



Improving National Building Codes and Standards in the Pacific

Coordination and Harmonization Report



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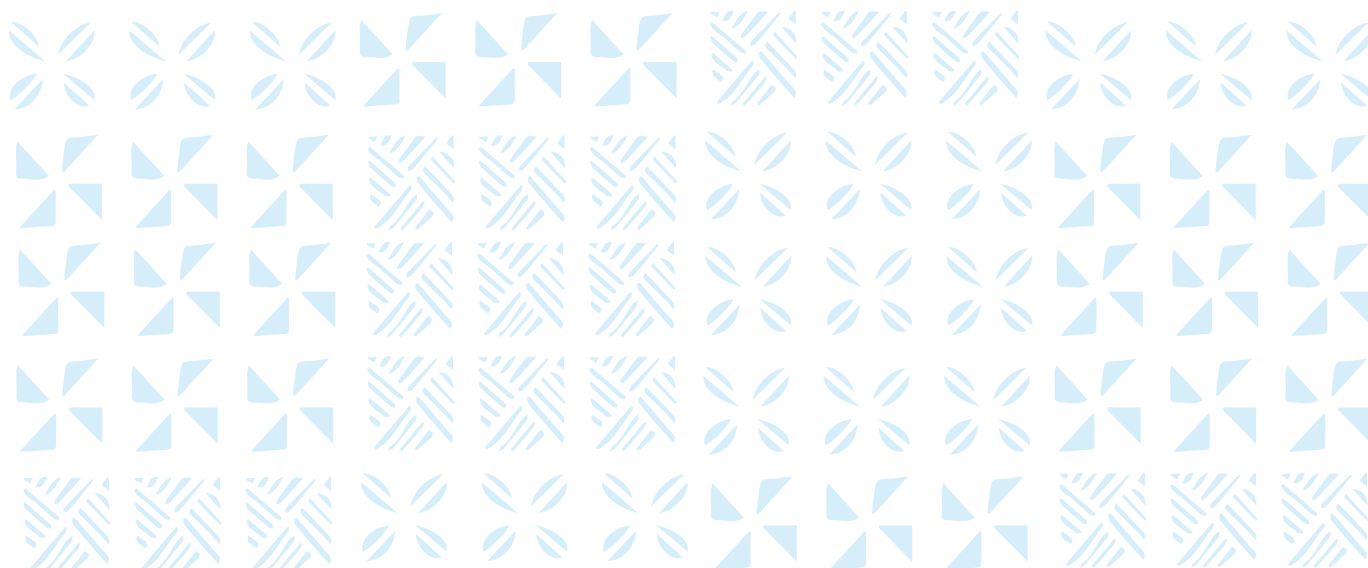
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Abbreviations

ADB	Asian Development Bank
DFAT	Australian Department of Foreign Affairs and Trade
FSM	Federated States of Micronesia
HBM	Home Building Manual
ICC	International Code Council
INBCSP	Improving National Building Codes and Standards in the Pacific
NBC	National Building Code
MFAT	New Zealand Ministry of Foreign Affairs and Trade
PBSP	Pacific Buildings and Standards Project
PDF	Pacific Disability Forum
PIC	Pacific Island Country
PQI	Pacific Quality Infrastructure
PRIF	Pacific Region Infrastructure Facility
RMI	Republic of the Marshall Islands
SPC	Pacific Community
SPREP	Secretariat of the Pacific Regional Environmental Project
TA	Technical Assistance
UNDRR	UN office for Disaster Recovery and Reconstruction
UNDP	UN Development program
UNICEF	UN International Children's Emergency Fund
WASH	Water, Sanitation and Hygiene

Glossary of Terms

Home Building Manuals: An accompanying document to a National Building Code that provides guidance for building practitioners to construct a simple, single-story buildings with common materials, usually with timber as the structural framing system, without the need for engaging the services of an architect or engineer. The manual provides a non-legally binding pathway to comply with the National Building Act and National Building Code.

National Building Act: A law enacted by the Parliament which sets out the major features of the building regulation system. It establishes the obligation to comply with building standards and to obtain approval for building work. The Act specifies penalties for non-compliance and identifies enforcement mechanisms. It authorizes the government to make a National Building Code as well as supporting regulations, manuals and guidelines. The main purposes of a National Building Act are to improve building work, encourage better building design and ensure that building construction standards are responsive, adaptive and suitable to the nation's needs.

National Building Code: A uniform set of minimum standards and technical provisions for the design, construction and performance of buildings and other structures covering matters such as structure, fire resistance, access and egress, services and equipment, energy efficiency and certain aspects of health and amenity. The requirements included in the National Building Code are intended to extend no further than is necessary in the public interest, to be cost-effective, not needlessly onerous in their application, and easily understood. The National Building Code is legally binding once it is recognized in national legislation through an Act or Regulation.

Standard: A document, established by a consensus of subject matter experts and approved by a recognized body that provides guidance on the design, use or performance of materials, products, processes, services, systems or persons. Standards can be developed by national, regional and international standards developing organizations.

Executive summary

Background and Objectives

The Pacific islands are facing increasing disaster risk because of climate change. The construction of **resilient and inclusive infrastructure** in the Pacific is a fundamental component of climate change adaption and mitigation, environmental sustainability, and social inclusivity for all Pacific Islanders. Appropriately written Pacific Island-focused National building Codes (NBCs), effectively administered and enforced, have an important role to play in achieving this objective and providing a de-risked value-for-money infrastructure outcome.

NBCs, properly enforced, should ensure that:

- structural designs are **cost-effective** and are in accordance with appropriate cyclonic, seismic, and flood criteria (integrating climate change and sea level rise);
- developments are designed to be **accessible, inclusive, and safe** for people of all ages, abilities, and genders;
- Water, Sanitation and Hygiene and electrical designs target areas where there is **no piped water or mains electric supply**;
- fire, electrical and mechanical services design is appropriate for the **technical resources available and service constraints** in Pacific Island countries (PICs)

Improving National Building Codes and Standards in the Pacific-Technical Assistance builds on the outcomes of the 2019 Pacific Region Infrastructure Facility (PRIF) National Building Code Regional Diagnostic Study and provides detailed analysis, findings and recommendations regarding coordination and harmonization of NBCs and standards at the country and regional level.

This report is intended to assist coordination across PRIF member countries and PRIF development partners to identify needs and support the sharing of NBC best practice, leverage lessons-learned, and support related initiatives. This report provides short-, medium-, and long-term national and regional recommendations to reinforce and improve building construction legislation, regulations, codes and standards across the Pacific and concludes with key reasons why supporting NBC regional harmonization and coordination is beneficial.



Port Vila, Vanuatu. Source: Rhys Gwilliam.

Findings and Key Recommendations

The key findings and recommendations from the study are organized under seven themes. Unless stated otherwise, the responsibility lies with the countries however in most cases, financial and technical support from one or more development partner will assist in actioning the recommendation:

NBC and HBM Relevance and Use

NBCs are relevant today, but most require regular review and most required updating. Use by local practitioners of the NBCs and Home Building Manuals (HBMs) was ad-hoc. NBC design criteria need to be reviewed to reflect current scientific practice and climate adaptation and mitigation objectives. Thematic priority areas include traditional design and local materials, climate change mitigation and adaptation, building energy efficiency and renewable energy, rainwater collection, and water conservation.

Key Recommendations

1. Review and update existing NBCs and companion HBMs that have not been reviewed or updated within the past 10 years (Vanuatu, Tonga).
2. Develop a new NBC for Palau by leveraging the experiences of the Republic of the Marshall Islands and the Federated States of Micronesia.
3. Undertake a regional review of individual PIC NBC chapter sections and tailor nationally to specific thematic areas and propose opportunities to harmonize chapter sections across multiple PICs.
4. Carry out ongoing regional reviews of individual PIC NBC updates and share lessons learned and best practice with other PICs.
5. Country-specific hazard studies (wind, seismic, flood, etc.) to be commissioned that will provide NBCs with updated design parameters (all PICs).

Standards and Standards Bureaus

Key NBC referenced standards from Standards New Zealand, Standards Australia, and US Standards Institutes/Associations, which have similar climate and hazard context, and/ or construction and engineering practices, should be freely viewable and accessible. Access to standards is a barrier to compliance and enforcement. The development of local material and traditional construction standards that could be referenced in NBCs to ensure preservation of local/traditional practices and utilization of locally available materials would be advantageous. There is a misalignment between the key referenced standards cited in the NBCs and the “Standards Bureau” catalogues of Fiji, Samoa, and Vanuatu. There is a general interest from other PICs to establish national standards bureaus in their jurisdictions.

Key Recommendations

1. Perform a gap and needs assessment of national and Pacific regional construction standards.
2. Standards New Zealand, Standards Australia, and American Standards Institutes/Associations to develop mechanisms that would enable key reference standards to be viewable to regulators and local design and construction practitioners at nil or a discounted fee.
3. Fiji, Vanuatu, and Samoa to update their standards bureau catalogues to align with key NBC reference standards.
4. The Pacific Island Forums’ Pacific Quality Infrastructure program (PQI) to assist PICs without national standards to establish standards bureaus.
5. PQI to develop a strategy for the analysis of PIC institutional and regulatory frameworks and capacities or PICs to enforce and test imported and exported construction materials/equipment.

Legislation and Building Regulation

Stakeholders surveyed indicated that while current legislation is being applied effectively, some legislation and building regulations could be better written to enable easier interpretation by construction designers, builders and inspectors. In some cases, local ordinances and bylaws do not align with national legislation and building regulations. A disconnect exists between building regulations at the national level and the application of the regulations at the sub-national level.

Key Recommendations

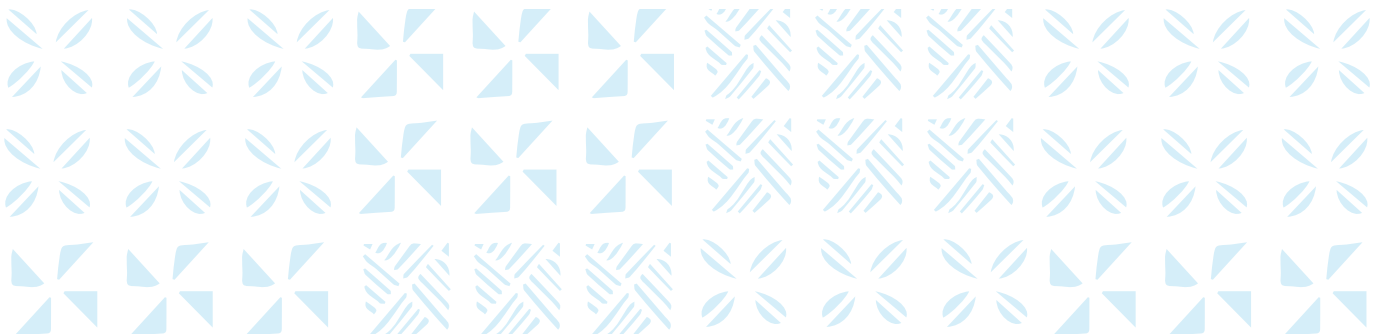
1. PICs to assess their national and subnational legislation, regulations, and building control institutional frameworks and address the disconnect between national NBC management and the administration and compliance enforcement at the sub-national level.
2. At a regional level, review NBC legislation from all PICs to identify case law examples and share best practice.
3. Establish a regional organization to coordinate, advocate, manage, and advise/support PICs on building legislation, regulations, codes, design criteria, and standards.

