Equity, Disability, and Social Inclusion
GHA	Greater Honiara Area
HURCAP	Honiara Urban Resilience and Climate Action Plan
HFHF	Habitat for Humanity Fiji
IASC	Inter-Agency Standing Committee
IFRC	International Federation of Red Cross and Red Crescent Societies
IDA	Initial Disaster Assessment
ISO	Initial Situation Overview
MECCDM	Ministry for the Environment, Climate Change and Disaster Management
MLHS	Ministry of Lands, Housing and Survey
MHMS	Ministry of Health and Medical Services
NDC	National Disaster Council
NDMO	National Disaster Management Office
N-DOC	National Disaster Operations Committee
NEOC	National Emergency Operations Centre
NERT	National Emergency Response Team
NGO	Non-Governmental Organisation
NZ-MFAT	New Zealand Ministry of Foreign Affairs and Trade
OPDs	Organisations of People with Disabilities
PDC	Provincial Disaster Committee
PDMO	Provincial Disaster Management Office
PDO	Provincial Disaster Officer
P-DOC	Provincial Disaster Operations Committee
PEOC	Provincial Emergency Operations Centre
PERT	Provincial Emergency Response Team
PIF	Pacific Islands Forum
PSS	Psychosocial Services
PWDSI	People with Disability Solomon Islands
RCC	Recovery Coordination Committee
RMIT	Royal Melbourne Institute of Technology
RTCs	Rural Training Centres
SIDS	Small Island Developing States
SIFM	Solomon Islands FM Radio
SIG	Solomon Islands Government
SIMS	Solomon Islands Meteorological Services
SINU	Solomon Islands National University
SIRC	Solomon Islands Red Cross
TWG	Technical Working Group
UNDRR	United Nations Office for Disaster Risk Reduction
UNFCCC	United Nations Framework Convention on Climate Change
UN-Habitat	United Nations Human Settlement Programme
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs

LIST OF FIGURES AND TABLES

1. Introduction

The Inclusive and Climate Resilient Shelter Guide (hereon referred to as the Guide) provides information on the shelter requirements of communities in Solomon Islands, within the context of disasters (irrespective of whether they are natural hazards or climate induced), with a deliberate emphasis on informal settlements[1] in the capital city of Solomon Islands, Honiara. These needs and capacities have been identified from perspectives of both bottom-up (community consultation) and top-down (engagement with Civil Society Organisations, Non-Governmental Organisations, and national and local Government officials), ensuring that the Guide is fit for localised disaster risk reduction in housing. It also draws relevant information from the Fiji Shelter handbook (2019), as well as related research that has carried out for the UN-Habitat project 'Climate Resilient Honiara' since 2019.

The Guide includes a catalogue of inclusive and best practice disaster and climate resilient features (including traditional best practice). It was developed with explicit consideration of the following topics:

- Housing typologies: traditional and contemporary typologies such as western influences and cultural mix, and people's cultural values and priorities and best practice examples that have withstood disasters in the past.
- Materials: the practicalities and environmental considerations of locally sourced versus imported materials.
- Construction skills: quality and consistency in construction practice including contemporary interpretations of traditional practices/ skills.
- Building regulations: adherence to the regulations and updates by community members.
- Roles and responsibilities of shelter responders: how can preparedness and recovery be supported, based on the understanding that communities are usually the first responders to disasters (i.e. assisted self-recovery)

Figure 1: SIDS in the Pacific: Location of Solomon Islands. (Sidev 2019)

1 Whilst the term 'slums' is used internationally, 'informal settlements' is more appropriate for Solomon Islands.

1.1 Rationale for a Focus on Urban Informal Settlements

Disaster and climate resilience challenges are particularly acute in the context of Small Island Developing States (SIDS) in the South Pacific. The country is located in the 'Pacific Ring of Fire' and has long been exposed to the impacts of a range of natural and climate-related extreme events such as earthquakes and cyclones. Solomon Islands is recognised as being one of the most vulnerable to natural hazards; ranked 2nd in the world (after Vanuatu) for disaster risk by the World Risk Report in 2021 (see Appendix 2 for more detail on natural hazard and climate exposure, and Appendix 3 for impact of various hazards and conflicts).

Not only are SIDS highly exposed to natural and climate-related hazards, many of their cities are also growing at a rapid rate. The population of the Solomon Islands has increased at an annual rate of 2.7% over the 2009 – 2019 period to reach 721,000. Over the same period, Honiara's population has increased at a much faster rate of 5.8% per year, reaching 130,000 (Solomon Islands National Statistics Office, 2020).

Development deficits make Solomon Islanders highly vulnerable to the impact of natural hazards and climate-related events. Some of the development challenges include small size (economy, domestic market, and limited resources), isolation (spatial, transport, telecommunication), and limited governance capacities.

The country's declining living standards, high poverty rate (with youth unemployment a particular problem), and significant gender inequalities resulted in a Human Development Index value of 0.567 in 2019. This places Solomon Islands 151st out of 189 countries and territories (UNDP, 2020).

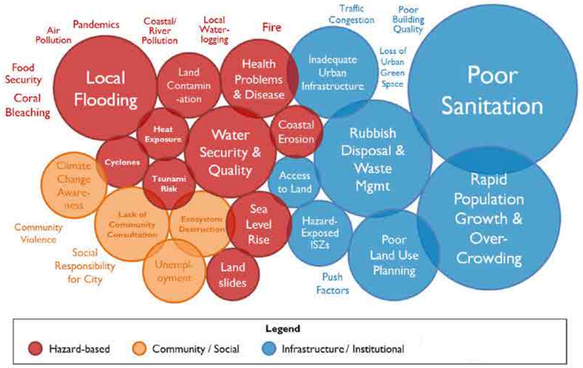


Figure 2: Community issues identified by stakeholders; Size of circle is reflective of how important stakeholders considered an issue (HURCAP, 2016 p.34)

Honiara, the capital city of the Solomon Islands, has approximately 40% of its population living in informal settlements and 'urban villages' (Trundle & McEvoy, 2016); with housing that is often poor quality, unsafe, and exposed to multiple hazards. A large proportion of these people also do not have secure land tenure; and consequently, lack sanitation, water, amenities, and infrastructure (identified in workshops as per Figure 2). Informal settlements are also present in Auki, capital of Malaita Province, and Noro Town in the Western Province.

For those in informal settlements, with insecure land tenure and few or no formal safety nets, self-recovery is the most common response. Without additional support and capacity building, these marginalised communities are at risk of being in a constant state of disaster recovery; reflecting that disasters are not natural and disproportionately affect the most vulnerable (see Appendix 4 for land tenure issues and Appendix 5 for reasons for housing damage). Despite these complex 'urban' challenges, the predominant focus of the international shelter response community has been on rural areas; with support for urban settings seen as resource intensive, complicated by land tenure issues, and often outside their professional experience. Whilst this Guide is intended for resilient shelter options across all of Solomon Islands, and its principles and are applicable across all shelter settings, particular focus is paid to shelter needs of informal settlements.

Of note is that adequate housing is now widely accepted to contribute to social and economic well-being, i.e., better quality of life. The right for all to adequate housing is enshrined in the international human rights law in Article 25 (1) of the Declaration of Human Rights, and is overseen and promoted by a dedicated authority: UN-Habitat, formed in 1978.

1.2 Developing the Guide

The Guide was developed over an eight-month period in 2021. It has been informed by a series of engagement activities, including five community workshops (representing 11 different settlements) that were conducted with residents in informal settlements in Honiara in August and September 2021 (see Figure 3).

Figure 3: Municipal boundary of Greater Honiara and the five urban informal settlements as case studies. (UN-Habitat Climate Resilient Honiara research project)

These engagement activities were followed by two validation workshops held with civil society organisations (CSOs), NGOs, faith-based organisations (FBOs), and local and national Government in October 2021. In total, 189 participants were involved in the workshops, including 90 women, 15 people living with disabilities, 26 young men and 43 young women. Among people with disabilities, 7 men (one blind man, one man with limited mobility, five deaf men) and 8 women (two blind women, five deaf women and one intellectually disabled woman) were involved in the workshops. A sign language interpreter was engaged for one stakeholder workshop, so the project team was able to collect stories and experiences from a group of young hearing-impaired students.

Figure 4: Validation workshop involving women, youth and people with disabilities. (Photo credit: Solomon Yeo)

Themed discussions were designed to inform the development of the Guide, the purpose of which was to better understand local shelter needs and capacities (urban and rural), and how actors in the shelter / disaster sector could better assist community preparedness, response, and self-recovery (full details on the study approach are shown in Appendix 1), including:

i) **Housing**: What are the local cultural views about housing versus shelter, traditional versus contemporary housing typologies, and the main elements of their desired home?
ii) **Preparedness**: What is currently done to prepare homes and the wider settlement before an extreme event, and what additional support is needed to enhance the resilience of their housing?
iii) **Response**: What is the local community's disaster plan, including an evacuation strategy (communication, location and accessibility)?
iv) **Recovery**: What are the likely long-term shelter rebuilding needs of the community, including land, material, technical and financial assistance, skills training, site clearing etc.?
v) **Governance**: Which organisations are best placed to provide support and how can they assist local communities with their shelter and settlement needs?

1.3 Summary Findings from the Community Workshops

Community participants first explained what home and shelter meant for them. Common elements of a home across all groups included:

- **Home =** a place to live, socialise, to pass on spiritual knowledge and educate children, safety, and livelihood
- **Shelter** = for emergencies, temporary

Participants then described what their current homes looked like. Common themes across all groups included:

- **Incremental nature of housing**: many community members were only able to afford incremental building of their homes when funds and materials became available. This is a critical factor when considering upgrading measures.
- **Preference for assistance with materials:** that are more 'permanent' or stronger such as a galvanized steel roof, and stilts of stronger material such as concrete, citing leaf roof and timber stilts as 'temporary' elements.
- **Kitchens and bathrooms:** were generally outdoors and separate to the main living and sleeping area/s, with lower build quality. Generally, every house had their own outdoor kitchen and three settlements out of eleven had one toilet per family. Inhabitants of coastal villages tend to rely on community toilets or more commonly open defecation near the ocean.
- **Housing typology:** there has been a gradual shift in housing typology from traditional to more contemporary and western styles, including the use of materials.

Participants were also asked how they prepared for a disaster, places for evacuation, what communication channels were used, and their priorities for recovery post-disaster. Key findings are as follows:

How did participants **prepare** for a disaster? • Stock up on food and water • Clear up the site around their house • Weigh down the roofs • Secure and tie down what they can in their house • In hilly areas, build retaining walls to slow down flood waters • Preference for at least one secure room	What did they prioritise for **recovery** in the aftermath? • Carry out Initial Damage assessment and Detailed sector assessment • Assist them with material, tools or financial support site clean-up, rebuild/ retrofit house, kitchen and toilet, incrementally • Inspect their house condition • Clean up their homes • Incorporate key disaster resilient features in at least one core space • Connect communities with formal recovery networks
How did they get **updates** about hazard events? • Word of mouth • Radio • SMS text messages • Facebook • Settlement or provincial representative	Where did participants go to **evacuate**? • School • Church • High ground • Extended family member with a 'strong' house

Figure 5: Summary findings from the community workshops in informal settlements, Honiara.

1.4 Who is this Guide for?

1	Shelter responders

Although developed independently, it is intended that the Guide will be of direct benefit to Solomon Islands Government (SIG), the national Shelter subcommittee, Honiara City Council, and other local organisations with an interest in resilient housing and disaster risk reduction. This includes SIG ministries and agencies; intergovernmental agencies such as the Australian DFAT and NZ MFAT; shelter agencies; NGOs; and CSOs and FBOs.

2	Local communities and households

As local communities are often the first responders, the Guide has also been designed to provide guidance to residents to upgrade their existing shelters and be better prepared for disasters and climate extreme events in the future, as well as build back better after an event.

1.5 How to Use this Guide?

Improving shelter to reduce disaster risk is a continuous cycle. Internationally, the United Nations Office for Disaster Risk Reduction (UNDRR) supports countries, their governments and societies, with the implementation, monitoring and sharing of what works at addressing disaster risk (Figure 6). The Inter-Agency Standing Committee (IASC), established in 1991 by UN General Assembly, is the longest-standing and highest-level humanitarian coordination forum, which sets strategic priorities and mobilises resources during a humanitarian crisis.

After the coordination section, which introduces readers to policies and Government partners with shelter roles, the Guide is structured according to different stages in the Disaster Risk Management (DRM) cycle: Preparedness, Response / Disaster Relief, and Recovery. While these are presented separately in this Guide, there are many overlaps and hence, should be seen as ongoing and inter-related activities. The emphasis of the Guide is on **assisted** preparation and recovery, with guidance provided for both shelter responders as well as local community members.

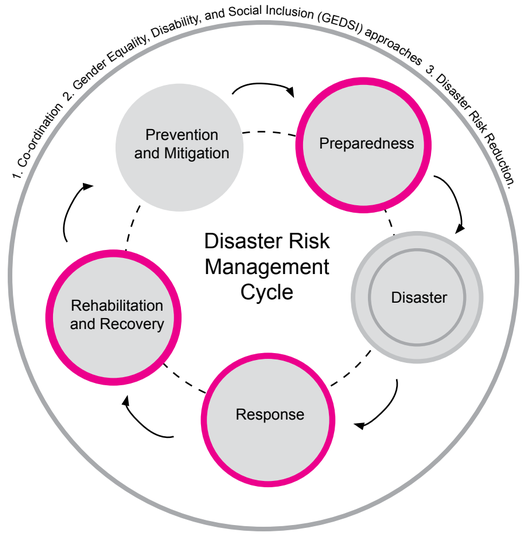


Figure 6: Disaster Risk Management Cycle. (1, 2 and 3 represent cross-cutting issues)

Each stage of managing disaster in the shelter sector is divided into the overarching categories of:
i) people and processes
ii) shelter and materials

Each section integrates gender equality, disability, and social inclusion (GEDSI) and identifies key actions or relevant links to address their rights, capacities and needs.