Building Control Institutional Framework - Capability and Capacity

Ministries have limited or insufficient resources to administer and update the NBC and there are insufficient building inspectors to enforce compliance. In many cases, inspectors are insufficiently qualified to inspect or enforce the NBC. Architects, engineers, and construction trades are well trained and capable. There exists the potential for a regional Pacific architect-engineer mobility licensing/chartered program.

Key Recommendations

1. PIC Ministries/Departments responsible for administration and enforcement of building construction to perform a sustainable budget and resource management gap/need analysis that includes:
 - A gap analysis of the capability and capacity of individual PICs to manage, administer, and enforce building legislation and codes;
 - A review of strategies to recruit inspectors and strengthen the training of existing inspectors;
 - A review of how building inspection functions could be adjusted to increase effectiveness, including a carrot and stick approach that would mix punitive measures with positive incentives; and
 - Capacity building and training strategies.
2. For the purposes of ease of doing business and creating regionally-recognized qualifications, undertake a regional feasibility study on establishing a Pacific region construction practitioner certification/ accreditation and mobility program.



Technical and Vocational Institutes

Technical and vocational institutes that teach construction technology have the capability and capacity to incorporate the NBC into their curricula and to train technical construction practitioners, Only Fiji has the capability for training professional construction practitioners.

Key Recommendations

1. At a regional level, develop curricula that would allow NBC-HBMs to be incorporated into construction training programs at secondary schools, technical institutes, and universities.

Awareness and Promotion

Most construction practitioners, government regulators, local municipalities, construction materials suppliers, and the general public are aware of the importance of good construction standards. However, more needs to be done to promote the benefits and universal adoption of building codes and the supply of building materials that comply with the building codes and standards.

Key Recommendations

1. Develop activities at a regional level that promote awareness of the costs and benefits of following standards and tailor and deliver the activities at a national level to mainstream NBCs and HBMs.

Regional Coordination and Harmonization

The establishment of a Pacific regional building construction forum supported by a secretariat to coordinate, advocate, manage, and advise/support PICs on building legislation, regulations, codes, design criteria, and standards would be of significant value in promoting the construction of resilient and inclusive infrastructure in the Pacific.

Key Recommendations

1. Perform a regional feasibility study on establishing a Pacific Region Building Construction Forum to advocate for and coordinate regional harmonization, sustainable and resilient development, building construction practitioner certification/accreditation and mobility, and ease of doing business (short term).
2. Coordinate, advocate, manage, and advise/support regional Pacific PICs on building legislation, regulations, codes, design criteria and standards (long term).
3. Establish a regional mechanism that would enable PIC construction practitioners from larger PICs to peer review NBC updates and assist with the assessment of more complex NBC applications from smaller PICs.
4. Develop appropriate PIC-focused NBC administration and inspection capacity building and training programs at a regional level and deliver the programs nationally at regular intervals.





1. Introduction

1.1 Context

The Improving National Building Codes and Standards in the Pacific Technical Assistance (INBCSP-TA) is a component of the overarching assignment TA-9819 REG: Pacific Region Infrastructure Facility (PRIF) - Leveraging Infrastructure for Sustainable Development. TA-9819 REG supports the resourcing and coordination of technical assistance activities by the PRIF Coordination Office. The activity is financed by multiple partners: Asian Development Bank, Australian Department of Foreign Affairs and Trade, European Union, European Investment Bank, Japan International Cooperation Agency, New Zealand Ministry for Foreign Affairs and Trade, United States Department of State, and the World Bank Group. PRIF aims to improve development effectiveness and the sustainability of infrastructure investments in Pacific Island member countries by:

- strengthening coordination among PRIF partners;
- improving infrastructure policies and regulation; and
- improving infrastructure planning and management.

Additional details can be found here: <https://www.theprif.org>

1.2 Problem Statement

The Pacific islands are facing increasing disaster risk because of climate change. The construction of **resilient and inclusive infrastructure** in the Pacific is a fundamental component of climate change adaptation and mitigation, environmental sustainability, and social inclusivity for all Pacific Islanders. Appropriately written Pacific Island-focused National building Codes (NBCs), effectively administered and enforced, have an important role to play in achieving this objective and providing a de-risked value for money infrastructure outcome.

NBCs ensure that:

- structural designs are **cost-effective**, and are in accordance with appropriate cyclonic, seismic, and flood criteria (integrating climate change and sea level rise);
- developments are designed to be **accessible, inclusive, and safe** for people of all ages, abilities, and genders;
- Water, Sanitation and Hygiene (WASH) and electrical designs target areas where there is **no piped water or mains electrical supply** (e.g., rural schools); and
- fire, electrical and mechanical services designs are appropriate for the **technical resources available and service constraints** in Pacific Island countries (PICs)

Across PRIF member countries, there are many examples of NBCs and standards that need to be updated and contextualized and/or require reinforcement of their legal/institutional arrangements and resources for well-constructed, resilient, climate-adapted, healthy, and safe buildings that are a good return on investment.

Several PRIF member countries do not have building codes or are in the process of legislating one, which creates challenges for governments that are required to ensure public safety and health, climate resilience, quality infrastructure, and consistency in services.



Melsisi Catholic Church Vanuatu following the destruction of Tropical Cyclone Harold in April 2020.
Source: Naparau Jelson Nishai

1.3 PRIF NBC Regional Diagnostic Study

In 2019, PRIF undertook a TA entitled “[Regional Diagnostic Study of Constraints in the Application of Building Codes in the Pacific](#)” (Diagnostic Study) with a view to investigating the capacity of PICs to apply their NBCs and guide future assistance initiatives related to NBC updates, administration, management and compliance enforcement that could be provided by PRIF development partners.

The Diagnostic Study identified a regional need for NBC-related activities to be coordinated and harmonized, with a long-term aim of establishing a regional co-ordination office that would provide PICs with NBC support in the areas of:

- reviewing and updating existing building codes or establishing new codes;
- reviewing building control legal and instructional frameworks;
- capacity and capability of local government systems to apply and enforce building codes;
- building standards;
- promotion and awareness strategies;
- technical training and capacity building;
- building insurance and banking; and
- incorporation of NBCs into technical training by local educational institutions.

The study determined that updating and revising building codes alone will not be enough to improve the built environment. The effective implementation of building codes and the realization that safe buildings require robust governance mechanisms, institutional frameworks, planning tools, effectual compliance enforcement and awareness among construction industry practitioners, regulators, civil servants, politicians, and the public.



1.4 PRIF Improving National Building Codes and Standards in the Pacific Technical Assistance

Given a number of direct requests for technical assistance from PRIF member countries, the opportunity to build on the momentum from a number of recent initiatives supported by development partners and with the recently completed Diagnostic Study in hand, PRIF has prioritized a more coordinated approach to addressing the shortcomings of unsuitable or inadequate NBCs and the inconsistent and ineffective application of standards across the region.

In September 2021, INBCSP-TA was established with two key objectives:

- At the **regional** level, to support improvements to national building codes, their implementation and enforcement, and contribute to the efficient and effective application of design and construction standards across the Pacific.
- At the **national** level, support strengthening of legislation and regulatory frameworks, improving building codes and associated standards, and identifying opportunities to improve the capacities for enforcement (FSM, Nauru, and Kiribati).

1.5 Report Overview and Methodology

This report is intended to assist coordination across PRIF member countries and partners to identify needs and support the sharing of NBC best practice, leverage learned lessons with associated recommendations, and support related initiatives. Lessons learned have been informed from stakeholder consultations and surveys, the mapping of building codes, reference standards, and design criteria, and the design and construction experience of the INBCSP-TA team members.

The report makes national and regional recommendations to reinforce and improve building construction legislation, regulations, codes, and standards across the Pacific and synthesizes stakeholder consultations and surveys, the mapping of building codes, reference standards, and design criteria and stakeholder surveys, with a particular focus on harmonization and coordination.

The INBCSP-TA has completed the following activities:

1. Reviewed and documented recent and ongoing lessons that have impacted the application, management, and enforcement of NBCs in PICs.
2. Identified best practice and lessons learned involving the collection and review of all NBCs that are officially legislated or are in progress, along with over 550 legislative, regulatory, policy, building code, manuals, standards, design guides, consultant reports, administrative, and other report documents related to Building Codes and Standards in the 13 PICs and Pacific region.

The collected documents have been deposited on the “Building Codes” page (www.theprif.org/building-codes) on the PRIF website.

3. Undertaken a stakeholder engagement exercise to understand how stakeholders can benefit from NBC improvements, facilitate NBC coordination and harmonization, and support the sharing of NBC best practice, leverage lessons-learned, and support related initiatives.
4. Based on the lessons learned and best practice case studies, propose a suite of short-, medium- and long-term recommendations.

The report concludes with a summary of the key reasons why retaining and maintaining NBC regional harmonization and coordination is beneficial.

Additional closeout activities will include the handover of building code-related documents collected under this project to the Point of Contacts at each PIC, with the intent to advocate that each PIC selects and uploads key documents to their webpage.

1.6 Peer Review Support for Related Activities

The INBCSP team have provided support to development partners and regional stakeholders on the following initiatives related to improving PIC NBCs:

1. Global Green Growth Institute’s Sustainability Chapter for the Fiji NBC
2. Review of the Facility Designers Guide for Tropical Islands
3. Review of the Republic of the Marshall Islands (RMI) draft NBC
4. ADB-funded support for the Fiji NBC (ongoing)
5. Secretariat of the Pacific Regional Environmental Project (SPREP)-funded Nauru Electrical Installations “Wiring Guidelines”
6. Rights and Inclusion Australia support to the Pacific Disability Forum to create Disability Guidelines
7. Solomon Islands Infrastructure Management Bill Assistance
8. Sendai Framework Implementation Midterm Review -Thematic consultation

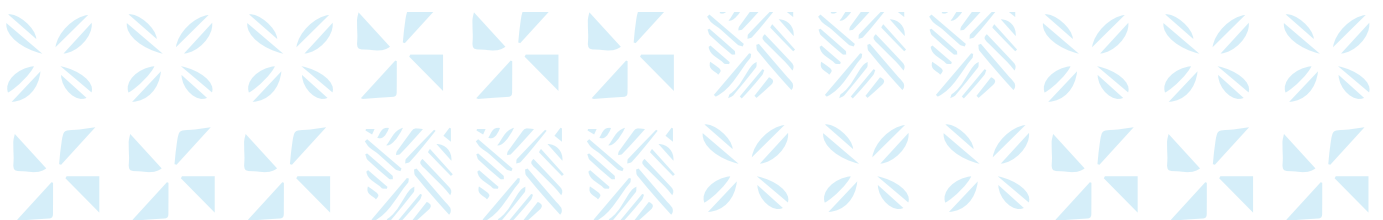
It has also provided support to other PRIF Initiatives and webinars outside the specific scope of this INBCSP-TA. A summary of the support provided is attached as Annex B whilst details of the peer reviews are outlined below. The peer reviewing of these initiatives has informed the lessons learned and the NBC recommendations.

1.7 National Support for NBCs in Selected PICs

Under the INBCSP-TA National Support for NBCs task, the TA is:

- assisting Nauru and FSM, who currently do not have NBCs, to prepare new building codes and associated legislation; and
- supporting Kiribati to review and update its 2011 NBC and associated legislation.

These activities are ongoing and are separate from the INBCSP-TA coordination and harmonization activities. They do not form part of this Coordination and Harmonization Report.





2. Recent and Ongoing PIC NBC Initiatives

2.1 National Initiatives and Status

Numerous NBC government and development partner initiatives have been implemented across the Pacific. These initiatives tend to be country-specific and to occur after a disaster event or to satisfy infrastructure development programs. In general, the Pacific region has not seen a comprehensive regional building code initiative since the 1990s Pacific Building Standards Project (PBSP). Table 1 outlines these initiatives.

Table 1: Building Code / Standards Initiatives (1990–2022)

Regional	DFAT	1990s Pacific Building Standards Project
	PRIF	2021/2022 Technical Assistance “Improving National Building Codes and Standards in the Pacific” (Regional in scope, but country-specific interventions limited to Nauru, FSM, Kiribati)
Country Specific	Fiji	2021-23 Government of Fiji - ADB
	Solomon Islands	2021-23 Government of Solomon Islands - DFAT
	Samoa	2017-19 Government of Samoa – Global Environmental Facility/UNDP – Green Climate Fund/UNDP - World Bank Group/ GFDRR
	RMI	2016-23 Government of RMI - Government of Italy
	Niue	2014-20 Government of Niue
	Kiribati	2013-14 Government of Kiribati - 2021-23 Gov of Kiribati -PRIF
	Nauru	2021-23 Government of Nauru - PRIF - SPREP
	FSM	2021-23 Government of FSM - PRIF
	Cook Islands	2017-19 Government of Cook Islands - SPC/European Union
	FSM, RMI, Palau (North Pacific Islands)	2022 United States Department of Interior Office of Insular Affairs
	Tonga	2018-19 Government of Tonga World Bank Group / GFDRR
	Tuvalu	2018-19 Government of Tuvalu – ADB - 2021-23 Government of Tonga - World Bank Group / GFDRR

Source: Mapping of PIC building codes by the authors.

ADB = Asian Development Bank; DFAT = Australian Department of Foreign Affairs; FSM = Federated States of Micronesia; GFDRR = Global Facility for Disaster Reduction and Recovery; PIC = Pacific Island country; PRIF = Pacific Region Infrastructure Facility; RMI = Republic of the Marshall Islands; SPC = Pacific Community; SPREP = Secretariat of the Pacific Regional Environmental Project; UNDP = United Nations Development Program.

In recent years, various Pacific Island governments have updated their legislation and building codes and/or developed new building codes independently or in partnership with foreign governments, international organizations, and/or multilateral development banks. Table 2 summarizes the various initiatives that focused specifically on building construction legislation and NBCs. This does not consider other initiatives that produced non-regulatory guidelines and handbooks that have a link to the building code and/or provides guidance (WASH, energy labeling, etc.).

Table 2: NBC Country-Specific Initiatives

Year	PIC	Activity	Status
2014 / 2020	Niue	Review and update of the NBC of Niue and HBM was initiated in 2014. The NBC for Niue 2020 and the Amendment Niue Building Code Act 2021 has approved by Cabinet. <i>Note: The HBM (Niue Building Code - Acceptable Solutions Workbook) was drafted in 2014 and the Government of Niue has indicated that this has yet to be updated and implemented due to lack of funding.</i>	NBC Completed, update of HBM on hold
2017 / 2019	Samoa	Update of the NBC of Samoa, under the Economy Wide Adaption to Climate Change Project, funded by the Global Environment Facility through the UNDP Multi Country Office in Samoa; with subsequent development of five NBC handbooks (in both English and Samoan) in 2019 under the Vaisaigano Catchment Project, funded under the Green Climate Fund through UNDP .	Completed
2018 / 2019	Tonga	Proposed updates to section A, B, and creation of a supplement section D (Dwellings & Outbuildings) of the NBC to provide deemed-to-satisfy rules for the structural requirements of private dwellings; under the Tropical Cyclone Ian Reconstruction and Climate Resilience Project co-financed by the World Bank and Kingdom of Tonga in 2018/2019.	Completed – Update of NBC required
2018 / 2023	Tuvalu	Revision and update of the Tuvalu NBC, Building regulations and regulatory framework. Development of factsheets and other guides. ADB started the process and, in 2019, the World Bank Group / GFDR continued the project.	In Progress
2017 / 2019	Cook Islands	Revision of the Cook Islands Building Code and Building Manual (formerly known as the Home Building Manual) carried out under the auspices of Infrastructure Cook Islands with facilitation and project management support provided by Volunteer Services Abroad, with funding provided through Emergency Management Cook Islands from donor partners: SPC, European Union, Asia Caribbean Pacific-EU Building Safety and Resilience in the Pacific.	Completed – In process of fully legislating
2021 / 2023	Solomon Islands	Review, update, revision, training, and dissemination of the Solomon Islands NBC and new legislation under the Solomon Islands Infrastructure Investment Program supported by DFAT . Solomon Islands Building Manual based on the 1990 Solomon Islands HBM in process of being prepared. <i>Note: NBC Expected to be legislated in 2022. Additional considerations for fire and egress, sustainability and other sections may be added in a 2023 edition.</i>	In Progress
2021 / 2022	Fiji	Development of sustainability guidelines to support government’s ongoing work to review its NBC and ensure resilience and climate change considerations in building planning and design are mainstreamed to support Article 72 of the Climate Change Act. Technical assistance was provided by the Green Global Growth Institute in partnership with New Zealand’s Ministry of Foreign Affairs and Trade’s Low Emissions Climate Resilient Development program.	Completed – in process of being integrated into NBC
2021 / 2023	Fiji	Update of the Fiji NBC, HBM, and legislation supported by the ADB under TA-9347 REG: Pacific Urban Development Investment Planning and Capacity Development Facility-Fiji National Building Code Support (51175-001). Support also includes review of Fiji’s legal and institutional building control framework, an analysis of the capacity and capability of Fiji’s municipalities and provinces to apply and enforce the NBC, and the development of an awareness and promotion strategy.	In Progress
2021 / 2022	Nauru	Development of the “Nauru Electrical Installations Wiring Guidelines”, which serves a precursor to the electrical sections of the Nauru NBC that is in development. Initiative implemented by SPREP , through funding by GIZ .	Completed
2021 / 2023	Nauru	Development of the Nauru NBC and HBM and legislation under the PRIF regional Technical Assistance “Improving National Building Codes and Standards in the Pacific”.	In Progress
2021 / 2023	Kiribati	Update of the Kiribati NBC and HBM and legislation under the PRIF regional Technical Assistance “Improving National Building Codes and Standards in the Pacific”.	In Progress

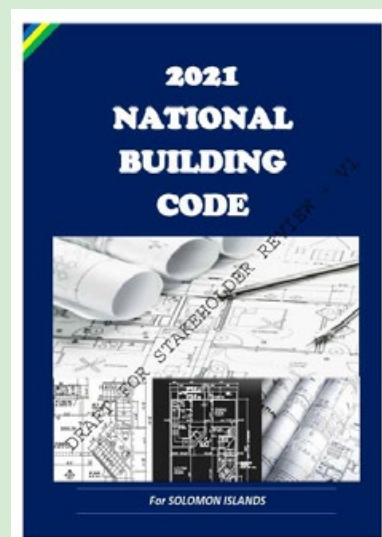
Table 2: NBC Country-Specific Initiatives (continued)

Year	PIC	Activity	Status
2016 / 2019	RMI	Development of “Republic of the Marshall Islands NBC Handbook, 1st Edition – 2019”. The building code project was spearheaded by National Disaster Management Office –Joint National Action Plan at the Office of the Chief Secretary and Project Management Unit at the Ministry of Works, Infrastructures, and Utilities under a project called the Building Infrastructure Resilience Component 1 – Development of the RMI National Building Code, which was funded through a grant from the Government of Italy for 2 years from 2016 to 2018.	Completed
2019 / 2023	RMI	Development of “The NBC of the Republic of Marshall Islands” based on the International Building Code with the “Republic of the Marshall Islands NBC Handbook, 1st Edition – 2019” included as the annex. Includes the updating of the necessary acts/legislation and a potential second phase of training and dissemination.	In Progress
2021 / 2022	FSM, Palau, RMI	Development of a “Facility Designers Guide for Tropical Islands” US Insular Areas and Compact States (FSM, RMI, Palau) managed by US Army Corps of Engineers and supported through US Department of Interior Office of Insular Affairs . <i>Note: Not a regulatory document but impacts the design of Compact-funded projects</i>	In Progress
2021 / 2023	FSM	Technical advisory to the development of an FSM National Building Code under the PRIF regional Technical Assistance “Improving National Building Codes and Standards in the Pacific”	In Progress

Source: Mapping of PIC building codes by the authors.

ADB = Asian Development Bank; DFAT = Australian Department of Foreign Affairs; FSM = Federated States of Micronesia; GIZ = Gesellschaft für Internationale Zusammenarbeit (German: Society for International Cooperation); GFDRR = Global Facility for Disaster Reduction and Recovery; HBM = Home Builders Manual; NBC = National Building Code; PIC = Pacific Island Country; PRIF = Pacific Region Infrastructure Facility; RMI = Republic of the Marshall Islands; SPC = Pacific Community; SPREP = Secretariat of the Pacific Regional Environmental Project; UNDP = United Nations Development Program.