The Preparedness section covers options for strengthening existing housing and is subdivided into two main sections on people and processes, and shelter and materials.

The Response and Disaster Relief section provides guidance on evacuation and emergency response, emergency shelter, and Initial Damage Assessment (IDA).

The section on Recovery targets rebuilding or retrofitting after a disaster, a new build or a damaged house respectively; providing guidance on the key features for multi-hazard safety of housing, strengthening of technical skills and capacities, and institutional support.

Stakeholder workshop (Photo credit: John Clemo)

2.1 Government Partners in Disaster Risk Management

The Solomon Islands National Disaster Management Plan (2018) sets out the formal governance arrangements during two phases of any disaster: operational response and longer-term recovery (see Figures 7 and 8); with a National Disaster Council, chaired by the Ministry of Environment, Climate Change and Disaster Management (MECCDM) having responsibility for strategic oversight throughout the disaster period.

In operational terms, the National Disaster Operations Committee (N-DOC) is chaired by the Director of the National Disaster Management Office (NDMO). N-DOC plays a critical role in assessing and managing impacts, as well as coordinating sectoral and provincial responses in the first instance. This includes enacting a National Emergency Response Team (NERT), crucial to any community rebuild process, as well as supporting local needs assessments.

A collaboration of NDMO and NGOs would therefore act as important responders to provide food and materials (it is recommended that local materials are used, rather than less practical options which need to be brought in from overseas e.g., tents).

Emergency shelter is dealt with as part of the infrastructure sector committee during the disaster relief phase, chaired by the Ministry of Infrastructure and Development (MID) (Figure 7). In the case of smaller events, coordination might be handled by one or two agencies at the local scale, rather than involving the committee network.

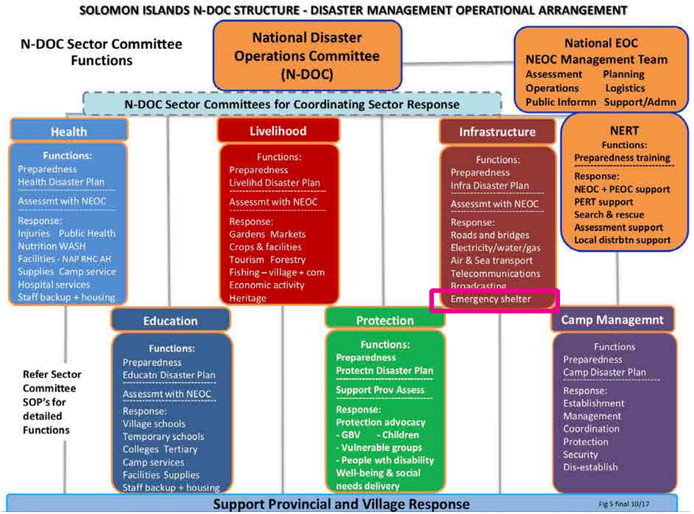


Figure 7: Solomon Islands Disaster Management Operational Arrangement. (Source: NDMO, 2018, p.45)

As actions move into a Recovery phase, NDMO transfers responsibilities to a Recovery Coordination Committee (RCC), led by the Ministry of National Planning, Development and Coordination (MPD&C) who will coordinate incoming aid and manage international relationships. MID will have a continued role in recovery efforts.

In the Recovery phase, a discrete subcommittee takes over actions specific to shelter. This is led jointly by MID and the Solomon Islands Red Cross (SIRC) (Figure 8). It is important that standard operating procedures are maintained and current to enforce regular meetings and clarity about the functions of the cluster. Further, terms of reference promote transparency of engagement processes, resourcing matters etc. (these have not been updated since 2017). Shelter subcommittee members should clearly define and proactively contribute, in practical terms, to longer-term recovery efforts.

What is missing from the above figures of governance arrangements is the important initial phase of the disaster risk management cycle: Preparedness. Here, other Government Ministries can play important roles. In particular, the Ministry for Lands, Housing and Survey (MLHS) with its housing remit and involvement with initiatives such as the Participatory Slum Upgrading Programme (PSUP), is well-placed to promote construction more resilient to climate-related disasters. Further, MID has the technical expertise to support best practice training (as detailed in this Guide and elsewhere); complemented by organisations such as the Asia Pacific Training Coalition (APTC), Australian Industry Trade College (AITC), Solomon Islands National University (SINU), etc. Government engagement with communities could potentially be facilitated by MLHS outreach officers. As shown in the figures, the Ministry of Women, Youth, Children and Family Affairs (MWYCFA) can play an important counselling role (Protection sector).

2.2 Other Shelter Agencies and Partners

Of note are the Provincial Disaster Officers (PDOs). When disasters occur, the role of the PDOs is to work closely with communities to support early assessments and coordinate responses. In Honiara, this is the City Council.

Ward Councils may also have a coordinating role to play in relaying individual community needs to relevant shelter responders. Capacity building of Ward Councillors would be beneficial.

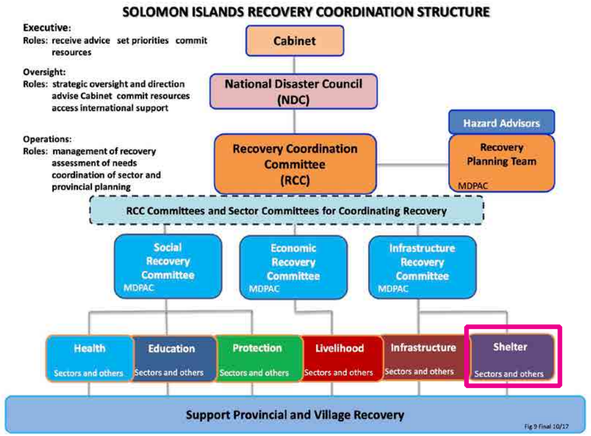


Figure 8: Solomon Islands Recovery Coordination Structure. (Source: NDMO, 2018 p. 62)

2.3 Roles and Responsibilities of Responders

Different organisations have responsibilities and roles to play in different stages of the disaster risk management cycle, as per the table below. Their roles, and suggestions for potential improvements, are also noted (see Appendix 6 for details on responders and NDMO).

Table 2: Roles and responsibilities of responders

Organisation	Potential Shelter Role
In support of Preparation	
Ministry of Infrastructure and Development	• Has the technical expertise to carry out best practice training (i.e. train the trainer). • The shelter subcommittee could be reactivated in the preparedness phase.
Ministry of Lands, Housing and Survey	• Responsible for land administration and housing policy; has power to make decisions relating to land allocation. • Involvement in participatory settlement upgrading scheme.
Training organisations	• Have the technical expertise to carry out best practice training
Solomon Islands Red Cross	• Support coordination of the Shelter subcommittee during preparedness.
NGOs and CSOs	• Potential support for preparedness (tools and materials). • Role in training and awareness raising. • Pre-positioning relief supplies. • Support community-based disaster risk reduction activities.
In support of immediate response	
National Disaster Operations Committee (N-DOC), led by NDMO.	• Assessing and managing impacts. • Coordinating sectoral responses e.g., shelter. • Provision of emergency shelter supplies.
National and Provincial Emergency Response Teams	• Set up by N-DOC. • Needs assessment and provision of emergency supplies.
Ministry of Infrastructure and Development	• Leader of the Infrastructure committee, which addresses shelter.
Solomon Islands Red Cross	• Co-leader of the shelter sub-committee.
Provincial Disaster Officers	• Support for needs assessment. • Liaison between community / provincial level disaster committees and responders.
NGOs and CSOs	• Provision of tools and materials, prioritising locally sourced over imported.

Table 2: Roles and responsibilities of responders (continue)

Organisation	Potential Shelter Role
In support of recovery	
Recovery Coordination Committee	• Responsible for coordinating international funds and strategic response. • Develop recovery policy and an appropriate shelter assistance package that has a combination of financial, material, technical and social support; informed by initial damage assessment and detailed sectoral assessment.
Ministry of Infrastructure and Development	• Assisting self-recovery. • Standard operating procedures and terms of reference to be updated.
Solomon Islands Red Cross	• Assisting self-recovery. • Standard operating procedures and terms of reference to be updated. • Capture lessons learnt and update it in knowledge management system in collaboration with MID, RCC.
NGOs and CSOs	• Assisting self-recovery. • Monitor the quality and compliance of shelter recovery. • Reflect on practical options for supporting self-recovery.

Laws, Policies and Initiatives of Relevance to Resilient Housing

Disaster management and Climate Change Policy

- National Disaster Management Plan (2018): http://www.ndmo.gov.sb/index.php/policies-plans-and-strategies/272-national-disaster-management-plan-2018
- National Climate Change Policy (2012-2017) with the mission statement “to enhance adaptation, disaster risk reduction and mitigation capacity through Solomon Islands that contributes to increased resilience and achievement of sustainable development goals.” (p.13): https://www.adaptation-undp.org/resources/naps-least-developed-countries-ldcs/solomon-islands%E2%80%99-national-climate-change-policy-2012

Development

- National Development Strategy (2016 – 2035) has objective four for resilient and environmentally sustainable development with effective disaster risk management, response and recovery: https://solomons.gov.sb/wp-content/uploads/2020/02/National-Development-Strategy-2016.pdf

Housing

Whilst there is no current national housing policy, there are initiatives of interest, including:

- Greater Honiara Urban Development Strategy and Action Plan (ABB, 2018): https://www.adb.org/sites/default/files/project-documents/49460/49460-001-dpta-en.pdf
- Participatory Slum Upgrading Programming: https://www.adb.org/sites/default/files/project-documents/49460/49460-001-dpta-en.pdf
- Honiara Building Ordinance (gazetted in 1984): http://honiaracitycouncil.com/wp-content/uploads/2016/09/Building-Ordinance.pdf
- Constraints in the application of building codes: Solomon Islands (PRIF, 2021): https://www.theprif.org/sites/default/files/documents/Building%20Codes%20Guidance_Solomons%20Islands%20Case%20Study.pdf

Land titles

- The Land and Titles Act (1996): http://www.paclii.org/sb/legis/consol_act/lata143/http://www.paclii.org/sb/legis/consol_act/lata143
- The Customary Land Records Act (1996): http://www.paclii.org/sb/legis/consol_act/clra249/

Regional

- Within the Pacific regional level, Solomon Islands is a signatory to the Pacific Plan and the regional ‘Framework for Resilient Development’ (FRDP, 2017-2030) in the Pacific. The FRDP was endorsed by the Pacific Islands Forum (PIF) Leaders in 2016 to develop an integrated approach in addressing climate change and disaster risk management.

2.4 Community Protocols and Traditional Approaches

Responders:

- Solomon Islands has diverse cultures, 'kastom' and languages across the different islands and provinces. It is important to practice and implement appropriate cultural and social protocols within communities, which can vary significantly from place to place.
- Communities are made up of one or more 'wantok'; in Solomon Islands Pidjin this translates as 'one talk', or someone with similar ancestral or geographical origins.
- Where practicable, communities should be contacted in advance to learn about community protocols, especially when entering the community. Protocols might include rules about meeting locations, and behaviour or clothing e.g. it is generally more respectful for women to wear a skirt (rather than trousers). Contacting the community can be done by face-to-face meeting or a phone call with a church leader, community chief, or representative from the village committee. Word-of-mouth can help you identify the right people. The PDO should also be informed of visits, given their coordination role. It is also good practice to inform police or law enforcement.
- In the absence of advance contact and approval, promptly state your purpose upon arrival, and ask for the appropriate person about protocols. If the community do not want you to come in, you must respect their wishes.
- Respect that local people have ownership over traditional knowledge, which they may not wish to be made publicly available.

Communities:

- Continue sharing and passing down your traditional knowledge of weather forecasting, including the Women's Weather Watch (e.g. understanding the lunar cycles; stars; wave patterns; clouds; birds and animal behaviour; plants; etc.)
- Collaborate with Solomon Islands Meteorological Services (SIMS) and the Ministry of Tourism and Culture to record traditional 'stori' so they can be shared (as appropriate) and preserved. Develop ways as to how this knowledge can be retained even by those moving to new locations.
- At settlement scale, establish a village disaster risk committee, for example, as part of your village committees.
- Village disaster risk committees should:
  - Coordinate and work together with the PDO, as well as Ward committees and shelter responders.
  - Identify shelter preparedness, response and recovery needs during and after a disaster event. Share this information (as well as any relevant photos) with the PDO and other shelter responders.
  - Develop and update your village disaster plan including how to help people, especially women, children and people with disabilities.
  - Practice regular disaster drills, which are inclusive and safe for women, children and people with disabilities.
  - Talk with your families and community about materials and natural resources needed for shelter. Raise awareness for planting and protecting sago palms, other trees, and mangroves in order to provide traditional materials.
  - Strengthen capacities within your community for shelter preparedness, including needs and damage assessments during and after disaster events. With this information, shelter responders can better assist your community with self-recovery.

Disaster preparedness refers to measures taken - knowledge and capacities development, actions – by the residents and responders, to prepare for and reduce the impacts of likely or current disasters. This includes actions taken in a timely and effective manner to maximise readiness to quickly and appropriately respond to and recover from the impacts of disasters, if required.

"Before an event, you do an assessment – is there any weakness in the house? If so, you must improve it." (Ontong Java settlement resident)
"At the family level, women said they had stores of clean water, matches, torches, and radio batteries for times of disaster." (Jabros settlement resident)

Community Members:
Always try and prepare well before the wet season, with more targeted efforts leading up to or at the beginning of a disaster.

Shelter Responders:
Provide practical upgrading training and advice, appropriate for local budgets.

What can community members do?

- Stay informed.
- Have a community and family disaster plan in place.
- Prepare shelter by tying down the house at every level from the roof to the ground.
- Clear the site around your house.
- Prepare your family by stocking up supplies and having a 'pick-n-go' bag (the local term) ready in case evacuation is necessary.
- Leave no one behind i.e. ensure people with disabilities, children and older people are evacuated earlier.
- Be prepared.

What can shelter responders do?