Best Practice Case Study – NBC Principles of Approach



Solomon Islands NBC: Principles of Approach

Recognizing that the NBC must remain relevant to the current needs of the built environment in Solomon Islands and should be modernized in a manner that retains practical application to both the local environmental conditions, availability of building materials, delivery systems and the capability of the local construction industry, the Ministry of Infrastructure Development developed a “Principles of Approach” that could be replicated for NBC reviews and updates in other PICs. The principles are:

- Principle 1 - Progressive Development Framework Model
- Principle 2 - Climate Adaptation and Resilience
- Principle 3 - Social Inclusion
- Principle 4 - Simplicity
- Principle 5 - Appropriate Technology
- Principle 6 - Targeted Focus
- Principle 7 - Accessible Information



PIC NBC Initiatives Lessons Learned

Some initiatives have been put on hold due to lack of funding (e.g., Niue, RMI).

Recommendation: PICs and development partners need to ensure that funding is sufficient to provide for the services required.

Legislating codes and standards can be a lengthy process involving additional consultation, in particularly in relation to residential components of the codes (e.g., Tonga, Tuvalu, Solomon Islands).

Recommendation: Sufficient time needs to be allowed when designing NBC improvement technical assistance for this type of consultation.

There have been no substantial initiatives to connect and transform the strategic requirements of policies, commitments, agreements, and plans into clear operational requirements that can be integrated into building codes readily. Across the various PICs, there are numerous strategic documents that mention the building code and the actions that need to be taken, but follow-through actions to update the Building Code and legislation is limited.

Recommendation: Resourcing of initiatives that target NBC operational activities at national and subnational levels needs to match higher level activities that target strategic policy and planning initiatives

Recommendation: Reviewing and updating the building codes and legislation on a regular basis could align building construction with national policies, commitments, agreements, and plans. **Principles of Approach** (refer case study above) should be developed and included in NBC introductory chapters to guide reviews and updates.

Knowledge of local construction practice and building industry constraints when reviewing NBCs are important elements to ensuring **ownership** and **implementability** of updated NBCs.

Recommendation: It is important that, when NBCs and associated legislation and building control frameworks are reviewed and updated, the reviews and updates are led by construction practitioners active in the local construction industry. Where development partners are procuring consultants to undertake NBC reviews and updates, procurement practices should be sufficiently flexible to allow participation by local consultants familiar with the NBC.

Recommendation: When designing NBC improvement technical assistance in very small local consulting markets (such as the Pacific), consideration could be given to recruiting individuals rather than firms.

2.2 Regional Initiatives

No regional body has a permanent mandate to coordinate efforts to establish and maintain standards and NBCs across the region. The Pacific Quality Infrastructure (PQI) project, based in the Pacific Islands Forum Secretariat, is in an early stage of development to establish regional QI frameworks for standardization, metrology, conformity assessments, and quality promotion for all Forum Island countries. While the initial emphasis is on improving standards related to trade, the PQI notes that “Quality Infrastructure is the backbone for other aspects in life such as health, environment, and buildings”. The PQI Initiative established the Pacific Islands Standards Committee (PISC) in April 2022 and are drafting a Regional Strategy for Standardization. They have established technical committees to develop regional standards, the first committee focusing on a regional cassava standard whilst the second committee is related to building construction, with an initial focus on drafting a regional energy efficiency standard (based off the current New Caledonia standard). A committee is planned to be established in April 2023 to focus on testing of materials and value chain analysis.

Regional – Pacific Quality Infrastructure (PQI), Pacific Islands Forum

The PQI project was initiated in 2020 with funding provided by the Enhanced Integrated Framework, Australian Department of Foreign Affairs and Trade, and the EU, and technical assistance through the National Metrology Institute of Germany. PQI's overall objective is to generate change toward higher quality products and processes, making products safer and more competitive on domestic and international markets.

The PQI project aims to strengthen a demand-oriented quality infrastructure and access to services that enhance trade competitiveness in the Pacific region through (a) establishing regional frameworks for standardization, metrology, conformity assessment, and quality promotion, and (b) identifying quality challenges in selected value chains in key export sectors which are addressed through targeted project measures at national and regional level.

<https://www.forumsec.org/pacific-quality-infrastructure-pqi>

Other regional initiatives include concepts/proposal by Standards Australia and Standards New Zealand to make their standards more accessible for PIC stakeholders. Standards Australia is considering a new online platform for this, as well as curated building sets for the Pacific, while Standards New Zealand, with the support of New Zealand MFAT, is considering sponsoring access to key standards for pre-agreed users. The ICC Model Building Codes and NFPA standards are freely viewable online, but not all standards referenced within these Codes are freely available.

There are also existing networks in the region through longstanding bilateral ties between established national standards bodies and emerging standards departments. These networks support formal project work, ad hoc support and regional and international memberships that can result in better construction outcomes.

The Pacific Disability Forum is also working with experts from Rights and Inclusion Australia to develop the Pacific Regional Disability Accessibility Standards and Enforcement Guidelines for the Built Environment. The standards and guidelines will inform the development of a broader framework for the enforcement of accessibility standards in the Pacific Region, and the future development of accessibility standards that apply to transport, information, and communications.

The US Department of the Interior has initiated the development of the Facility Designers Guide for Tropical Islands for standardizing and improving the quality and long-term performance of construction projects that are critical to the island communities of American Samoa, Guam, the Commonwealth of the Northern Marianas Islands, the US Virgin Islands, the Federated States of Micronesia, the Republic of the Marshall Islands, and Palau.

US states and territories in the Pacific continue to update their building codes, with Guam recently adopting the Guam Tropical Energy Code, and the US department of Energy supporting research in Tropical Energy Codes.

Regional Initiatives Lessons Learned

Country and regional initiatives in thematic areas have numerous benefits, even if there is no direct impact on building codes. Reports, guidelines, and other deliverables can indirectly impact building codes by filling building code gaps, provide more detail to ease or exceed building code compliance, improve building construction, and provide case studies and lessons learned. The reports, guidelines, and other deliverables can inform and serve as a basis for future building code updates.

Recommendation: There exists potential for regional coordination, dissemination, and information sharing of project outputs that could improve building codes and construction practices, avoid duplication, and leverage good practices, lessons learned, and case studies

Recommendation: Consideration should be given to the sharing of practical guidance/ guidelines/ checklists/ materials to support the implementation and awareness-raising of sometimes very complex building codes.

2.3 Related Initiatives

Numerous other country and regional initiatives have been completed and/or are ongoing that address cross-cutting and other thematic areas that may be limited in scope or geographic area. These include climate change adaptation, climate change mitigation, sea level rise, building and equipment energy efficiency, renewable energy, accessibility, WASH, rainwater collection, shelter, traditional construction, maintenance, urban and rural planning, and gender. There have been no substantial initiatives in the areas of building construction training and qualifications, trade and customs controls on building construction materials, hazard studies with the purpose of providing building design parameters, identifying and clearly defining critical and essential facilities (connecting emergency management), and resource and budget reviews of Ministries/Departments responsible for building code enforcement.

Table 3 documents selected initiatives that have NBC implications and provide some valuable lessons learned.



Table 3: Select Initiatives with NBC implications

Themes	Initiatives
WASH	Numerous ADB, SPC, SPREP, UNICEF, Engineers without Borders Australia initiatives that have and/or are in the process of producing assessments and guidelines.
Accessibility	<p>Numerous governments, UNICEF, DFAT, and other initiatives to address building accessibility that is appropriate and achievable in the Pacific while reinforcing/balancing the expectations of the tourism industry.</p> <p>Ex. “Pacific Regional Accessibility Guidelines and Standards” under the Pacific Disability Forum and funded by DFAT.</p>
Shelter & Traditional Construction	Numerous guidelines and manuals produced by Red Cross, World Bank, DFAT, and other partners to address shelter construction. Limited initiatives on traditional construction.
Sea Level Rise (Climate change resilience)	World Bank Study in RMI, Regional Study by PRIF, SPC Studies.
Sea level Rise	PRIF Guidance Document to explain the infrastructure risks associated with sea level rise. (Refer best practice case study under the section on Hazard design parameters.)
Energy Labelling	Through the Pacific Community, the Pacific Appliance Labelling and Standards project assisted PICs to adopt the Australia and New Zealand standards and energy labelling for selected electrical appliances. The project was supported by the Australian Government represented by the Department of Environment and Energy
Building Ratings / Energy Efficiency / Renewable Energy (Climate Mitigation)	SPC, UNDP, Global Environmental Facility, Green Global Growth Institute, Pacific Centre for Renewable Energy and Energy Efficiency and numerous other partners implementing projects and producing guidelines around climate change mitigation through energy efficiency, renewable energy, building energy efficiency policies / benchmarking, green building rating systems, etc.

Source: Mapping of PIC building codes by the authors.

ADB = Asian Development Bank; DFAT = Australian Department of Foreign Affairs; PIC = Pacific Island Country; RMI = Republic of the Marshall Islands; SPC = Pacific Community; SPREP = Secretariat of the Pacific Regional Environmental Project; UNICEF = United Nations Children’s Fund; UNDP = United Nations Development Program; WASH = Water, Sanitation and Hygiene.

Other Initiatives - Lessons Learned
<p>WASH assessments and guidelines provide context, requirements, and sometimes drawings that could update the plumbing and sanitation requirements of NBCs.</p> <p>Recommendation: Review regional or other country specific WASH studies that may be relevant to NBC reviews and updates.</p>
<p>There is potential to adjust and/or strengthen NBC requirements on accessibility and for a regional Pacific accessibility standard (North and South) that could be referenced in NBCs.</p> <p>Recommendation: Review regional or other country specific accessibility studies that may be relevant to NBC reviews and updates.</p>
<p>There is potential to adjust and/or strengthen housing design and construction and integrate traditional construction practices and techniques in NBCs and HBMs.</p> <p>Recommendation: Review regional or other country specific housing and traditional design studies that may be relevant to NBC reviews and updates. (Refer section 4.1)</p>
<p>There is potential to integrate flood and sea level rise design and construction requirements in NBCs, land use plans, and urban plans.</p> <p>Recommendation: Review regional or other country specific flood and sea level rise design studies that may be relevant to NBC reviews and updates.</p>
<p>There is potential to strengthen NBCs, building standards, and reduce national energy infrastructure needs to meet climate change commitments and for country-specific energy efficiency policies and for Pacific region green building rating system that can be referenced in procurement to meet or exceed NBC requirements and/or provide incentives.</p>
<p>There is potential to reference energy labelling in NBCs. Potential to integrated standards in Trade/Customs controls and Standards Bureau catalogues.</p> <p>Recommendation: Review regional or other country specific energy studies that may be relevant to NBC reviews and updates.</p>