- Inform yourself on the context and appropriate assistance types and methodologies.
- Conduct disaster awareness training, education and drills on an ongoing basis, by employing a combination of technology and traditional knowledge.
- Conduct inclusive best practice construction training and advice for more resilient housing.
- Communicate using all available formats for early warning.
- Actively seek out and understand your organisation's roles and responsibilities.
- Stay updated by maintaining regular contact and knowledge sharing with:
  - Relevant government agencies and contact points at national, provincial and municipal levels.
  - CSOs and community groups such as women, youth and People with Disabilities.
  - Community Development Committees (CDCs), or village committees especially those within your operational area.

Shelter Responders:
In accordance with the *Disaster Impact Assessment Guidance for Solomon Islands Version 1.0 (2018)*, understand your roles and responsibilities within the entire assessment process from preparedness to Detailed Sector Assessments (DSA). This includes downloading the KoBoToolbox per user. Engage across all levels of the NDMO, a summary of this is in Appendix 6.
Conduct skills training for shelter preparation, such as construction and maintenance, so local communities can strengthen their house and do their own shelter preparedness.
Disaster awareness and preparedness: Provide a regular training program, including evacuation practice drills to understand what unsafe conditions are and how to monitor these.
Trainings should occur year-round, with a focus on on-site and on-the-job training campaigns no later than in the three (3) months leading up to the cyclone season.
Partner with People with Disabilities Solomon Islands (PWDSI) and women with disabilities to ensure their rights, needs and dignity is met in an inclusive manner through all preparedness activities, including, evacuation drills and awareness training and accessible formats of communication (e.g. Braille, audio, video, sign language). Refer to awareness training such as those in All Under One Roof (IFRC, 2015), available at: https://www.ifrc.org/media/48958
Consider the DFAT Promoting a Disability-Inclusive Humanitarian Response (2021) guidance paper, in particular the notes on 'Advancing disability inclusion within the humanitarian cycle' (pp10-13), available at: https://www.dfat.gov.au/sites/default/files/disability-inclusive-development-guidance-note.pdf The section on Needs Assessment and Analysis will directly influence your Preparedness for people with disabilities, and includes operational and training measures such as: • Include disability inclusion criteria and policies related to disability inclusion in calls, proposals and contract agreements. • Ensure that staff are trained in the inclusion of People with Disabilities and that a dedicated disability focal point is appointed. Prepare disability guidance for implementing partners. • Invest in disability-inclusive preparedness and provide funding to support capacity development designed to ensure that all humanitarian stakeholders, including Organisations of People with Disabilities (OPDs), are equipped and prepared to include people with disabilities in humanitarian action. • Participate in the national coordination mechanism for the shelter sector – the shelter subcommittee chaired by MID and SIRC.

"There is no community plan in place for disasters." *(Jabros settlement resident)*

Community Members:
Work with PWDSI and other OPDs to establish inclusion and assistance relationship between people with disabilities, their households, and their community. This will be particular importance to those people who do not have family members, or members within the community they are living in. The IASC Guidelines, Inclusion of Persons with Disabilities in Humanitarian Action (2019) provides a baseline resource at community and household level considerations for people with disabilities. It is evidence-based with case studies across multiple stakeholders and regions, available at: https://interagencystandingcommittee.org/iasc-task-team-inclusion-persons-disabilities-humanitarian-action/documents/iasc-guidelines The following ELRHA resource provides a succinct gap analysis on more effective strategies to include and account for older people, and older people with disabilities, available at: https://www.elrha.org/researchdatabase/gap-analysis-the-inclusion-of-people-with-disability-and-older-people-in-humanitarian-response-beyond-the-evidence/

Figure 9: Sample ways to better prepare for people with disabilities: access and early-warning.

Figure 10: Steps to prepare and evacuate people with disabilities.

3.1 Early Warning Systems and Use of Accessible Formats

- Use a wide range of accessible media and communication formats to get your key action messages out to the public. These can include radio, television, newspapers, social media and SMS. Key messages can also be shared on Information, Education, Communication pamphlets (IEC) by field staff and through other committees and CSO/NGO/ OPD groups. Messages must be understandable by the deaf, blind, persons with cognitive or intellectual disability.
- Communication must be clear, consistent and provided in multiple accessible formats such as Braille; audio; video; sign language; pictorial; etc.

- Work with PWDSI and DPOs to confirm the most effective ways for people with disabilities to be informed for advance notification and evacuation. Note: the level of urgency for people with disabilities are much higher than those without, as a Category 2 cyclone can often bring Category 5 challenges for people with disabilities.
- Audio mode of announcements via radio (SIFM radio channel), local community leaders shout out warnings using church bells, drums or conch shells, as it is effective for visually impaired people.
- Physical actions such as a warning flags system, or door-to-door; and digital actions such as text announcements via mobile phone SMS, newspaper weather column or posts on social media, as it is effective for people who have difficulty hearing (See Figure 9).
- Flood warning system at the mouth of Mataniko river (housed in Ontong Java Settlement) is a good initiative but its colour coding system is not well understood by people. Awareness raising about colour coding systems and other forms of early warning would be beneficial. Community members would prefer a traffic light system of colouring – red, yellow and green.
- Confirm that a person with disability has a nominated member of their family or in the community, especially for those without family members, to provide communication and physical assistance in a timely manner (See Figure 10). This includes evacuation routes to a nominated evacuation centre or nearby ‘strong’ houses or buildings
- The AHP provides a series of guidance notes on disability inclusion: https://www.australianhumanitarianpartnership.org/library-contents/disability-inclusion-in-disaster-preparedness-and-response-an-evaluation-of-disability-inclusion-in-the-disaster-ready-program-in-fiji-vanuatu-solomon-islands-papua-new-guinea-and-timor-leste. Within this, there are a number of ‘thematic’ guidance notes, such as the following for the preparedness process as follows: https://www.australianhumanitarianpartnership.org/library-contents/thematic-guidance-note-strengthening-disability-inclusion-in-community-based-disaster-preparedness
- Periodic updates and communication must be provided by the NDMO, shelter cluster, and PDMO.
- For the nominated evacuation place, consider the guidance set out in All Under One Roof (IFRC, 2015), especially on accessible communication; maintaining dignity; provision of physical markers such as signage, flags, or coloured posts along the routes and within the space; installation of ramp, wheeled ramps, and handrails; and fit-for-intended purpose equipment such as wheelchairs and walking sticks.
- Refer to the Disability Inclusive Communication Guideline for further information, available at: https://www.shelthercluster.org/pacific/documents/disability-inclusive-communication-guideline

3.2 Current Housing: an Evaluation

You can have any type of house. Just make sure it is properly built, tied, and braced. Then keep up with the building maintenance by checking that all fixings, ties, and braces are tight and secured before and after storm events.

Traditional - Gable Roof
An example of a traditional house built on the ground with Gable roof. It uses local materials and traditional cladding methods such as weaving for wall panels and thatching for the roof.

Current Strengths: (——)
Natural materials allow the house to ‘breathe’ and release internal pressure during storm events. It also provides flexibility to the building structure that improves the resilience of traditional homes of this type. Reef Islands are in ‘cyclone alley’ and therefore more prone to damaging events.

Improvement Opportunities: (·····)
A house on the ground is prone to flood damage.

Figure 11: Photo of a traditional house or Sapulau in Reef Islands, Temotu Province. (Photo credit: John Clemo)

Traditional - Dutch Gable Roof
An example of a traditional house with Dutch gable roof and floor raised on stilts.

Current Strengths: (——)
This house also allows permeability and cross flow of winds.
The raised floor allows wind and water to flow beneath. There is permeability of the walls and the roof, which also draws hot air further up into the roof pitch of the Dutch gable.

Improvement Opportunities: (·····)
Inaccessible for people with disabilities.

Figure 12: Photo of a traditional house with Dutch gable roof, lower leaf roof and upper steep roof. Location: Jabros settlement (Photo credit: John Clemo)

Inland, Peri-Urban, Hillside House Types

These more contemporary homes are built to an obvious gabled-roof typology, with floors raised on stilts. Stilts are mainly made from structural timber or reinforced concrete and set into reinforced concrete footings. The roofs are made from corrugated sheeting fixed to purlins.

Current Strengths: (——)
Standardised structural frames allow for ease of maintenance in terms of ties and bracings. Some windows have metal grills for security and protection, while others have storm shutters.

Improvement Opportunities: (·····)
Long reinforced concrete columns without ring beams or timber stilts without bracing, means the stilts are not properly connected together to create an interlocking structure. This means the stilts can still move around and collapse, compromising the efforts made in the ties and bracing work above. It also raises questions as to whether the sizing, spacing and tying of various structural elements, including, stilts, floor bearers, wall frames, roof trusses, are accurate or not.

Figure 13: Photo of a 'strong' house built by Kwara'ae man; dotted line shows improvement opportunities.
Location: Wind Valley settlement
(Photo credit: John Clemo)

Figure 14: Photo of a typical timber house with timber posts, corrugated roof and window shields for rain; dotted line shows improvement opportunities.
Location: Aekafo-Feraladoa settlement
(Photo credit: John Clemo)

Figure 15: Photo of a house on higher posts on slope.
Location: Jabros settlement
(Photo credit: John Clemo)

Coastal House Types

These two coastal houses showcase one that is contemporary and one semi-traditional. The semi-traditional house (Figure 17) had withstood Cyclone Namu in 1986 and uses traditional woven wall panels. The roof has since been replaced with corrugated sheeting. The contemporary house (Figure 19) is sufficiently raised to make use of the space below. Community members have requested houses with sufficient space below for storage and general use.

Current Strengths: (——)
In the semi-traditional house, the cross-brace of the wall frames, shutters on windows and the floor bearers' connection with stilts using notched and bolted joints have helped the house withstand extreme wind events.

Improvement Opportunities: (·····)
The more contemporary house built using concrete columns can benefit from ring beams. The concrete columns should be verified to ensure that each member is properly sized and have the required steel reinforcement to support what is quite a large house.

Figure 16: Photo of a 'sturdy' house.
Location: Ontong Java settlement (Photo credit: John Clemo)

Figure 17: Photo of a house which withstood Cyclone Namu (1986) with 'copper' roof added since.
Location: Fishing Village settlement (Photo credit: John Clemo)

3.3 Shelter Preparedness: Materials

MATERIALS	
Local Strengthen the sustainable supply and use of locally available materials to drive local, nature-based shelter preparedness options. This should form part of your overall shelter strategy from maintenance and preparedness, to rebuild after disasters.	**Imported** Be strategic about the cost/ longevity aspects of imported materials. Although they might last longer, they will cost more. They may also have a larger environmental impact. Ensure you make informed decision while choosing materials.

1	Tie Down from Bottom Up: assist with the supply of materials and tools for **ties, straps and cross-bracing** of building stilts and wall frames within the core space. Prioritise materials and tools people can self-maintain and self-repair.
2	Local materials can be: a) Foundations and Footings: crushed coral. b) Ties and Straps: ropes; vines; recycled steel straps and plates, however, they must comply with the building code, where practicable. c) Infill Roof and Wall Panels: can be thatched roof and weaved wall panels. If materials are in short supply, also consider salvaged or upcycling of imported materials such as 'copper sheeting', 'iron roof sheets', 'Colourbond', etc.
3	Supply of tools: it is important to supply good quality, fit for purpose tools that will last (not single-use disposable), can be self-resharpened, and do not require long lead times for imported parts or sending parts off for sharpening or maintenance. In some villages, the tools are centrally stored with the Village Chief or their representatives. Work with them to coordinate and ensure all households get to use the tools they need in a timely manner. There will be tools that are in high demand, organise local knowledge and traditional practices, or use and adapt similar objects such as: hammer/ timber mallet; shovels/ coconut shells; hand-auger/ self-made pipes; etc.

3.4 Shelter Preparedness: Tie Down from Bottom Up

"When there is a big wind; some people will try to tie rope; or nail timber on the roof or put canvas up. Windows can be broken during really strong winds, and wind and rain can blow into the house." *(Fishing Village settlement resident)*

"When big winds come, the rains come in through my windows." *(Wind Valley settlement resident)*

Tie Down from Bottom Up to best prepare your shelter.

As a Responder, you can actively help prevent the negative impacts to a shelter structure through your on-ground involvement. However, many households may not be able to properly tie and brace their entire structure. So, focus your efforts on one core end of the home as shown. This will be their core space to defend, and from which they have the best opportunity to recover and rebuild from.

Figure 18: Typical concept of Tie Down from Bottom Up. (Graphics adapted from Kaunitz Yeung Architecture, 2017)

Assist households to prioritise a ‘core space’ in their home: a part of the house that can be strengthened given available budget. If this is not feasible, it would be safer to evacuate.

‘Tie Down from Bottom Up’ of that core space, and from there if feasible, as much of the remaining house as practicable (Figure 19). These include:

a) Cross-brace (new) or tightening existing bolts or straps of all timber stilts. This is important to interlock the base of the house to better support everything on top of it.
b) Securely connect and tie together all the house frames, especially the structural members, such as:
   - the floor bearers to the wall frames with new bolts, tightening existing bolts, re-nailing existing straps (sometimes this will mean extra nails), or nailing new straps. There might be joints that uses notched details and these will need to be checked and reinforced.
   - the wall frame to all roof frames or trusses with new ties and straps, ropes and vines, or re-nail existing ones.
   - the roof frames or trusses by nailing or tying down every part of the frame with ties, straps, ropes or vines.
   - tying and weighing down the roof sheets as practicable with available materials such as heavy pieces of timber or palm fronds, ropes or vines, or extra nails and roofing screws at the edges (sides, top, bottom) of the ‘copper’ (corrugated iron) roof sheets.
c) Provision of scaled models of frames and construction details that people can pass from village to village to help organise how to brace and tie the structural frame. These can be built with the community as part of preparedness training, or as examples to show in the absence of training.

Doors and Windows: cover all openings, including doors and windows from outside with panel made from Sago leaves or split bamboo or other available materials (timber pieces, timber sheets, copper etc). Add a timber latch on the outside of the windows to avoid any debris to break open the windows.

Site preparedness actions such as cleaning up and securing loose items; tree trimming; sandbagging; etc. The objective is to protect the entire house.

Check to see if your neighbour needs any help – in a storm your house is only as strong as your neighbour’s house.

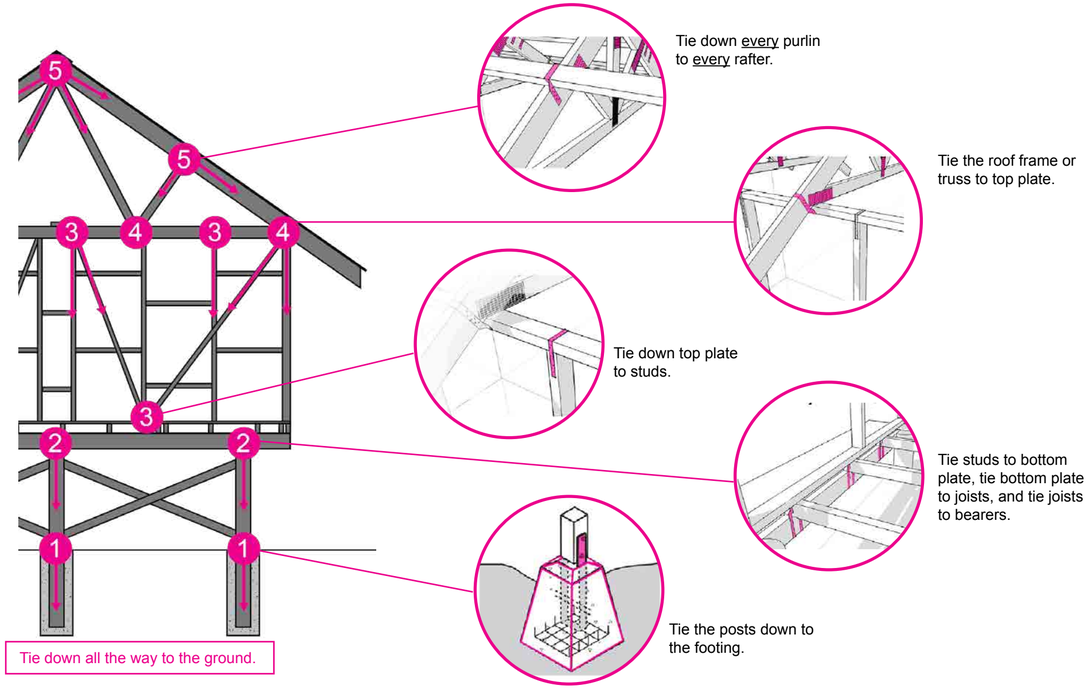


Figure 19: Tie Down from Bottom Up.
(Image on left: Kaunitz Yeung Architecture; Image on right: Adapted from Fiji Shelter Handbook, 2019)

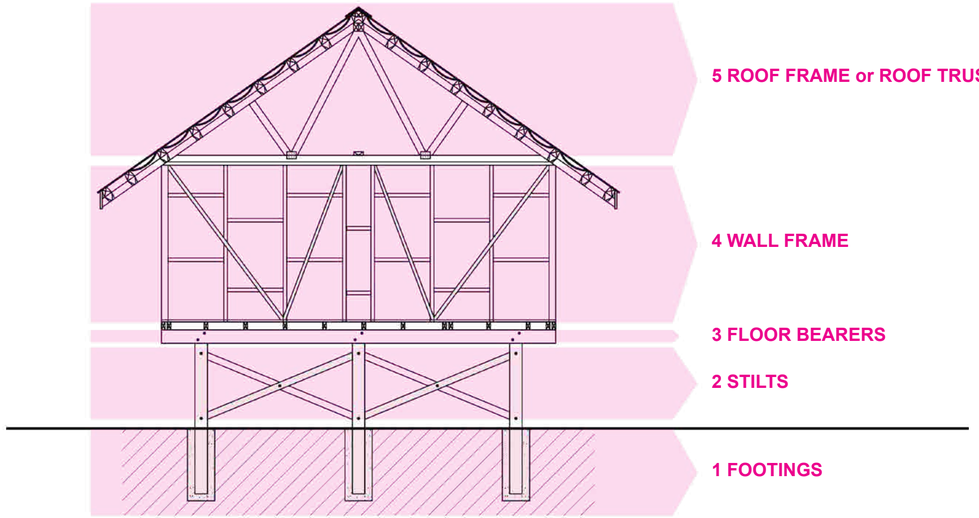


Figure 20: Key structural parts of a typical house with floor raised from the ground. (Graphics adapted from Kaunitz Yeung Architecture, 2017)

Response refers to actions taken directly during and immediately after a disaster, by community and responders, to ensure everyone's safety, dignity and access to basic needs. Response activities immediately after the disaster are sometimes called disaster relief. It includes immediate sheltering of people either in an evacuation centre or elsewhere, or temporary sheltering on site.

"During cyclone (Namu, Ida), the disabled people were shifted to the SINU dining hall by family members. Women, children, the elderly and disabled are moved to houses near the road." (Kukum Fishing Village settlement resident)

Assessment is key to effective response.

Community Members:
- Inspect house condition and procure disaster relief provisions for site clean-up and house repair.
- Assist family and neighbours by providing local shelter materials and tools, and other essential supplies.

Shelter Responder:
- Participate in the shelter coordination mechanisms and assist in initial damage assessment.
- Ensure response and the actions are well-aligned with community needs and capacities.

What can community members do?

- Connect with a formal network/ organisation or a focal technical person for technical advice on house safety assessment (cracks, joints or broken parts) and identifying measures to make your house secure.
- Participate in conducting IDA with formal networks
- Identify a Designated Disability Inclusion Focal Points in each organization to collaborate with.
- Ensure people with disabilities, women and older people are well-represented in all stakeholder consultations, community assessments, and in planning strategies.

What can shelter responders do?

- Assist NDMO, SIRC, and NGOs / CSOs in carrying out Initial Damage Assessment (IDA)
- Participate in the shelter coordination mechanisms to develop a well-coordinated response strategy.
- Collectively distribute Non-Food Items (NFIs) for shelter, collaboratively.
- Partner with People with Disabilities Solomon Islands or other OPDs.
- Manage the accessibility, safety, and dignity needs of people at all evacuation locations.
- Assist NDMO, SIRC and allied NGOs/ CSOs to support residents with assessing the safety of their house.
- Share all assessment data with the Shelter subcommittee.

"Though houses were standing, the roof experienced a leak. Solomon Islands Red Cross helped some with tents [tarpaulins], others remained at the evacuation centre for 1-2 weeks before returning." *(Wind Valley settlement resident)*

Shelter Responder should:

- Assist the NDMO, SIRC and allied NGOs and CSOs in carrying out an initial damage assessment (IDA). This process typically includes downloading the KoBoToolbox. In Solomon Islands, follow the advice of the NDMO (who leads the IDA process) on appropriate assessment form.
- Assist the NDMO, SIRC and allied NGOs and CSOs in:
  - Distributing Non-Food Items (NFIs) including, the essential household items related to the shelter sector such as sleeping mats, cooking sets. Refer 'Selecting NFIs for Shelter', available at: https://www.sheltercluster.org/coordination-toolkit-2018-version/library/non-food-items
  - Identifying the contents and supply of items included for distribution for their relevance to people with disabilities.
  - Distributing items for repairing shelter or cleaning up the site.
  - Assisting residents to assess the safety of their house (cracks, joints or broken parts) and identify measures – relocation, retrofitting or complete rebuilding – they need to take to make their house secure.
- Partner with people with disabilities Solomon Islands (PWDSIs) and other OPDs for the assessment and response process, which should capture data by gender, age, diversity, disability and protection, at a minimum. Use existing tools such as the Washington Group questions on functioning, available at: https://www.washingtongroup-disability.com
- Ensure adequate staff of implementing partners are trained in disability inclusion.

4.1 Emergency Shelter

"Assistance with building materials would be more helpful. Cement, nails, timber, copper….I still don't feel safe if I am just living in a tent [tarpauline]. Plus, there is no privacy. Security is an issue – people could come by in the night and cause trouble."
(Wind Valley settlement resident)

"It shouldn't be up to individual people in the community; there should be quick contact with other organisations so they can assess [damage] and provide the needed support." *(Aekafo-Feraladoa settlement resident)*

One of the major shelter responders during the emergency phase is Solomon Islands Red Cross (SIRC). They have a standard shelter toolkit, which is endorsed by IFRC. However, the shelter subcommittee does not have an agreed or endorsed standard shelter toolkit. Additionally, since the focus here is on informal settlements, the construction type may also differ. While a list of items is recommended here (see Table 3 and Table 4), it must be tailored to meet the needs of the affected people and available resources.

Figure 21: Emergency Shelter following an 8.0 magnitude earthquake and tsunami in 2013, Santa Cruz Island in the eastern province of Temotu. (Source: World Vision Solomon Islands, 2014)

Table 3: Items for Shelter Repair for informal settlements

Items for Shelter Repair	
Materials	• Tarpaulin • Copper roofing sheet, if possible • Timber • Nails/ bolts
Tools	• Jacks and lever blocks to lift house for re-stumping. • Chisel Sets • Manual Saws: variety of crosscut; rip cut; hacksaw – prioritising quality blades that can be resharpened within the village. • Motorised Saws: rear-handled chainsaws with manual sharpeners, plus related safety equipment and training. • Hand-augers for timber and accompanying drill bits that match the supplied bolts (M-threads), including bits to account for up to 10% greater than the M-thread. • Machete or Bush Knife with timber handle • Hammers; Crowbars • Shovels

Table 4: Items for Site Clean-up for Residents

Clean-up Kit for Residents	
Tools	• Digging bar or crowbar • Shovel • Large chainsaw • Machete/ knife with wooden handle • Shears • Wheelbarrow • Handgloves • Gumboots

Figure 22: Items for site cleaning up. (Source: HfHF, 2019)

5.0 Recovery (Medium - Long Term)

Recovery refers to activities undertaken after a disaster, aimed at restoring or improving the disaster affected community's health, livelihood, shelter and the infrastructure that supports them. While recovery is a medium-to long term process, it can last up to a number of years post-disaster, depending on local realities and community member's pre-disaster challenges. Consequently, each individual/ household will follow different recovery pathways.

"Need to get money first. You might ask your family for money if you need to have shelter immediately. Otherwise, it can take too long to sell things at the market." (Aekafo-Feraladoa settlement resident)

"You can rebuild your kitchen in one day. But for a house – you need to gather materials. It might take one and a half months. Or it could take longer if you don't have the money." (Ontong Java settlement resident)

"Most house plans are not drawn on paper, but remain in the mind, "plan lo mind nao." [They are] build according to stages due to affordability." (Jabros settlement resident)

Recovery starts from day one. Everyone will take a different recovery pathway (Figure 26). For community, a house must have a wall, floor and roof. It is also a place to pass on spiritual knowledge and educate children.

Community Member:
- Participate in conducting Detailed Sector Assessment (DSA) with formal networks.
- Design a core space that includes space to sleep and cook; has access to sanitation; can be extended; is accessible, safe and meets privacy needs.
- Tie down from bottom up: footings; shoring; tying; strapping; notching; continue to practice thatching and weaving, and to pass these skills on to younger generations.

Shelter Responder:
- Demystifying disasters: science and tradition.
- Localise self-recovery by provide a combination of financial, material, technical and social assistance. Encourage material selection that is local, long-lasting and with limited environmental impact.
- Leave no one behind i.e. ensure the interventions reach all disaster- affected households. Enable people to have choice and agency over their housing recovery pathways.

Shelter Responder should:

- Based on information from IDA, together with SIRC, conduct a Shelter-sector specific Detailed Sectoral Assessment (DSA) at a household level, in accordance with the *Disaster Impact Assessment Guidance for Solomon Islands Version 1.0* (2018).
- Together with SIRC and NDMO, determine an appropriate shelter assistance package, which includes a combination of financial, material, technical and social assistance. Commit to a timeframe for which community needs you for assistance to self-recover.
- Shelter assistance must be inclusive and equitable to include historically disadvantages and under-served community members, women, people with disabilities, First Nations, people of diverse Sexual Orientation, Gender Identity and Expression and Sexual Characteristics (SOGIESC), youth, older people, culturally and linguistically diverse people and ethnic minorities. Refer to DFAT's *A Systematic Approach to GEDSI* (2020) and *Promoting a Disability-Inclusive Humanitarian Response* (2021) guidance paper, in particular the notes on 'Advancing disability inclusion within the humanitarian cycle' (pp10-13): https://www.dfat.gov.au/sites/default/files/disability-inclusive-development-guidance-note.pdf
- Some operational measures during recovery include:
  - Ensure women's participation in the shelter recovery process, given they often do not have land titles.
  - Require implementing partners to design and include strategies on disability inclusion as part of funding requirements.
  - Refer to the Australian Humanitarian Partnership (AHP) guidance notes on disability inclusion as part of the recovery process, available at: https://www.australianhumanitarianpartnership.org/library-contents/thematic-guidance-note-influencing-government-led-disability-inclusive-disaster-risk-reduction
- Responders should work with PWDSI and other OPDs to enable the Provincial Committees and Village Chiefs to maximise social inclusion where practicable. The Washington Group provides a range of engagement techniques: https://www.washingtongroup-disability.com
- Localise self-recovery as it provides a greater sense of ownership, knowledge of key safety features in their houses and ensures the intervention reaches all disaster-affected communities. Note: a self-recovery approach is strongly supported by NDMO.
- Advocate for access design principles where practicable. In particular, forward plan with the community and effected households to prioritise their budget as it becomes available. This may vary from minor construction works such as wheel ramps on existing stairs, improved handrails, or installation of visual or audio warning systems, to upfront investments in spatial design to better house the person with disability. *Accessibility Design Guide (DFAT, 2013) and All Under One Roof* (IFRC, 2015) provides a range of suggestions and methods about the disaster risk reduction benefits of accessible and design principles: https://www.ifrc.org/media/48958
- Support HCC to update building regulations for multi-hazard safe construction.
- Ensure there is an accessible, consistent and robust feedback mechanism that clearly explains how feedback is being addressed and implemented and if not, why and what the alternatives are.