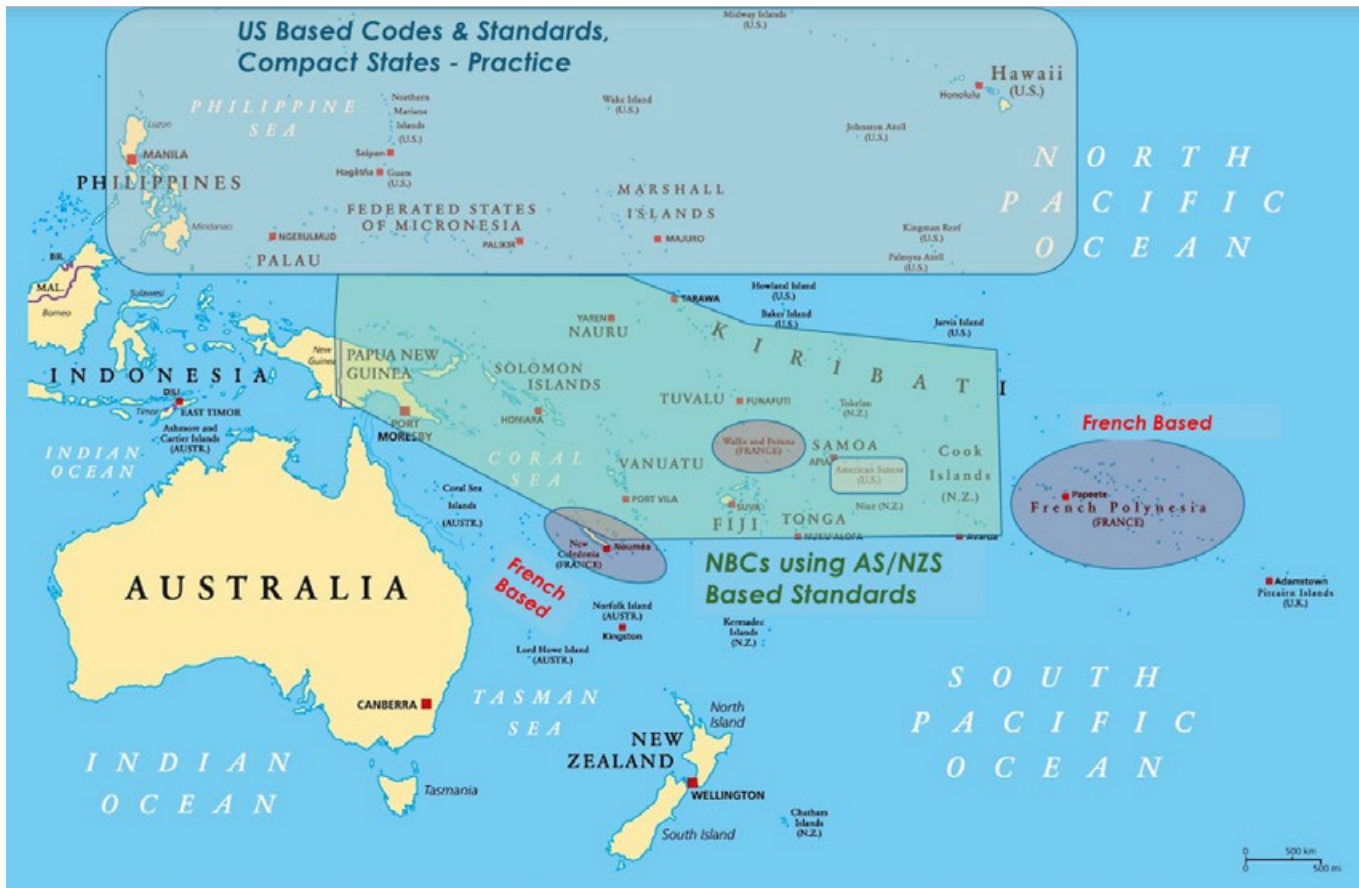
3. Pacific Building Code and Standards - Stocktake and Review

3.1 General Overview

Pacific building codes have generally evolved, been developed, and influenced through political relations and development cooperation initiatives between Pacific Island governments, foreign governments, and/or multi-lateral development banks. The trade flow of construction materials and education of technical specialists overseas has also had an influence on which codes and standards are implemented in PICs.

In general, PICs can be partitioned into three zones of practice for building codes and standards (see Figure 1), noting that there can be exceptions to certain building projects where no building legislation or building code exists (but where there is a practice), where donor projects are permitted to use a different standard, or where the availability of construction materials may limit full compliance with the practiced codes and standards.

Figure 1: Geographical Distribution of the Practice US-Based and Australian/ New Zealand-Based, and France-Based Codes/Standards



Australian and New Zealand-Based Codes and Standards	Cook Islands, Fiji, Kiribati, Nauru, Niue, Samoa, Solomon Islands, Tonga, Tokelau, Tuvalu, and Vanuatu
France-Based Regulations and Norms	French Polynesia, New Caledonia, Wallis and Futuna
US-Based Codes and Standards (North Pacific)	FSM, Palau, RMI; US Insular areas (Guam, Northern Mariana Islands, American Samoa); US States (Hawaii); Philippines

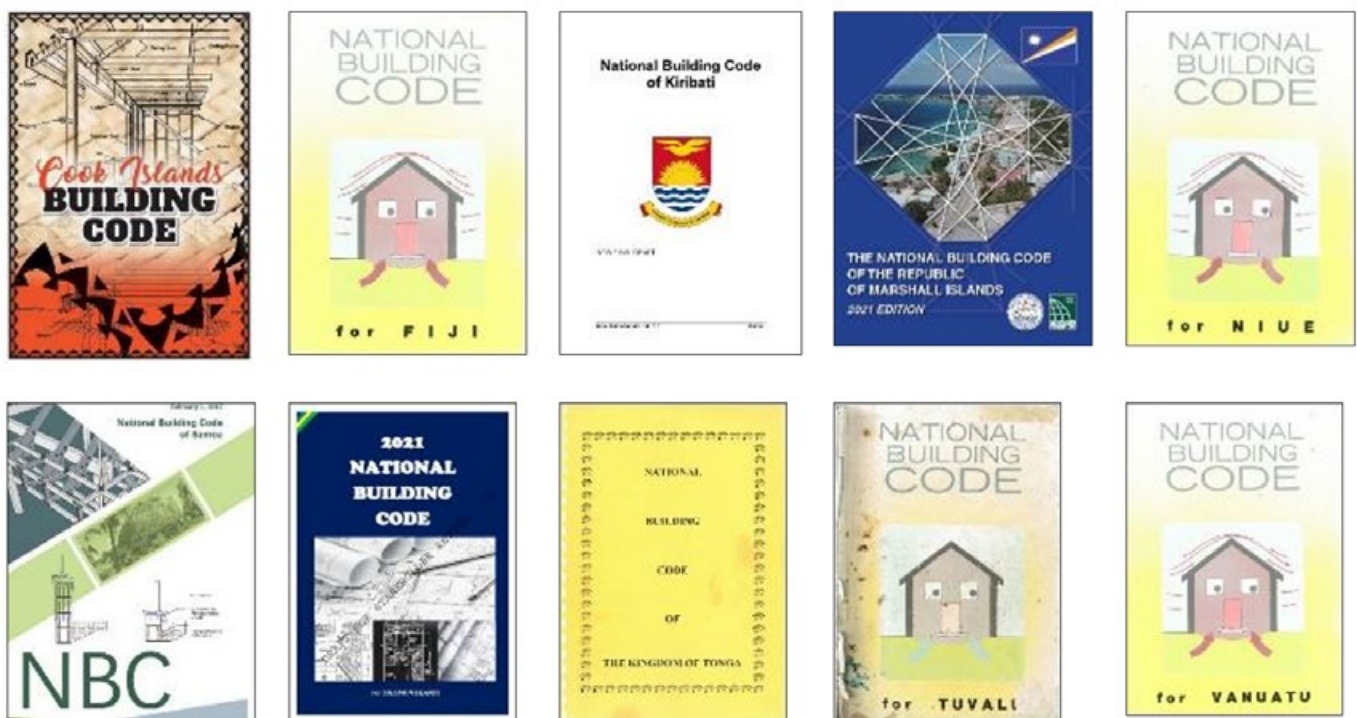
Source Mapping of PIC building codes by the authors. AS/NZS = Australian and New Zealand standards

The three zones are quite distinctive in the way their codes are written and practiced. New Caledonia is developing an "Oceanian housing referential system" with Fiji and Vanuatu to "lay the foundations for a resilient, affordable habitat, meeting specific quality requirements and allowing the use of materials and ancestral and local techniques". The system is targeted at nature-based solutions which are currently not covered by building codes. The view of stakeholders interviewed was that while buildings constructed from traditional materials remain outside the scope of the NBCs, standards targeting traditional materials used in conventional construction, such as native timbers, should be developed.

3.2 Documentation Mapping Exercise

As part of the mapping exercise to identify lessons learned and best practice, the INBCSP team collected, scanned, organized, and reviewed the most recent NBCs that are officially legislated or are in progress and over 550 legislative, regulatory, policy, building code, manuals, standards, design guides, consultant reports, administrative, and other report documents related to Building Codes and Standards in the 13 PICs and Pacific region. The documents were obtained through government sources, the private sector, development partners, and personal collections. The documents have been incorporated into a "Pacific Building Code Documentation Library" list (refer Annex C) and uploaded onto a dedicated "Building Codes" webpage¹ established on the PRIF website.

Documents collected for each individual PIC will be shared with each focal point at a future workshop/forum event.



Front covers of Building Codes.



¹ <https://www.theprif.org/building-codes>.

3.3 Historical Context

South Pacific

Prior to the 1990s, several PICs had legislation and/or municipal laws regarding building construction that were established in colonial and trust territory times. During the 1990s and 2000s, the Australian International Development Assistance Bureau initiated the Pacific Building Standards Project (PBSP) to develop NBCs for Cook Islands, Fiji, Niue, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu. Kiribati and Nauru were initially excluded from the PBSP. In 2010, Kiribati adopted the PBSP NBC model to draft its own building code. Nauru is currently developing its own building code with support from PRIF under this Technical Assistance.

The NBCs reference Australian, New Zealand, and international standards that provide building design parameters for:

- Structures
- Water and sanitation
- Fire services
- Electrical services
- Accessibility
- Building materials

HBM were developed under the PBSP as a companion volume to NBCs. They are technical manuals with drawings and design tables that allowed para-technicians and local builders to design and construct simple single-story buildings in urban areas, villages, and informal settlements that are NBC-compliant.

In many instances, the PBSP building codes were not legislated until the 2000s, showing large lag times between building code development and adoption. Due to years of civil unrest in Solomon Islands and the limited resources available to government in Tuvalu the PBSP building code was never legislated in these two countries.

North Pacific

During the 1990s within the North Pacific (Pacific Insular Areas and Compact States), US-funded projects utilized codes published by the predecessors of the International Code Council and various standards published by US institutes and associations. Within the Compact States (RMI, FSM, and Palau), the use of US codes and standards continues today. Palau has pursued various bills between 2014 and 2021, attempting to adopt a building code without success. Some states within FSM state codes have references to building codes that either are outdated or are not used.

3.4 Current Building Code Context

The age of the latest edition of the PIC NBCs and HBMs varies. The 1990s/2000s PBSP was the first successful South Pacific regional project at establishing building codes that were coordinated and harmonized in content, form, and key referenced standards.

As of 2022, the following is the status of the development and legislation of NBCs.

PICs with NBCs:

- PICs have updated their NBCs at irregular intervals.
- Niue, Cook Islands, and Samoa have updated their NBCs in the past 5 years, with Cook Islands in the process of legislating their updated NBC.

Table 4: Progress and Update of Building Codes (continued)

- Fiji, Kiribati, Solomon Islands, and Tuvalu are in progress of updating their NBCs. Fiji and Kiribati are currently reviewing their legislation and Solomon Islands and Tuvalu are in the process of drafting new NBC legislation.
- Tonga, and Vanuatu are not currently pursuing updates to their building codes.

PICs without NBCs:

- Nauru, FSM, and RMI are at various stages of developing and legislating their first NBCs.
- Palau is not currently pursuing the development of an NBC.

The most recent NBCs that are officially legislated, or in the progress of being legislated, are shown in Table 4. All have been extensively reviewed as part of this documentation mapping exercise.

Table 4: Progress and Update of Building Codes

PIC	1 st NBC	Latest Update of NBC	Age (yrs.)	Notes
COOK ISLANDS	1990 (legislation date unknown; minor NBC amendment in 2005)	2019 (unlegislated). NBC in the process of full legislation	3	Not posted on ICC website; in process of being legislated.
FIJI	1990 (legislated 2004)	Updates to NBC and legislation in progress 2022	32	2004 version used.
KIRIBATI	2000 (legislated in 2006)	2012 Updates to NBC and legislation in progress 2022	12	Not posted on website.
NIUE	1990 (legislated 1992)	2020 (legislated 2021)	2	Not posted on website.
NAURU	In progress 2022	New NBC and legislation in progress		Not posted on website.
SAMOA	1992 (legislated 2002)	2017 (legislated 2019)	5	In draft, newer version available dated July 2022. Posted on website.
SOLOMON ISLANDS	1990 (unlegislated)	Updated NBC and legislation in draft to be legislated early 2023	32	In draft. Posted on Ministry of Infrastructure and Development website.
TONGA	2001 (unlegislated)	2007 (legislated 2007)	15	In draft. Not posted on website.
TUVALU	1990 (unlegislated)	Updated NBC and legislation in draft to be legislated early 2023	32	Posted on Public Works Department website.
VANUATU	1990 (unlegislated)	2000 (legislated 2017)	22	No building code.
FSM	In progress 2022	No legislated NBC		No building code. Compact projects generally use ICC codes. Some state Acts refer to older American standards. Yap state Code may exist.
RMI	"The National Building Code of the Republic of Marshall Islands, 2021 Edition" Final Draft 2 for Public Consultation	No legislated NBC		In draft. Not posted on website.
Palau		No legislated NBC		No building code. Compact projects generally use ICC

Source: Mapping of PIC building codes by the authors.

FSM = Federated States of Micronesia; ICC = International Code Council; NBC = National Building Code;

RMI = Republic of the Marshall Islands.

NBC and HBM contextual Lessons Learned

The time lag between when an NBC is developed and when it is legislated and comes into force can be substantial. This can lead to the adoption of an NBC that is already outdated or the use of an NBC before it is legally enforceable.

Recommendation: Designs for technical assistance need to consider this time lag.

Several PICs have updated or are updating their HBM simultaneously with NBC updates, but in some cases HBMs may not have been updated or disseminated due to lack of resources or time.

Recommendation: Designs for technical assistance need to allow the necessary time and resources when HBMs and being simultaneously updated with NBCs.

Promotional and advocacy activities should be developed that will mainstream the use of NBC and HBM.

Recommendation: Promotional and advocacy activities should be supplemented by stakeholder consultations to determine the barriers to HBM use and any modifications required. Updating and promoting the HBM should facilitate compliance and resilience in the housing sector.

3.5 NBC-referenced Standards – South Pacific

An evaluation was undertaken to determine whether NBC-referenced standards in the South Pacific NBC are current or outdated/superseded. The purpose was to identify which NBCs may require assistance to update their NBCs in order to ensure that they are modern and aligned with regional and international building construction material trade flows/markets and design practices (ease of doing business). Using standards as an indicator also provides potential insights into whether the NBCs are still relevant and fit-for-purpose and whether there is a likelihood that designers, building contractors, and building officials no longer use them (which may imply that there is a risk that building design, construction, and enforcement may be inconsistent with potential legal implications on health, safety, cost, durability, and disaster risk).

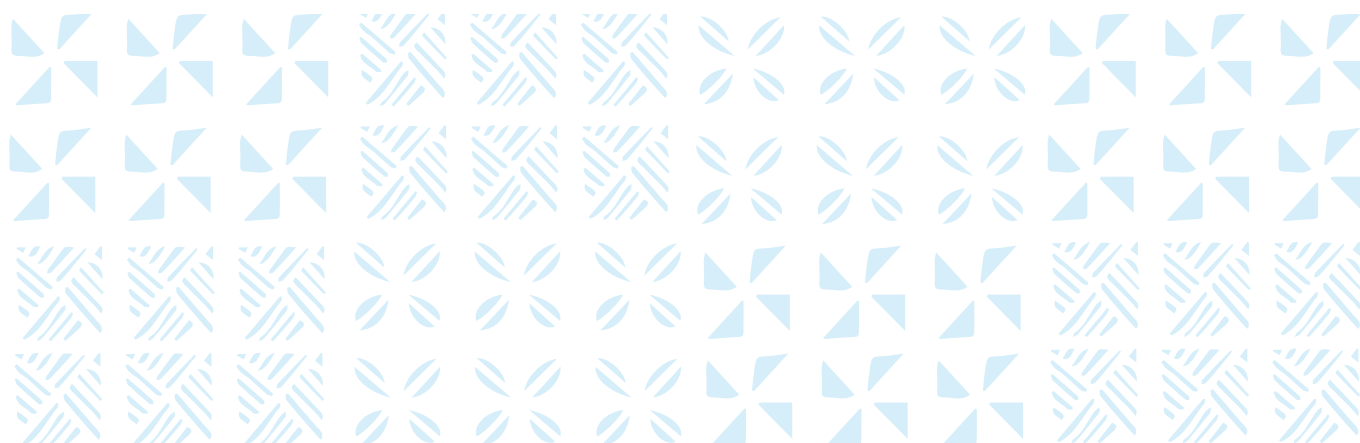
The review of key standards referenced in several NBCs revealed:

1. many standards are outdated (in some cases by 85%, with some standards over 50 years old, as in the case of Fiji); and
2. referenced standards tend to be 5–20 years older than the date that the NBC was developed and 5–30 years older by the time the NBC has been legislated.

Referenced Standards Lessons Learned

Australian, New Zealand and international building standards referenced in NBCs are often reviewed and updated.

Recommendation: NBCs should be regularly reviewed (say every 5 -10 years, depending on costs and resources available) to align with the latest Australian, New Zealand, and Australian/New Zealand and international standards. (Updates to the Fiji, Tuvalu, and Solomon Islands NBCs by development partners and PRIF NBC support to Nauru and Kiribati will likely bring them up to the most current Australian, New Zealand and international standards.)



3.6 Evaluation of NBC Structure – Harmonization and Coordination

The structure of PIC NBCs was evaluated to verify which groups are harmonized or de-harmonized, and which PICs have retained or changed the structure of their NBCs. This will establish whether the Pacific Region is maintaining regional harmonization or starting to de-harmonize. Using the NBC structure as an indicator, current trends in the region and have been analyzed and a view determined as to whether a regional dialogue and/or coordination mechanism should be established to discuss the benefits and drawbacks that regional harmonization could have on trade, ease of doing business, technical training, building practitioner mobility, and other inter-island topics. The comparison of the structures is illustrated in figure 2.

Figure 2: NBC Structure

Building Code Structure Comparison				
Period	South/Central Pacific			North Pacific
1990s - 2000s	1990s/2000s Pacific Building Standards Project – NBCs and HBMs: <i>Cook Islands, Fiji, Kiribati, Niue, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu & Tokelau</i> Note: No NBC/HBM developed for Nauru			<i>FSM, Palau, RMI</i> – No Building Code (except for some requirements for Yap and Chuuk)
2000 -2022	NBC Updated Retaining Previous Structure <i>Cook Islands</i> (2019) – in process of legislating in 2022 <i>Kiribati</i> (2017) – Additional amendment in 2019 <i>Niue</i> (2021) – updated in 2014 <i>Tonga</i> (2017) <i>Vanuatu</i> (2000)	NBC in Process of Updating with Unknown Structure <i>Fiji</i> (2022) – ADB supported. Unknown if previous structure will be retained or modified.	NBC updated with New Structure <i>Samoa</i> (2017)	<i>RMI</i> – Draft of 1 st Building Code 2021/2022 based on ICC model code <i>FSM</i> – NBC Technical Working Group Established 2021 with intent to adopt ICC model codes
	NBC in Official Process of Updating Retaining Previous Structure <i>Solomon Islands</i> (2021/2022) – DFAT Supported <i>Tuvalu</i> (2021/2022) – WBG supported <i>Nauru</i> – 2022 development of 1 st NBC.			

	Building Codes that generally retain their NBC structure from the 1990s/2000s Pacific Building Standards Project
	Building Codes that are in development and structure of new NBC is unknown
	Samoa Building Code Structure – new structure that is different from their previous NBC developed under the 1990s/2000s Pacific Building Standards Project
	North Pacific Building Codes – in development. Generally Compact projects specify the use of the ICC model codes and referenced standards.

Source: Mapping of PIC building codes by the authors.

ADB = Asian Development Bank; DFAT = Australian Department of Foreign Affairs; FSM = Federated States of Micronesia; HBM = Home Builders Manual; ICC = International Code Council; NCC = National Construction Code (Commonwealth of Australia); NBC = National Building Code; RMI = Republic of the Marshall Islands

South Pacific: As discussed in previous sections the structure of the most current legislated NBCs of nine PICs were analyzed, noting that Nauru does not have a building code. These PICs compared generally follow the Australian and New Zealand Building Codes.

- Of the nine South Pacific PICs that have legislated NBCs, eight have almost identical structures and align well with the Australian National Construction Code; this is due to the impact that the 1990s/2000s Pacific Building Standards Project had in the region by providing a harmonized and consistent building code to each of the PICs. Several PICs have updated and amended their NBCs and retained the same structure and format. This has contributed to regional harmonization and alignment of PIC NBCs.
- The latest edition of the Samoa NBC has a different Building Code structure than that of the other eight PICs. The structure of the Samoa NBC is not harmonized with the other PIC NBCs, although much of the content and referenced standards are compatible.
- The scope of the other eight PIC NBCs covers buildings, while the Samoa NBC also covers buildings, dams, seawalls and maritime infrastructure.