5.1 Capacity Strengthening for Housing Recovery

"80-90% of houses built in the community are without a proper house plan so may be in breach of relevant laws. It would be great for them [the building code] to explain the rules, why they exist. To raise awareness and train people how to build according to the code."

(Wind Valley settlement resident)

A lot of community members are highly skilled and qualified in carpentry and building. They have the required skills to adhere to relevant building regulations. However, from a local perspective, there is a need for awareness raising around key features for disaster resilience of housing, best practice examples sharing and construction skills training to strengthen their own houses against extreme events.

Some skills training measures and activities for people in relevant principles and techniques for incorporating key resilient features in housing, and not limited to, include:

- Building set-out: using string, marking the location of footings, structural posts, corners etc.
- Timber joinery techniques: use treated timber and raise timber post off the ground; if setting posts in ground, paint them with wood preservatives; determine appropriate sizes of timber (for bearers, floor joists); secure connection types using traditional timber joinery (e.g., notching), strapping and bracing.
- Reinforced cement concrete construction techniques: ratio of cement to sand to water for reinforced concrete mix; size, number and tying steel bars; curing reinforced concrete.
- Galvanised steel construction techniques: use galvanized steel for columns, corrugated metal sheet, nails etc. to protect from rusting; select appropriate size (length and thickness) of steel members for structural framing; appropriate size and quality of straps with ample nails; use J-bolts to tie roofing to rafters, securely.
- Sago palm leaves: use adequate number of leaves to build a watertight and secure roof; important to preserve this skill and pass it down to the young generation. Note: Typically, it is the women who source materials for a traditional house and undertake the weaving that make the wall panels. So, this provides women a unique opportunity to teach and train future generations.
- Bamboo: use treated bamboo to prevent borer attacks; use whole bamboo for roof structure or split woven bamboo to form solid shutters to protect doors and windows from strong winds.
- Footing construction: understand difference between short posts/ floor posts and full-length posts that uses one single post from ground to roof.
- Floor construction.
- Wall frame construction: set openings for doors and windows in wall.
- Roof construction.
- Kitchen construction: learn to build kitchen within house; provide adequate ventilation; plumbing needs.
- Toilet construction: learn to build a toilet within house; plumbing; sewage etc.

Many of these skills trainings can be provided on on-going basis via '**train the trainer**' activities, using existing training organisations. Currently, builders get construction skills from vocational schools like Solomon Island National University (SINU), Australian Industry Trade College (AITC) and Australia Pacific Training Coalition (APTC; held at Don Bosco and APTC campus near Coral Sea).

Figure 23: Only footings and posts constructed.
Location: Jabros settlement
(Photo credit: John Clemo)

Figure 24: Incremental addition of floor and wall frames.
Location: Jabros settlement
(Photo credit: John Clemo)

Figure 25: Incremental addition of wall finish (temporary) but structure built well.
Location: Ontong Java settlement
(Photo credit: John Clemo)

Incremental housing as one of the pathways to permanence

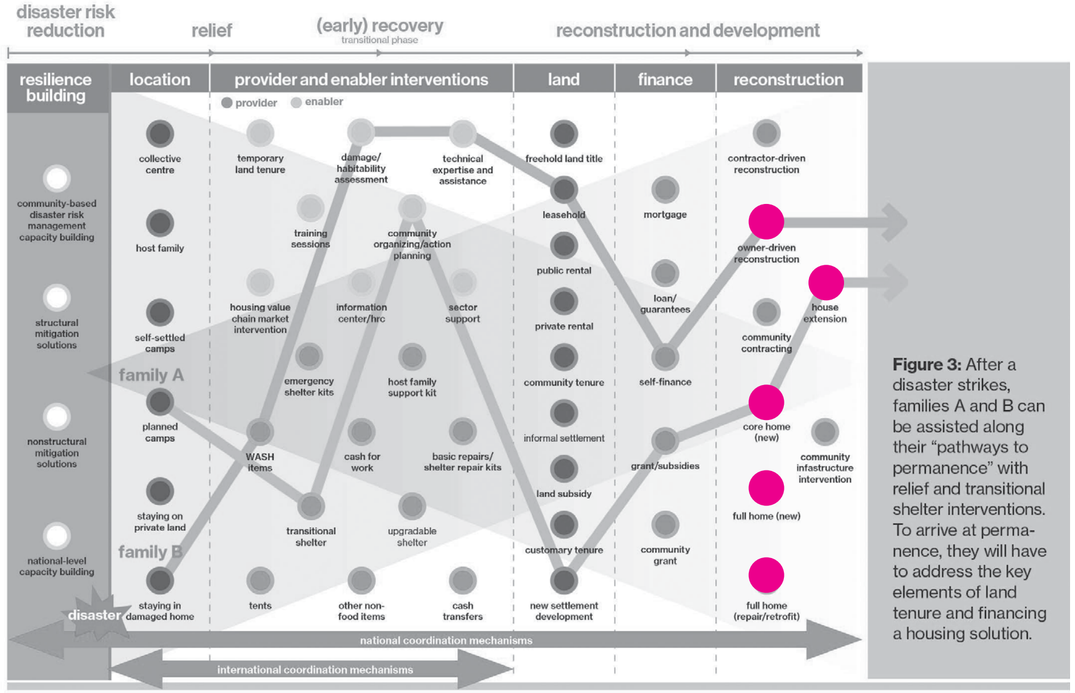


Figure 26: Pathways to permanence. (HfHF, 2016)

Figure 3: After a disaster strikes, families A and B can be assisted along their "pathways to permanence" with relief and transitional shelter interventions. To arrive at permanence, they will have to address the key elements of land tenure and financing a housing solution.

5.2 Critical Features for Multi-hazard Safety

Tie the house structure securely from the roof all the way to the ground, creating a chain or anchorage, by using:
i) bracing across all the corners and junctions
ii) a combination of connection details using nails/ bolts, galvanized steel straps, vines or notched joints to ensure secure connection
iii) a quality and consistent construction quality by using proper construction techniques and relevant building regulations.

Table 5: Critical features for hazard-specific safety of housing.

Features	Hazard		
	Cyclone	**Flood**	**Earthquake**
Location	Site house in a wind buffer or natural protection such as windbreaker trees and landscape, banks and rocks or is oriented to streamline with the generally westerly cyclonic winds, or known cyclonic winds in your area.	• Site house on solid ground with adequate set back from flood. • Orient house to sun for natural light.	Site house on a stable slope without signs of prior landslides or stream flows and avoid building on highly sandy/ clay soil.
Shape of the house	Symmetrical – square or rectangular, without many projections to allow the wind to glide around.		
Footings	• Anchor the house structure to the ground using strong and wide footings. • Determine depth of footing by the location, soil condition and water table. • Materials: timber, steel, bamboo, reinforced concrete.		• Materials: reinforced concrete, or rock footings and foundation.
Ground floor structure + walls	Brace the structure on the ground floor, tie post to stud and studs to bearer, for timber construction.	• Brace the structure. • Wet-proof: build breakaway walls on the ground floor to allow floodwaters to enter and leave the house quickly without causing significant damage. • Dry-proof: build the ground floor with heavy masonry construction to create flood barriers and prevent floodwaters from entering the house.	• Avoid tall stilts unless properly engineered and braced and at least three ring beams: at plinth, lintel, and roof levels with overlapping steel rods within. • Completely enclose the ground floor with walls made from mortared concrete blocks or similar.

Table 5: Critical features for hazard-specific safety of housing (continue).

Features	Hazard		
	Cyclone	**Flood**	**Earthquake**
Roof + roof covering	• Hip or Gable roof are both strong and affordable. Roof pitch: at least 1:3 ratio (roof rise to width), or 22.5 - 45 degrees. • Brace and tie down the roof as per Tie Down from Bottom-Up approach (Section 3 Preparedness).		• Avoid roofs made from heavy materials. Use lightweight materials such as timber and corrugated metal sheeting, or traditional materials such as Sago palm leaves or bamboo.
Roof overhangs or verandah	• Separate verandah roof structure from the house roof so the verandah can break away separately from the main structure. • Make overhangs less than 600 mm and eaves less than 400mm. • Protect extended roof with either a parapet above it or provide a knee-tie.		
Doors, windows and other openings	Cover doors and windows with firm shutters for cyclone safety from the outside and inside on windward side and from the outside on leeward side.		Openings should be away from the corners and must not exceed 50% of any single wall area.

Location, Orientation of a Core Space

"Our houses are "streamlined with the wind. And the kitchen is usually based on the coastal side. Due to lack of space, we rebuild our house on unsafe (steep or next to stream) locations." (Fishing Village Settlement, resident)

Community Member should:

- Identify a 'core space' to strengthen existing house or new build. The concept of 'core space' relates to least one room or a minimum standard of space, which is built/ strengthened for multi-hazard resilience. It can be made up for new or existing housing.
- Determine where to locate and orient the core space if the house is completely/ partially damaged: community members have good knowledge of location and orientation of their houses, as evident in the quote above. Accordingly, orient the core space of house such that it is streamlined with the westerly cyclonic winds (like the houses in Reef Islands), or to take advantage of natural protection such as strong bushes, banks and rocks (Figures 27 and 28).
- Decide what to include in your core space (Figures 29 and 30):
  - Habitable area: minimum one room for sleeping.
  - Non-habitable area: structure such as verandah.
  - Services area: toilet, shower, kitchen that is safe and dignified.

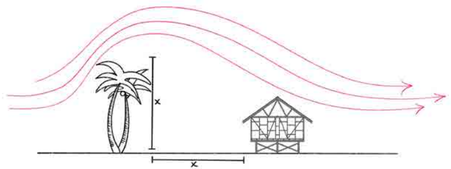
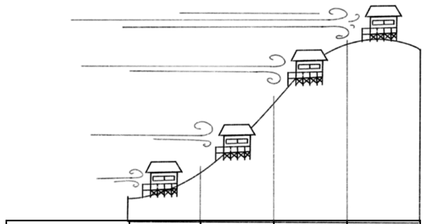


Figure 27: Considerations for house location: wind break.



Design to wind speed (km/h)	180	220	267	310

Figure 28: Considerations for house location: inland hilly area, wind and topography.

Arrangement of a Core Space

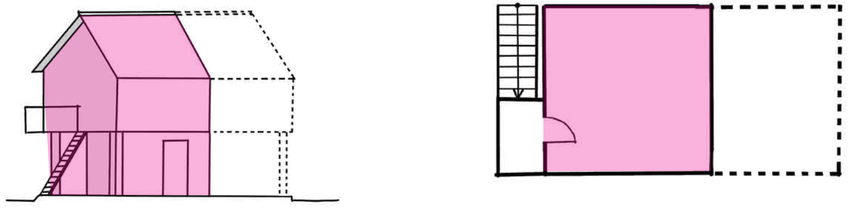


Figure 29: Core space arrangement (single room 4mx4m, floor raised to have ample space underneath for People with Disabilities, a gable roof, dotted line shows possibility for future extension).

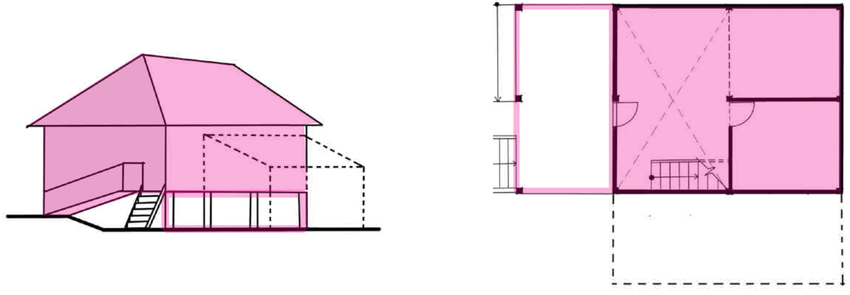


Figure 30: Core space arrangement (multiple rooms, 5mx5m, floor raised but not too high to allow for a ramp; hipped roof; dotted line shows possibility for future extension).

Footings

- Safety features: strong and wide footings with context-specific depth, quality and reasonable construction techniques. Determine depth and size of footing based on soil condition and location, but as a rule of thumb, it must a minimum 1-1.5metre underground, if not more, or until you reach a stable base.
- Techniques: for reinforced concrete, ensure the ratio of cement to sand to water is correct; the size, number and tying technique for steel bars are correct and reinforced concrete is cured reasonably well. For timber, always raise timber post off ground and if setting posts in ground, paint them with wood preservatives.
- Footing material options: timber or reinforced concrete set in coral or reinforced concrete footing. Always use treated timber and raise timber posts off the ground; if setting timber posts in ground, paint them with wood preservatives.

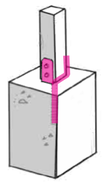


Figure 31: Pad footing with timber post, sitting on a galvanized steel shoe to elevate timber post to avoid timber decay.

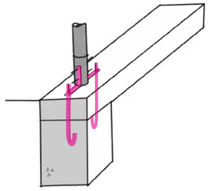


Figure 32: Pad footing with reinforced concrete plinth beam for bamboo post; threaded rods in concrete and angle bracket used to connect bamboo to beam.

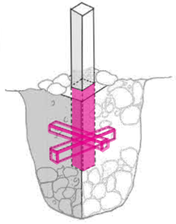


Figure 33: Crushed coral footing with timber post, which is painted with tar to protect from white ants and decay.

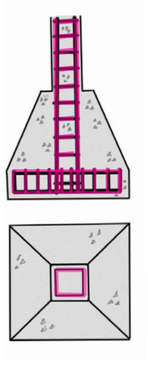


Figure 34: Stepped footing with reinforced concrete column with minimum 4 steel bars.

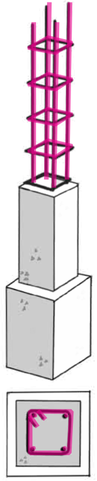


Figure 35: Sloped footing with reinforced concrete column with minimum 4 steel bars.

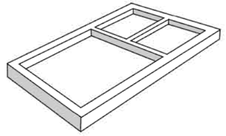


Figure 36: Strip footing from reinforced concrete.