In addition, the following should be noted:

- The Tuvalu and Solomon Islands NBCs are currently being updated and legislated. These retain the structure of their previous NBCs, i.e., the 1990s/2000s Pacific Building Standards Project structure, which retains regional harmonization.
- Fiji is in the early stages of updating their NBC. It is unclear if the structure of the previous Fiji NBC will be retained or if the Samoa NBC structure or Australia NCC structure will be utilized. There is a potential for dis-harmonization with other Pacific region NBCs.
- Nauru is in the early stages of developing their NBC. The Nauru Action Plan adopts the 2022 Solomon Islands NBC as a basis for the new Nauru NBC. This will retain regional harmonization.

North Pacific: RMI is in the process of adopting the International Building Code with specific amendments that reference US standards. FSM and Palau generally utilize the US codes and standards in public and internationally funded projects. FSM has established a building code technical working group with the intent to adopt the International Code Council model codes.

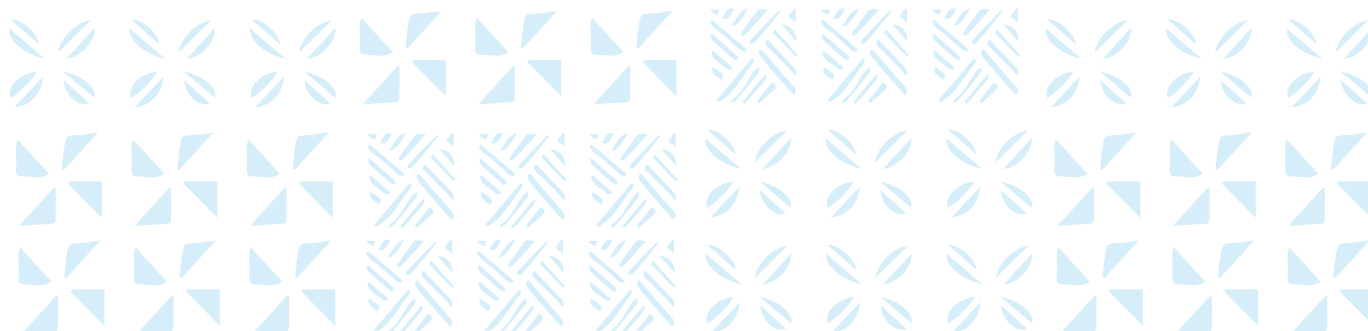
Harmonization and Evaluation Lessons Learned

Adopting different NBC structures for different PICs can be problematic for regional harmonization and coordination.

Recommendation: Retaining the historical NBC structure helps retain regional harmonization and familiarity and facilitates ease of doing business and mobility of building practitioners across the Pacific, eg Fijian engineers undertaking assignments in Vanuatu. In essence, there is currently a “Pacific Region Model Code”, but as PICs start updating their codes there is potential for dis-harmonization.

There is no regional coordination mechanism or forum to help ensure that Pacific NBCs are generally aligned.

Recommendation: Considerations should be given to the establishment of a regional body to coordinate NBC activities among all PICs.



3.7 Standards Bureaus

Overview

There exist three country standards bureaus in the South Pacific and one regional initiative. Country standards and quality control bureaus review and adopt international/regional standards as per country needs, develop specific country standards where appropriate, and sometimes enforce mandatory standards and products. Standards catalogues usually will include mandatory and voluntary building design, materials, practices, and testing/inspection standards.



Pacific Islands Forum Secretariat, Suva. Photo by Architects Pacific.

Standards Australia and Standards New Zealand

Standards Australia and Standards New Zealand are in the early stages of discussions with regional partners to make their standards more accessible for PIC stakeholders. Standards Australia is considering a new online platform as well as curated building sets for the Pacific, while Standards New Zealand, with the support of New Zealand MFAT, is considering sponsoring access to key standards for pre-agreed users.

There are also existing networks between established international standards bodies/institutes and emerging standards departments in the region working through longstanding bilateral ties, formal project work, ad hoc support and regional and international memberships. The current standards focus is on import/export trade products rather the construction techniques and materials.

Referenced Standards Lessons Learned

Standards Australia and Standards New Zealand building standards referenced in the South Pacific NBCs are not freely available to local regulators and practitioners and this creates a barrier to their proper application and enforcement.

The ICC Model Building Codes and NFPA standards are freely viewable online; but not all standards referenced within these Codes are freely available.

Recommendation: Mechanisms need to be explored that will allow PIC regulators and practitioners to access building standards more easily.

Regional Pacific Initiative

The PQI project, based in the Pacific Islands Forum Secretariat, is in an early stage of development to establish regional frameworks for standardization, metrology, conformity assessments, and quality promotion for all Forum Island countries. The recently established Pacific Islands Standards Committee (PISC) shows some initial promise to assist with the harmonization of standards across the region..

Regional Lessons Learned

Based on stakeholder consultations, the focus of PQI is not yet on building construction materials and techniques, but there is potential. There is also potential to develop Pacific Regional Standards for adoption by PICs.

Recommendation: the possibility of using PQI as a vehicle to promote and coordinate PIC NBCs should be explored.



Standards used in the South Pacific

Three South Pacific standards bureaus exist (Table 5). Australia and Standards New Zealand are also active in the South Pacific region.

Table 5: Standards Bureaus – South Pacific

Standards Bureau	Description
Fiji - The Fiji Department of National Trade Measurement and Standards DNTMS, Ministry of Commerce, Trade, Tourism and Transport	<p>Established under the Trade Standards and Quality Control Act 1992, the DNTMS prepares and promotes standards in relation to goods, services, processes and practices used and produced locally, for the protection of the health and safety of consumers and the environment, as well as for industrial development, in order to enhance the economy of Fiji.</p> <p>The DMTMS is a full member of the International Organization for Standardization an Affiliate of the International Electrotechnical Commission and a full member of the Pacific Area Standards Congress.</p> <p>The DNTMS signed a Memorandum of Understanding with Standards Australia International in 1998, which gave Fiji a platform from which it approached standardization issues. The Memorandum of Understanding gave the DNTMS the opportunity to adopt and modify Australian Standards as Fiji Standards.</p> <p>https://www.mcttt.gov.fj/division/national-trade-measurement-and-standards/standards/</p>
Samoa - National Standards Samoa (NSS), Ministry of Commerce, Industry and Labor	<p>Established in 2018, the NSS is entrusted to facilitate the development of national standards based on the needs of industry, community and government. NSS develops national standards, but is not responsible for enforcing, regulating or certifying compliance with those standards.</p> <p>https://www.mcil.gov.ws/services/consumer-protection/national-standards/</p>
Vanuatu - Vanuatu Bureau of Standards, Ministry of Trade (VBS)	<p>The VBS was established under the Bureau of Standards Act No. 14 of 2016 as a statutory body under the Ministry of Tourism, Trade, Industry, Commerce and Ni-Vanuatu Business. VBS was formally launched in August 2017 to develop, increase, and verify the quality of goods traded in an efficient and fair manner so as to reduce trade barriers and improve consumer welfare.</p> <p>VBS promotes standardization in industry and commerce; acts as a depository for all standards; prepares draft standards and to declare them as Vanuatu Standards; makes arrangements or provide facilities for the examination and testing of commodities and any material or substance from which or with which they may be manufactured, produced, processed, or treated and the manner of such manufacture, production, processing or treatment; provides for the assessment of manufacturing, process or management systems and their certification; and provides for the examination, testing and calibration of instruments, appliances, apparatus and weights and measures, weighing and measuring instruments in relation to their accuracy.</p> <p>The VBS is a Correspondent member of the International Organization for Standardization.</p> <p>http://www.vbs.gov.vu/</p>

Source: Mapping of PIC building standards by the authors.

DNTMS = The Fiji Department of National Trade Measurement and Standards; NSS = National Standards Samoa;

VBS = Vanuatu Bureau of Standards

Through a review of the key referenced standards cited in the NBCs and a review of the Standards Bureau catalogues of Fiji, Samoa, and Vanuatu, a misalignment has been noted. The standards catalogue of Samoa and Vanuatu do not include NBC referenced standards; while the Fiji standards catalogue does not align with the Fiji NBC (and in some cases is outdated). Updated standards catalogues provide an extra layer to ensure imported/exported construction materials are of a quality that is satisfactory to support resilient NBCs and prevent low-quality and hazardous materials from entering the country and being incorporated into building construction.



Standards Bureaus Lessons Learned

The DNTMS standards catalogue includes numerous Fijian standards for building design, materials, practices, and testing/inspection which are adopted and based on Australian and New Zealand Standards. The Fiji standards catalogue does not currently align with the Fiji National Building Code.

Recommendation: Fiji Standards catalogue to be reviewed and updated to align with the Fiji NBC.

The NSS and VBS catalogues currently do not include standards relating to construction techniques and materials.

Recommendation: Standards relating to construction techniques and materials would be a useful addition to NSS and VBS catalogues, similar to what Fiji has achieved with its standards catalogue.

Standards used in the North Pacific

US standards institutes and organizations are currently not active in FSM, Palau, and RMI.

3.8 Hazard Design Parameters

Overview

NBC hazard design parameters/maps that are scientifically based have appropriate geographic coverage, integrate climate change, and are regulated to ensure uniform hazard/uniform risk in building design and development planning support the proper and effective use of NBCs. In addition, they provide a consistent and level playing field for designers to compete, facilitating enforcement and compliance.

South Pacific

Nine South Pacific PICs have hazard design parameters indicated in their NBCs; however, these may require review and updating based on recent studies and scientific models, with improved geographic coverage (mapping) for PICs that have island groups/regions.

Example: DFAT-supported (GNS Australia & Standards Australia), GNS Science New Zealand-supported, and ADB-supported studies in Solomon Islands, Tonga, and Fiji indicate differences between science and the hazard design parameters provided in the NBCs. In some cases, scientific studies have highlighted new or elevated hazards that NBCs have accounted for.

Current initiatives, standards and guidelines to determine hazard parameters are:

Wind: HB-212 “Design Wind Speeds for the Asia-Pacific Region” published by Standards Australia in 2002 provides the best available information for design wind speeds for use with the AS/NZS design standards (it may require updating and greater geographic granularity). The latest AS/NZS 1170.2:2021 “Structural Design Actions, Part 2: Wind Actions” provides a climate change multiplier for Australia and New Zealand. For the Pacific, the climate change multiplier may be larger or smaller. It is recommended that a regional study be performed to determine the appropriate climate change multiplier for each PIC.