Figure 37: Photo of a house with crushed coral footing and timber post, which is painted with tar to protect from white ants and decay. Coral rocks are also added around the bottom of the wooden post to provide a bit of buffer and protection from waves. Location: Ontong Java settlement (Photo credit: John Clemo)

Figure 38: Photo of a house built on reinforced concrete pad footing with timber post. Location: Aekafo-Feraladoa settlement (Photo credit: John Clemo)

Figure 39: Photo of a house with reinforced concrete stepped footing and reinforced concrete column. Location: Aekafo-Feraladoa settlement (Photo credit: John Clemo)

Figure 40: Photo of a house with reinforced concrete strip footing, timber posts, masonry walls and Colourbond roof. Location: Aekafo-Feraladoa settlement (Photo credit: John Clemo)

Posts and Bearers

- Safety features: tying posts to bearers securely (Figures below); bracing or ring beams between the posts (Figure 46 and Figure 47).
- Technique: ensure the size of posts and bearers and spacing between them is structurally adequate; if using steel, use galvanised steel to avoid corrosion/ rusting; select appropriate size and quality of galvanized steel straps to have ample nails; use J-bolts or galvanized steel straps to tie roofing to rafters, securely; tie post to stud and studs to bearer.
- Posts and bearers' material options: reinforced concrete; timber [imported; local harvest and milled; collected (round logs); reused (salvaged timber).

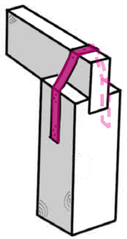


Figure 41: Galvanised steel strip for tying timber bearer to timber posts. (Adapted from Vanuatu Shelter Guide, 2019)

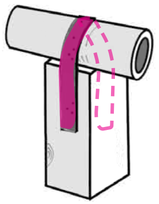


Figure 42: Galvanised steel strip for tying bamboo bearer to timber post.

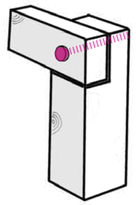


Figure 43: Bolt tying of timber bearer to timber posts. (Adapted from Kaunitz Yeung Architecture, 2008)

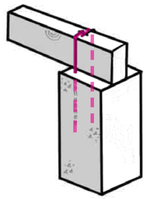


Figure 44: Reinforcement bar for tying timber to reinforced concrete column.

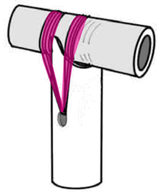


Figure 45: Tying bearer to posts. (Adapted from Vanuatu Shelter Guide, 2019)

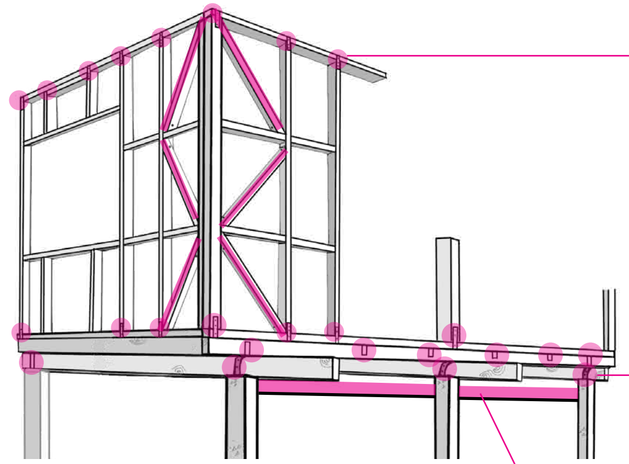


Figure 46: Short or floor-post detail with diagonal bracing at the corners of external walls.

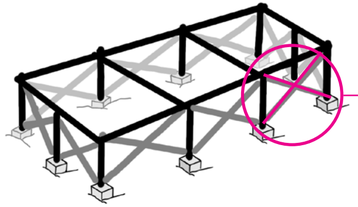
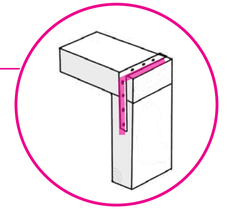
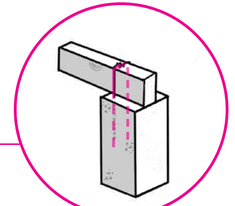


Figure 47: Showing bracing, column to bearer connections to demonstrate current good construction practice.

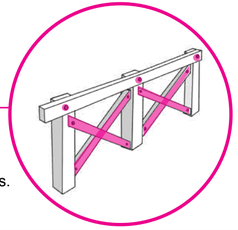


Ties between top plate and post.



Reinforcement bar for tying timber to reinforced concrete column.

Ring beam between reinforced concrete columns.



Cross bracing between timber posts.

Wall Frame

Safety features: bracing the structure, especially the corners of all external walls; tying all structural elements and building internal walls to create rigid boxes, which plays an important role in transmitting lateral wind load from roof level to the floor.

Techniques: use structural grade of timber of appropriate size and use quality materials and techniques for creating secure connections.

Wall frame material options: timber, steel.

Wall Panels material options: Colourbond sheeting; Copper sheets; sago palm leaves woven; timber slates or concrete block.

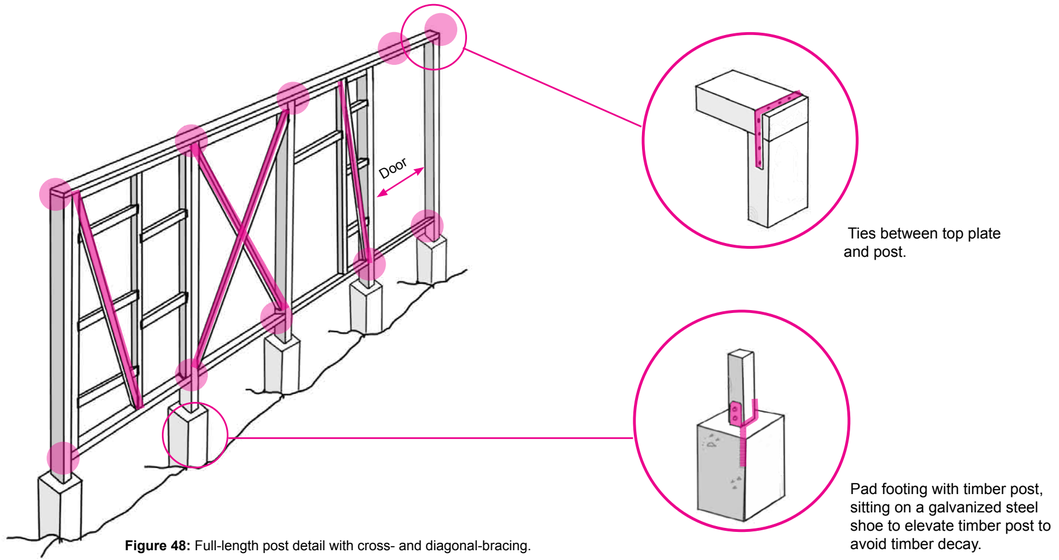


Figure 48: Full-length post detail with cross- and diagonal-bracing.

Roof Frame

- Safety features: Build a hip (Figure 53) or gable (Figure 50) or Dutch gable roof (Figure 51), with a pitch of at least 1:3 ratio (roof rise to width) or 29-45 degrees; ensure adequate bracing, tying and strapping used to tie down the roof i.e. the top plate/ truss to studs, battens to rafters and roof covering to battens; ensure verandah roof is not connected to the house roof structure and make roof overhangs less than 600 mm.
- Techniques: use corrosion resistant fasteners (e.g. galvanized steel cyclone straps for tying roof structure; J-bolts or U-bolts or vine or polyester fabric strip to tie roofing to roof structure), use traditional notching techniques for timber bracing.
- Roof structure material options: treated timber, galvanized steel, treated bamboo, coconut trunk, galvanized steel.
- Roofing material options: corrugated metal sheet, woven sago palm leaf roofing.

Figure 49: Gable Roof truss with bracing.
Location: Ontong Java settlement
(Photo credit: John Clemo)

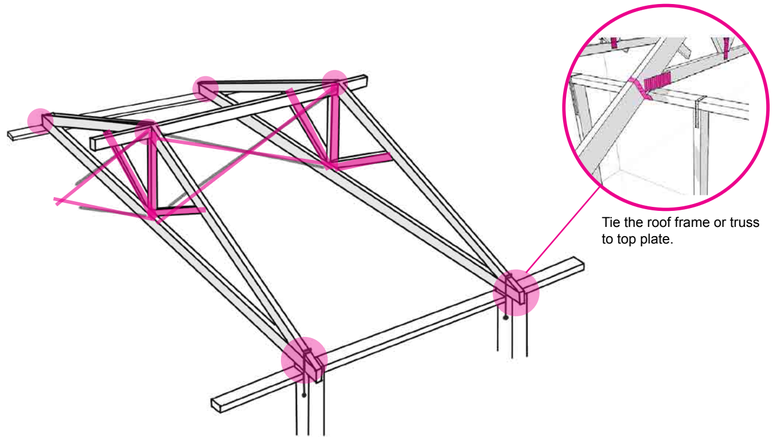


Figure 50: Gable roof truss using galvanised steel for frame, steel wire bracing and screws, minimum roof pitch 22.5-45 degrees. (Adapted from DoFA, DoC & ISET, 2017)

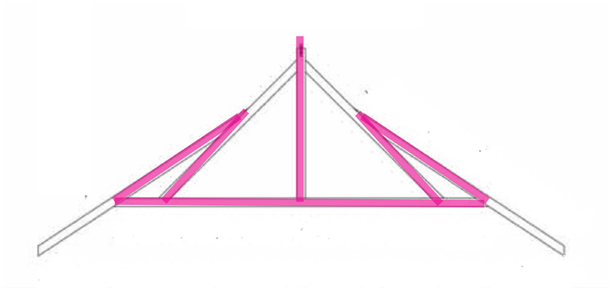


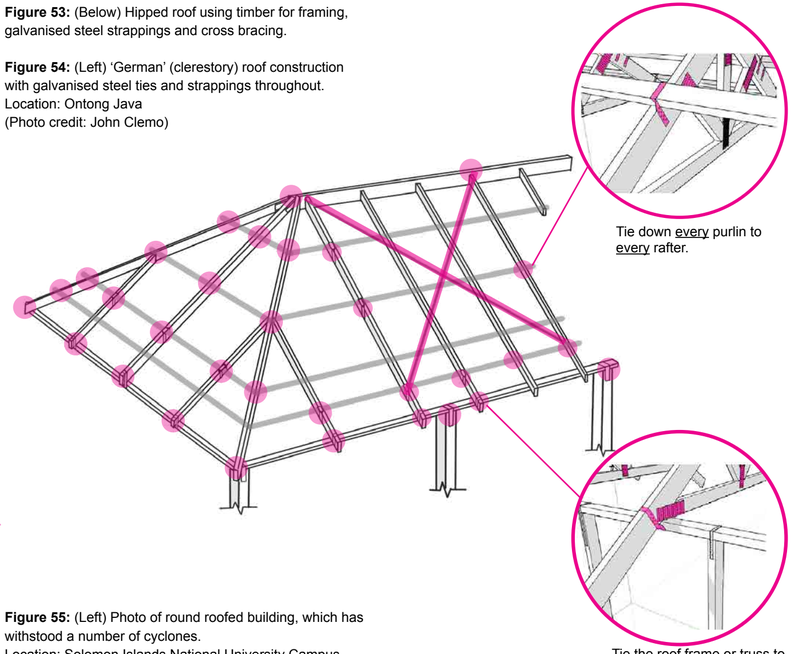
Figure 51: Dutch Gable roof truss for Sago Palm leaves roofing or for corrugated galvanized steel sheeting.
(Source: Kaunitz Yeung Architecture)

Figure 52: Dutch Gable roof truss for corrugated galvanized steel roofing at a community hall
Location: Jabros settlement
(Photo credit: John Clemo)

Figure 53: (Below) Hipped roof using timber for framing, galvanised steel strappings and cross bracing.

Figure 54: (Left) 'German' (clerestory) roof construction with galvanised steel ties and strappings throughout.
Location: Ontong Java
(Photo credit: John Clemo)

Figure 55: (Left) Photo of round roofed building, which has withstood a number of cyclones.
Location: Solomon Islands National University Campus
(Photo credit: John Clemo)



Window and Door Openings

- Safety features: cover windows from the outside on leeward side with solid safety shutters (see images below); secure windows and doors from the inside using latches at the top and bottom; use thick unglazed glass for windows.
- Window and door material options: thick unglazed glass in timber or galvanized steel frame; copper or woven panels (split bamboo or leaves or grasses) for shutters.
- Note: Windows and doors facing windward side gets pushed inwards by the wind forces, while those on leeward side or side walls gets pushed outwards.

Figure 56: Openable timber louvre shutters on windows for wind and rain protection.
Location: Ontong Java settlement
(Photo credit: John Clemo)

Figure 57: Fixed rain-guards in a semi-traditional house.
Location: Aekafo-Feraladoa settlement
(Photo credit: John Clemo)

Figure 58: Openable copper sheet shutters on windows for wind and protect on rain.
Location: Ontong Java settlement
(Photo credit: John Clemo)

From the community workshops, a number of women across settlements had expressed preference for washrooms (shower and toilet) and the kitchen to be within the house (Figures 60 and 61). These should be considered as part of shelter responders' construction training and capacity strengthening.

Figure 59: Incremental house with timber framing on reinforced concrete posts.
Location: Jabros settlement
(Photo credit: John Clemo)

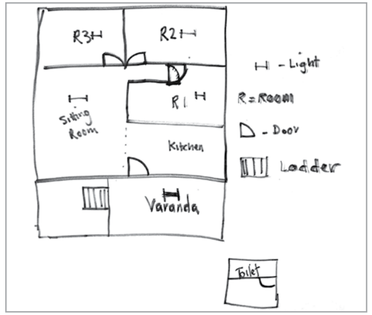


Figure 60: Sketch of a preferred housing arrangement, Aekafo-Feraladoa settlement resident.

Figure 61: Sketch of a preferred housing arrangement, Ontong Java settlement resident.

Remember, assistance e.g. land, money, materials and capacity strengthening will determine whether community will remain in a constant cycle of recovery (Figure 63) or will manage to self-recover a durable, accessible and resilient shelter (Figure 62).

Figure 62: Housing recovery for some: houses with enclosed lower floor for accessibility.
Location: Aekafo-Feraladoa settlement
(Photo credit: John Clemo)

Figure 63: No recovery for some: people living in temporary shelter in April Valley, still awaiting assistance with access to safe land.
Location: April Valley settlement, Honiara
(Photo credit: Koroi Hawkins)

Logistics is a support service and requires the cooperation of multiple organisations to maintain the steady flow and supply of shelter materials from source to destination. This 'steady flow' of materials relies on a supply chain: an interconnected series of infrastructure elements (see Appendix 7 for a typical supply chain diagram). Effective logistics to support supply chain stability is the continued assessment of the following mechanisms:

1. Planning and Procurement
2. Mobilisation and Transport Management
3. Warehouse or Storage Management
4. Tracking and Reporting
5. Contingency Planning and Management
6. Training and Capacity Building

"We are also blessed, after a cyclone huge piles of logs washed ashore, and we used these to extract timber for rebuilding."
(Fishing Village settlement resident)

Understand what the key considerations are within each logistic mechanism to stay agile and adaptive to changing supply and logistics conditions.

What can community members do?

From harvesting to end-use, there is great opportunity to engage in sustainable practices that includes all members of the community. Sustainability involves best practice forestry management from growing and harvesting, to the traditional drying and non-milled use of round logs. Where milling machinery is used, consider quality blades for Lucas Mills and chainsaws that can be easily repaired and sharpened.

Women can also participate in the supply chain by productising their traditional weaving for wall panels, along with training across a range of logistics roles.

What can shelter responders do?

There need to be a balance between the supply of imported materials, which are generally more expensive and at the mercy of external market forces' and local materials, which are more readily available, though limited in range and quality.

Key to this balance is the sustainability of supply from harvest to end-use. The supply chain and logistics routes can also differ significantly between imported and local materials.

Planning and Procurement
This includes the scope; budget vs total cost (purchase price, handling fees; taxes and charges, transport, etc); time (manufacture and supply); quality and quantity; reputable suppliers; distribution; and all aspects of the supply chain.

Key Considerations:

- Imported: Expensive with most materials coming from China and Australia.
  - Almost all materials are shipped to Point Cruz, the main port in Honiara.
  - Requires long-lead time (in terms of months) from point-of-sale to Point Cruz, with limited inspection capabilities.
  - Requires prompt onward delivery to smaller storage facilities such as hardware shops and local village sheds.
  - Local supply chain mapping (Figure 64) references Solomon Sheet Steel Limited, Cheng's Hardware and Construction, and Tongs Corporation Limited. They are all wholesale importers, the latter being part of the Lumber and Other Construction Materials Merchant Wholesalers Industry, amongst other industry groups.
- Local: Limited options and the quality may be inconsistent; Responders should focus their efforts – where practicable – towards investing in and establishing local economy of materials as a key assisted self-recovery driver. Nature-based Solutions (NbS) should be explored and promoted with a focus on sustainable practices (e.g. forestry management). This will include the continuation of traditional shelter practices such as woven wall panels and roof thatching using Sago Palm leaves.

Mobilisation and Transport Management:
This is the timely scheduling in the movement of materials to minimise delays, long wait or storage times; along with effective matching of material quantities to transport volume and type.

Key Considerations:

- Logistics Capacity Assessment (LCA) provides a succinct baseline resource on the logistics capacity for the Solomon Islands. The World Food Programme (WFP) hosts the tool for the global humanitarian community. It provides comprehensive and detailed information on general logistics; port; aviation; road network; ground transportation; waterways; storage; and contact lists: https://dlca.logcluster.org/display/public/DLCA/2+Solomon+Islands+Logistics+Infrastructure
- Transport can become expensive, especially for larger vehicles and dedicated transport services. A number of more in/formal services exist to ship goods to outer islands, ranging from ferries to smaller dinghies and canoes.
- Transport to hilly and remote areas can range from smaller utility vehicles to donkeys, to human cartage.
- The IFRC, World Vision, and other more established agencies have updated on-ground knowledge. These agencies also have an established network that are utilised and noted in the IFRC's Emergency Plan of Action (EPoA) reporting. They should be engaged in the first instance to better understand immediate and longer-term transport challenges and opportunities.

The following supply chain mappings of local and imported materials are a key outcome from the stakeholder workshop.

Timbers for construction are sized with chainsaws or Lucas mills.

A range of timber-based materials (logs; leaves; vines) is sourced from local forests.

Key shops are: Solomon Steel, Cheng's Hardware, and Tong's Hardware and Construction (Appendix 7 for details).

Imported materials are sold in hardware or construction shops, or roadside.

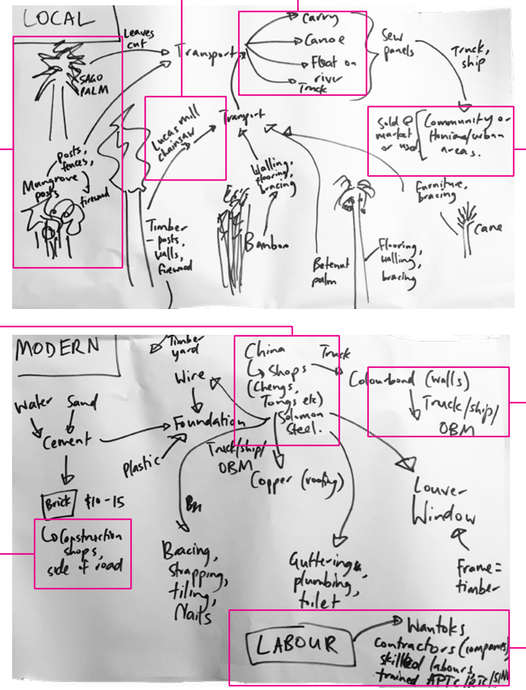


Figure 64: Supply chain mappings of local and imported materials from the stakeholder workshop.

Local transport varies from trucks and canoes, to floating logs down the river and physically carrying into remote areas – by people or animals.

Some materials are sold at local markets, or distributed for use.

Transport range from trucks and larger ships such as ferries, to OBM: outboard motorboats – essentially 'banana boats' that range from 30hp-40hp, with some at the lower end of 15hp, and some at the higher end of up to 60hp. These boats are the most common form of water transport across the Solomon Islands.

Most of the labour is from the village 'Wantoks'. Other labours are sourced from contractors (construction companies). Training is provided by APTC, RTCs, and SINU.

Warehouse Management
The NDMO does not operate a warehouse. The Solomon Islands Red Cross (SIRC), IFRC, and allied NGOs administer the main warehouse in Honiara. There are no warehouses in the Provinces.

Key Considerations:
- What gets stored centrally, and what can be stored locally at Municipal/ Provincial level for shorter distance deployment, and with whom?
- Given the absence of warehousing facilities, especially at Municipal/ Provincial level, storage considerations will need to focus on rapid deployment and decentralised opportunities such as per Village with the Village Chiefs; local hardware stores; civic centres; etc.
- Across the numerous visits for the community and stakeholder workshops, it was noted many households store their own materials under their houses (stilt houses), or stockpiled to the side.
- The local supply chain mapping (Figure 64), references storage in Solomon Sheet Steel, Cheng's Hardware and Construction, and Tongs Hardware.

Tracking and Reporting
It is the ability to track and report seamlessly across the entire supply chain from one organisation to another across public and private sectors including ancillary services.

Key Considerations:
- Kobo Toolbox is the emerging open-source software specifically designed for humanitarian logistics planning and assessment. It is developed by the Harvard Humanitarian Initiative in collaboration with the UNOCHA, and the International Rescue Committee (IRC). www.kobotoolbox.org
- The Solomon Islands National Government has adopted this Toolbox to varying degrees, and is used by the NDMO. Please consider the prevailing software application in the first instance to avoid mis-synchronisation of data; logistics planning, tracking and reporting – in particular disaster preparedness and response. Consider integration of logistics and tracking as part of the NDMO to village-level disaster risk management plans.
- In support of digital tracking, always carry hard copies, as Internet connection may be intermittent or non-existent. The IFRC EPoAs note challenges around the use of HF Radios, so the cost of telephone communication including satellite phones should be considered as part of your operational budget.

Contingency Planning and Management
This is about forward planning and understanding the immediate and longer-term needs from preparedness to recovery. Account for factors that may impact the timely and effective flow of materials such as weather; labour strikes; low-grade infrastructure; etc

Key Considerations:
- The NDMO undertakes a range of needs assessments and situational reporting (SitRep) assessment reports, which include shelter requirements as part of their ISO; IDA; DSA. They also undertake planning, operations and logistics functions at the national level to support sector and Provincial responses.
- The IFRC issues EPoA and Emergency Appeals. These are succinct 'news flashes' that SitRep; immediate impacts to shelter; immediate needs and requirements; etc. There are sections specifically noting logistics and supply chain challenges, along with associated costs. These are tangible resources to review and analyse the patterns and trends of disaster impacts to better plan your supply and logistics contingencies.
- Given storage challenges, this is about building relationships and working at Provincial and Ward levels to assure supplies. Consider embedding logistics communication into your overall shelter process to better understand the rise and fall of your supply levels.
- Develop a network across Islands to 'bank' – bulk store – essential shelter supplies (materials and tools) for ongoing maintenance to ensure a robust or 'strong' shelter. This includes planning for rapid deployment – as an individual agency and collectively with more established networks.

Training and Capacity Building
These are programmes to enable and empower local employment, trade, and economy; along with measures for Continued Professional Development (CPD) and knowledge-sharing of lessons learned for local agency employment and across the supply chain.

Key Considerations:
- The assistance provided by responders in training and capacity building is a key driver toward self-recovery. It reduces dependency on external and third-party agencies, and helps build knowledge and opportunities within communities. Aside from direct construction training such as the Build Back Safer (BBS) programme as noted below, responders should also work with APTC, RTC, and SINU to provide training in supply chain management to augment the circularity of self-recovery. This includes 'train-the-trainer' programmes to enable and empower local skills and expertise.

Build Back Safer (BBS)
The HfHF promotes the concept of Build Back Safer (BBS), and has worked with the APTC since 2017 to deliver BBS training programmes across the Pacific Islands region. The programme trains local community carpenters including farmers and homeowners. The IFRC's EPoA reports after disasters specifically note the use of BBS techniques in shelter re/construction. Though BBS was not specifically referenced in the community and community stakeholders' workshops, the concept itself form part of a broader agency-wide strategy toward assisted self-recovery through robust building techniques, with the Tie-Down-Bottom-Up central to its approach.

"The aim of the BBS program is to multiply the effect of this training by bringing together communities who will then be available as an informal network to assist families in the reconstruction of their homes."

Habitat for Humanity Fiji National Director, Masi Latianara (2017)

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The Guide builds on ongoing research for the project 'Climate Resilient Honiara', funded by the UNFCCC Adaptation Fund and administered by UN-Habitat; as well as other local activities being carried out by shelter researchers and practitioners in shelter, informal settlements, disaster risk reduction, and urban climate resilience across Melanesia. The work was underpinned by an area-based 'action research' approach (see Keen et al. 2021), with the project team comprising a mix of Solomon Islanders and international researchers. This gave due weight to local knowledge and traditional practice, while also applying scientific expertise in the built environment. The voices of local women, youth and disability groups were given prominence to ensure that the Guide was informed by the cultural knowledge of all community members around shelter, vulnerability, and acceptable levels of risk (at the same time, trying to avoid the stereotype of who is 'vulnerable').

The goal of adequate, affordable, inclusive and disaster-resilient housing and settlement is defined by the authors (adapted from UN u.d.; Bosher 2008; Sen 1985, 2006), as:

> *designed, located, built, operated and maintained in a way that meets its residents' basic needs (shelter, privacy, lighting, ventilation, access to basic facilities and work, space for social meeting and work), enables their capabilities (freedom to choose the asset that meets their diverse needs and aligns with their values; engagement in process and transparency) and maximises resident ability, the ability of built assets and associated support systems (physical and institutional) to prepare, withstand and recover from the impacts of natural hazards and extreme weather events.*

The work involved:

- **A lead team of multi-disciplinary academics from RMIT University** involving expertise in housing, architecture, urban planning and design, sustainability and urban climate resilience.
- **A review of the literature** (academic and practitioner) to build upon existing knowledge.
- **Formation of an advisory group of experts** comprising a mix of academics and practitioners with experience in the region.
- **Engagement of a local team in Honiara to facilitate all workshops and interviews** with most engagement in Pidgin. The local team was made up of academics, climate change and housing practitioners, and a gender specialist; providing diverse experience to draw on during consultations. This local team had pre-established trust of the community leaders and people in each community.
- **Five community workshops** representative of 11 informal settlements in Honiara – Ontong Java, Kukum Fishing Village, Aekafo-Feraladoa (comprising seven informal settlement zones), Wind Valley and Jabros. These had previously been selected as vulnerability 'hotspot' case studies based on climate vulnerability and socio-economic status (Trundle & McEvoy, 2016) (geographic focus)
- **One key informant workshop** to engage with people with disabilities, elderly, women and girls (people-centered and inclusive).
- **One key stakeholder workshop** to engage with local NGOs, civil society organisations (CSOs), and relevant Government departments e.g. Solomon Islands Ministry for the Environment, Climate Change and Disaster Management (MECCDM), Ministry of Infrastructure (MID), Ministry of Lands, Housing and Survey (MLHS), Honiara City Council (HCC) and other shelter responders to build on existing systems of governance and service delivery.
- **Additional key stakeholder interviews** to gather more in-depth information and address knowledge gaps.
- **Peer-review panel** to review the final draft of the Guide.

Each community workshop was four hours long, including a refreshment break. Visual story boards rather than written questionnaires were created to assist the local team with any technical or language barriers (English into Pidgin).

The team also took photographs of existing houses that demonstrated good practice or had survived past disasters. They also engaged workshop participants in sketching activities (e.g. their desired house, material supply chain, or stakeholder mapping).

Participants at the two stakeholder workshops, conducted to validate the community findings and explore the roles of the responder community, were representative of different sectors including shelter, water, sanitation and hygiene, disaster management etc.

Figure 65: Josephine Teakeni facilitating workshop with women's group at Jabros settlement. (Credit: Lorraine Livia)

Figure 66: Josephine Teakeni facilitating women's workshop, Wind Valley settlement. (Credit: Lorraine Livia)

Figure 67: Freddy Ratu facilitating men's workshop, Wind Valley settlement. (Credit: Lorraine Livia)

Figure 68: Freddy Ratu facilitating men's workshop, Jabros settlement. (Credit: Lorraine Livia)

More localised findings from community engagement activities indicate that the hazards of most concern to those living in:

- **coastal settlements** are sea level rise, storm surge, coastal erosion, riverine flooding and erosion, cyclones, and increasingly, heat stress.
- **inland, hilly, settings** are exposed to landslides and mudslides, flash flooding, cyclones and vector-borne diseases.

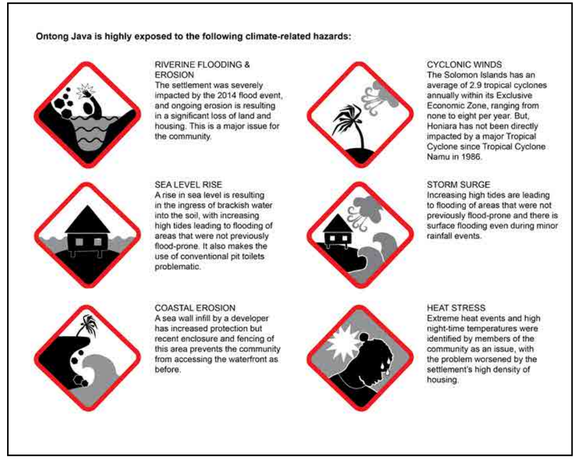


Figure 69: Coastal hazard exposure, Ontong Java settlement. (Climate Resilient Honiara project, UN-Habitat, u.d.)

SOLOMON ISLANDS' DISASTER RISK PROFILE

- Cyclones
- Sea level rise
- Storm surge, extreme wave action
- Flash flooding and riverine flooding
- Tsunami
- Landslides
- Earthquakes
- Volcanoes
- Drought, with a flow on effect on reduced availability of food, water and livelihood means
- Associated mosquito-borne disease and other water/food borne diseases (e.g. diarrhea)
- Temperature rise

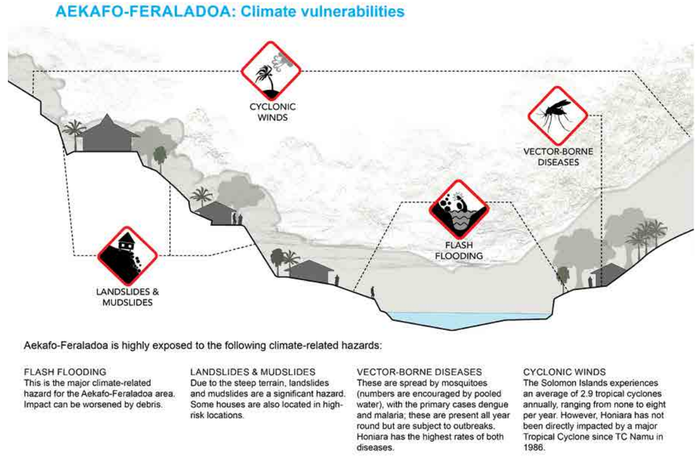


Figure 70: Inland hazard exposure, Aekafo-Feraladoa settlement. (Climate Resilient Honiara project, UN-Habitat u.d.)

Appendix 3 | Impacts of Hazards and Conflicts

The Solomon Islands face multiple natural hazards, including cyclones, earthquakes, tsunamis, coastal and riverine flooding, landslides, volcanoes, increasing extreme heat, wildfires, and water scarcity. For instance, it is estimated that the economic losses from earthquakes and tropical cyclones will cost the Solomon Islands an average 20.5 million USD per year (PCRAF, 2015: p.42). The impact of recent hazards and conflicts are shown in the table below.

Table 7: Impact of natural hazards, climate events and conflicts in Solomon Islands. (Source: PCRAF, 2015; MLHS, 2014)

Year	Hazard or Conflict	Location	Impact		
			Lives lost (**affected)	Houses	Economic loss (USD)
1977	Earthquake and associated landslide	Duidui, Guadalcanal	Relocation to Aruligo and Takaboru in West Guadalcanal - those in Takaboru were then swept by floods in 2009		
1999-2003	Tensions (civil conflict)	Guadalcanal and other provinces		Almost all	Entire
1986	Cyclone Namu, landslides and floods	Guadalcanal, Malaita	100	10,000+	30-60 million
2007	Earthquake of 8.1 on Richter scale & Tsunami	Western & Choiseul Provinces	52	widespread	100 million
2009	Floods	West Guadalcanal, Sasa River	11	Almost all, driving relocation	TBA
2012 Dec	Cyclone *Freda*	-	-	-	unknown
2013 Feb	Earthquake of 8.0 on Richter scale & Tsunami	Santa Cruz	37%**	588 destroyed 478 **	
2014 April	Flash flooding	Honiara	22 deaths 52,000**	758 destroyed 638** Food Gardens	9.2% GDP (56% monetary value attributed to shelter)
2020	Cyclone TC Harold and ship disaster	Honiara and Malaita provinces	27	TBA	TBA

Appendix 4 | Land Tenure Issues in Informal Settlements

There is a Land Register, which is maintained by the Register of Titles. This falls under the Ministry of Justice and Legal Affairs. The most common types of tenure in the Solomon Islands are:

- Perpetual Estate Title = Freehold
- Fixed-Term Estate (FTE) Title = 70yrs; only 32 percent of population has FTE.
- Temporary Occupancy Licence (TOL) on Public Land = 3 years; approximately 41 percent population rely on TOLs

Under SUMP the MLHS undertakes “Regularization” of “Unauthorized Occupancy of Public Land” to Fixed Term Estate Title.

The table highlights the size, hazard exposure and land tenure challenges facing the residents of each settlement.

Table 8: The land tenure challenges and hazard exposure facing residents of selected urban informal settlements.

Settlement name	1. Jabros (Gilbert Camp)	2. Wind Valley (White River)	3. Ontong Java	4. Kukum Fishing Village	5. Aekafo-Feraladoa
Location type	Inland peri-urban site, outside Guadalcanal Province	Inland peri-urban site	Coastal site	Coastal site	Inland hilly site (7 zones)
Natural hazards and climate-based exposure	Landslides and mudslides, flash flooding, cyclonic winds	Landslides and mudslides, flash flooding, cyclonic winds	Riverine flood, sea level rise, coastal erosion, cyclonic winds, storm surge, heat stress	Sea level rise, storm surge, coastal erosion, cyclonic winds, heat stress, ocean warming + acidification	Landslides and mudslides, flash flooding, cyclonic winds, vector borne diseases
Estimated number of houses (2019)	296	108	88	55	1154
Land tenure	all households = Perpetual Estate title, held by the Commissioner for Lands on behalf of the Solomon Islanders	69 households = legal land rights; with 31 being the owners of the land, 20 hold an FTE and 26 hold a TOL	all households = legal title over the land they inhabit, with FTE having been granted to the Board of Trustees in 2008	25 households = legal land rights as FTE and access to services 30 houses = unauthorised occupation of land	only a few households hold an FTE majority do not even have ToLs

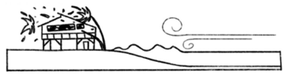
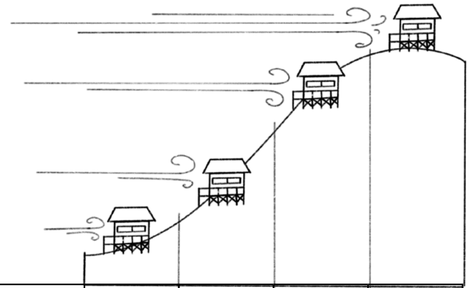
CATEGORY	WIND GUSTS (km/h)	EFFECTS
C1	90 - 124	
C2	125 - 164	
C3	165 - 224	
C4	225 - 279	
C5	280 +	

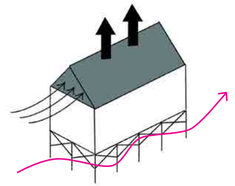
Figure 71: SAFFIR Simpson Wind Scale for cyclones.



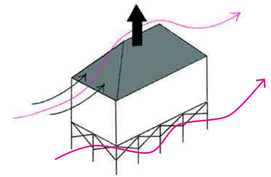
Wind classification	C1	C2	C3	C4
Design site to wind speed (km/h)	180	220	267	310

Figure 72: Cyclone resilient building guidelines for hillside locations by the Queensland Construction Authority for Get Ready Queensland, based off the SAFFIR Simpson Wind Scale.

Gable-ended roof risks higher uplift from strong winds because the wind is hitting a flat surface.



Hip roof risks lower roof uplift because the wind hits an angled surface and can be diverted.



Pyramidical roof risks lowest roof uplift because the wind has equal diversion on all sides.

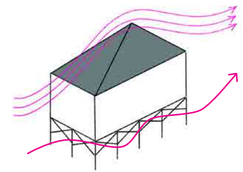


Figure 73: Roof damage due to inadequate bracing, Wind Valley settlement. (Photo credit: John Clemo)

Figure 75: Without anchoring the house to the ground with footings, the entire house - no matter how well built, tied, and braced - can still tip over in a disaster event. (World Vision Solomon Islands, 2014)

Figure 74: Complete collapse of house but relatively intact roof. (Photo credit: Kaunitz Yeung Architecture)

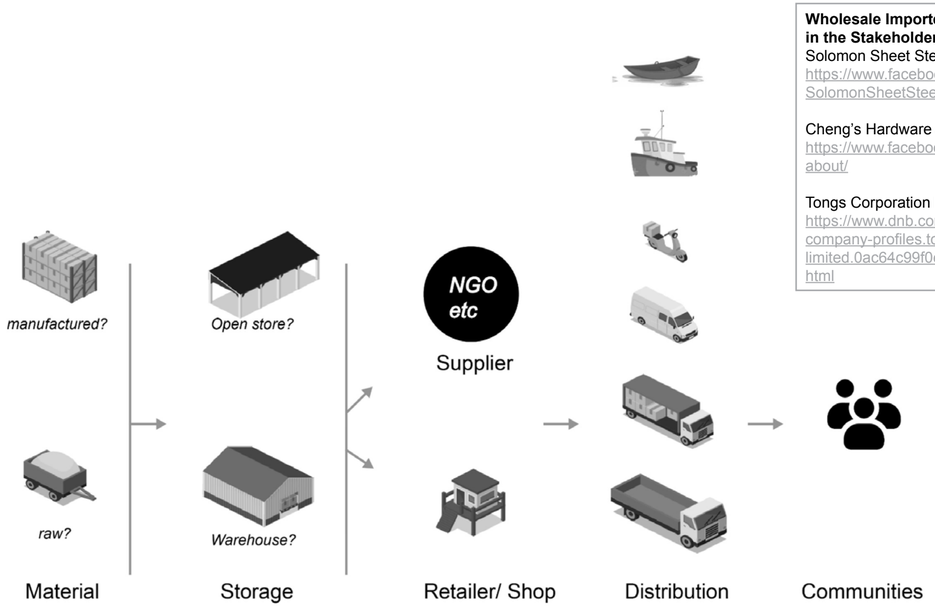
An 8.2 magnitude earthquake and subsequent tsunami devastated the Western, Choisel, and Shortland Provinces. An estimated 10% of the population were displaced. The island of Ranongga was lifted permanently out of the sea by 4m and the Island of Simbo subsided.

Figure 76: Structural failure of stilts due to lack of cross-bracing. (World Vision Solomon Islands, 2014)

Coordinate with NEOC/ NDMO/ NDC regarding:	
Regional and National	
1	Coordination, agreement and dissemination of Key Action Messages.
2	Communication across all levels of government and allied agencies.
3	Location and responsibility of Pre-positioned Emergency Shelters and Emergency Household Item Stocks.

Coordinate with PDCs, P-DOCs, PDMOs, and PEOCs regarding:	
Municipal and Provincial	
1	Your PERT roles and responsibilities.
2	Location of Emergency Centres; Nearest ‘Safe Shelter’; High Ground; Safe Place.
Ward and Village DRCs regarding Village; Community; Household	
1	Tapping into traditional knowledge on weather including the Women’s Weather Watch
2	(lunar cycles; stars; wave patterns; clouds; birds and animal behaviour; plants; etc)
3	Develop and update evacuation plans and each adult with a ‘pick-n-go’ bag of essential supplies. This includes rehearsals of simulated disaster and evacuation events.
4	Community Stakeholder Groups especially for women, youth, disabled, older people and LGBTIQ on specific preparedness measures.
	Working with the Village Chief and their representatives regarding the:
	a) Assessment of building needs to strengthen individual households against disasters.
	b) Coordination on the use of any centralised village supplies such as tools and building materials for early and immediate preparedness.

Appendix 7 | Diagram of a Typical Supply Chain and Referenced Local Wholesalers



Wholesale Importers and Retailers mentioned in the Stakeholder Workshop:
Solomon Sheet Steel Limited
https://www.facebook.com/SolomonSheetSteel1998/

Cheng's Hardware and Construction
https://www.facebook.com/supplyserviceschengs/about/

Tongs Corporation Ltd
https://www.dnb.com/business-directory/company-profiles.tongs_corporation_limited.0ac64c99f0efd1c5d9e228c330552690.html

Figure 77: A typical material supply chain and referenced

Wind Valley settlement , Honiara (Photo credit: Serene Ho)

Inclusive and Disaster Resilient Shelter Guide

Urban Informal Settlements, Honiara, Solomon Islands

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