Seismic: Seismic hazard studies prepared by Geoscience Australia and New Zealand for the Solomon Islands and Fiji provides earthquake design parameters that can be utilized with the AS/NZS 1170 earthquake action standards. These studies are limited in geographic scope and may also exclude seismicity due to volcanic activity. A harmonized and consistent seismic source model that can be the basis for regional earthquake design parameters linked to the AS/NZS 1170 standard should be pursued.



Tsunami-Flood-Storm Surge: NBC hazard design parameters and building design requirements for resilience to flood (tidal, storm surge, inland flooding, earthquake-induced tsunami, and volcanic-induced tsunami that also integrates climate change and sea level rise) are lacking. In general, flood hazard design parameters (flood height and speed) are prepared and provided in land-use planning hazard maps. Flood design requirements such as strength, ground floor height, freeboard, and placement of equipment are lacking. Flood requirements should integrate and account for climate change.

Volcanic: Volcanic ash loading is not covered by NBCs, nor is there volcanic hazard mapping for land-use planning purposes. Some studies indicate that ash fall may be less than imposed load requirements. Volcanic ash can also have an impact on electrical systems. More research is required in to inform land-use plans and NBC design parameters.

North Pacific

Three North Pacific PICs do not have hazard design parameters legislated/regulated and there have been only limited studies. There exist US design guides that provide seismic and wind design parameters for certain North Pacific capitals, but these are not always utilized and there is a need to improve geographic coverage. United States Geological Survey seismic hazard studies and seismic design parameters are available for some US territories, but exclude the North Pacific PICs. North Pacific PICs utilizing the International Building Codes have the necessary design requirements for floods, but lack hazard maps to be able to design for them (Flood Insurance Rate Maps that provide flood zone, flood height, and flood speed).

Best Practice Case Study- Hazard Risk

SOLOMON ISLANDS – Building Importance Level

The updated 2022 Solomon Islands NBC introduced the concept of Importance Levels to provide a calculated response to hazard risk that considers the limited resources available in many PICs. The “building importance” guides design engineers on the appropriate design parameters identified in the NBC-referenced structural design standards. There are five importance levels:

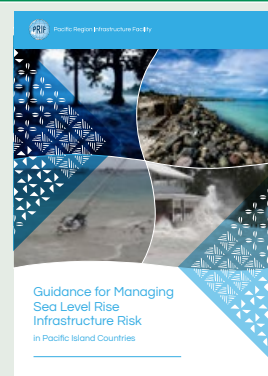
1. Low consequence for loss of human life or small or moderate economic, social or environmental consequences. Minor Structures (failure not likely to endanger human life)
2. Medium consequences for loss of human life, or considerable economic, social or environmental consequences. Major Structures (affecting crowds)
3. High consequence for loss of human life or very great economic, social or environmental consequences. Major Structures (affecting crowds)
4. High consequence for loss of human life or very great economic, social or environmental consequences. Major Structures (affecting crowds). Post-Disaster Structures (Post Disaster Functions or Dangerous activities)
5. Exceptional circumstances where reliability must be set on a case-by-case basis. Exceptional Structures (Beyond the scope of this code)

Best Practice Case Study – Climate Change Mitigation

PRIF – SEA LEVEL RISE

Sea level rise, which is experienced throughout the Pacific, is adversely affecting infrastructure and, consequently, communities. Combined with ongoing intensification of coastal development and future projections of higher rates of sea level rise for PICs, the risk and liability exposure are increasing.

PRIF has developed a Guidance Document on how to manage the infrastructure risks associated with sea level rise. This document shows regulators and design engineers how to approach sea level rise planning through the concept of dynamic adaptive pathways when considering infrastructure developments and NBC compliance requirements.



Hazard mapping Lessons Learned

Many of the PIC NBCs reference outdated structural design standards and/or Australian structural standards that do not take account of increased disaster risk specific to PIC climate change impact. Updating relevant NBC chapters to reference relevant multi-hazard criteria would improve construction outcomes and mitigate disaster risk.

Recommendation: There is a need for regional and country specific multi-hazard modeling considering building/asset typologies and existing NBCs that can reinforce and justify updates to NBCs, land-use plans, and coastal management plans using a harmonized and consistent approach that aligns with international best practice.

Evidence based hazard design parameters are a critical component of PIC NBC climate change adaptation and mitigation measures.

Recommendation: A study to assess/compare different approaches to hazard design parameters, referencing natural hazards/ climate change and noting good practices and lessons learned, would be useful.

Best Practice Case Study – Importance of NBCs and HBMs to support disaster reconstruction build-back-better activities

VANUATU –CYCLONE PAM TANNA SCHOOL RECONSTRUCTION

In 2015 the island of Tanna in Vanuatu was hit by a devastating tropical cyclone (TC Pam) which destroyed many of Tanna's buildings. In 2016-17 the Vanuatu Ministry of Education and Training (MoET), with the support of DFAT, undertook the reconstruction of classrooms at 18 primary schools which had been damaged by the cyclone. The classrooms were designed in accordance with the Vanuatu National Building Code (VNBC). Local builders were contracted on labor only contracts to construct the buildings with materials supplied and delivered under separate contracts by Port Vila based building material suppliers. One of the aims of the school reconstruction process was to educate local builders on how to “build-back-better” using designs conforming with the VNBC and cyclone resistant construction techniques informed by the Vanuatu Home Building Manual. This included properly reinforced blockwork, timber truss tie downs to bond beams, roofing sheet secured with cyclone screws to tied down roof purlins and cyclone shutters to windows.



Disaster Reconstruction – Lessons Learned

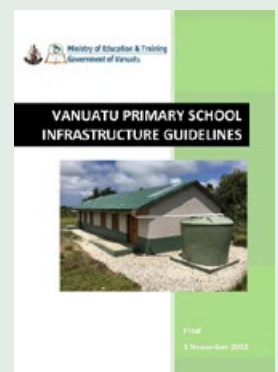
Recommendation: Ensuring compliance of designs to the National Building Codes and construction of buildings in accordance with Home Building Manuals are an important part of the “build-back-better” approach to disaster reconstruction.

Best Practice Case Study – Importance of NBCs in Ensuring Safe and Secure Education Buildings

VANUATU –VANUATU PRIMARY SCHOOLS INFRASTRUCTURE GUIDELINES

In 2022 the MoET, with the support of DFAT, prepared the Vanuatu Primary School Infrastructure Guidelines. A key requirement of the Guidelines is that all new “permanent” school buildings must be designed and constructed in accordance with the structural, fire safety, access, egress, natural lighting, ventilation, social inclusion, and WASH requirements as described in the Vanuatu National Building Code (VNBC). For new “semi-permanent” buildings the guidelines require that the structure, at a minimum, should be designed and constructed to comply with the VNBC.

Additionally, the guidelines require that every school in Vanuatu should have at least one double classroom is built of permanent materials and designed to withstand cyclonic and seismic hazards in accordance with the VNBC. The guidelines note that where the National Disaster Management Office advises that there are no other nearby emergency shelters this building can be designated as an emergency shelter for the community during tropical cyclones.



Safe and secure Education Buildings – Lessons Learned

Recommendation: Embedding references to National Building Codes in education infrastructure guidelines helps to ensure that school buildings are safe and secure and support the key principles of the ‘Child Friendly Schools Approach’ developed by UNICEF.



4. Stakeholder Views

4.1 Overview

To understand how stakeholders can benefit from NBC improvements, facilitate NBC coordination and harmonization, support the sharing of NBC best practice, and leverage lessons-learned and support related initiatives, the INBCSP-TA team:

1. Established points of contact with the ministries responsible for regulating building codes and regulations in all 13 PIC PRIF members (for details of the Point of Contacts, status of engagement, and NBC-related activities in each of the PICs, refer Annex A).
2. Developed NBC survey questionnaires (refer Annex D for a typical sample), held virtual briefing sessions, and received back responses from nine of the remaining 10 PIC members who currently operate NBCs (Tuvalu was unable to attend the briefings and did not submit a response to the questionnaire).
3. Prepared survey questionnaire forms for the three PICs where PRIF will support the preparation of new NBCs (FSM and Nauru) and review existing NBCs (Kiribati) that will help inform technical working groups when preparing and implementing their NBC Action Plans.
4. Established points of contact and held virtual meetings with four of the development partners (World Bank, ADB, Australian DFAT, New Zealand MFAT) and documented their projects and initiatives that may impact Pacific NBCs and improve NBC regional coordination and harmonization. (refer Annex A for details of points of contact and outline of current activities).
5. Established points of contact with 19 regional stakeholders, held virtual meetings with 12 of them, and documented their current pacific projects and initiatives that may impact Pacific NBCs and improve NBC regional coordination and harmonization (refer Annex A for details of regional stakeholders that have been consulted).

N.B.: The consultations with national stakeholders focused on obtaining views from authorities with responsibilities for enforcing and improving the NBCs. A previous PRIF study canvassed a wide range of views from other national stakeholders including private sector representatives for the countries of Fiji, Vanuaut and Solomon Islands and can be found on the PRIF website.



Kitset housing Gizo, Solomon Islands

SOLOMON ISLANDS NBC AND ASSOCIATED LEGISLATION CONSULTATION

The review process for the Solomon Islands NBC and the preparation of the associated legislation involved a province-wide consultation led by senior Ministry of Infrastructure Development officials and local consultants contracted by the development partner DFAT. The team met with officials and private sector representatives in most of the Solomon Islands provinces and presented to them an outline of the NBC updates, proposed regulations, and legislation. A stakeholder feedback matrix was developed to record comments and the matrix was posted on the Ministry of Infrastructure Development website. Private sector construction practitioners were encouraged to add their comments online to the feedback record; 223 comments were received and recorded.

The team were guests on “tok-pisin-bak” radio, which engaged the general public in the consultation process.

Some of the more significant contributions that informed the final 2022 edition of the Solomon Islands NBC and associated regulations included:

1. Incorporation of local materials linked to nature-based infrastructures: sand, gravel, stones, hardwood, softwood, bamboo, etc.
2. Guidelines for the use of Solomon Islands timbers.
3. Clarification on NBC application to buildings on custom land.
4. Social inclusion, in particular disabled access to public buildings.
5. Asbestos demolition and removal.
6. Unexploded ordnance identification and removal.
7. Septic tank design and the collection and disposal of septic tank effluent in urban areas.
8. Penalties for noncompliance.
9. Gender equality inclusiveness into building control institutional bodies.

Key findings and lessons learned from the stakeholder engagement process can be grouped under the following headings:

1. NBC and HBM relevance and use
2. Thematic areas
3. Standards and Standards Bureaus
4. Legislation and building regulation
5. Building control institutional frameworks
6. Capability and capacity
7. NBC Awareness and promotion
8. Regional coordination and harmonization

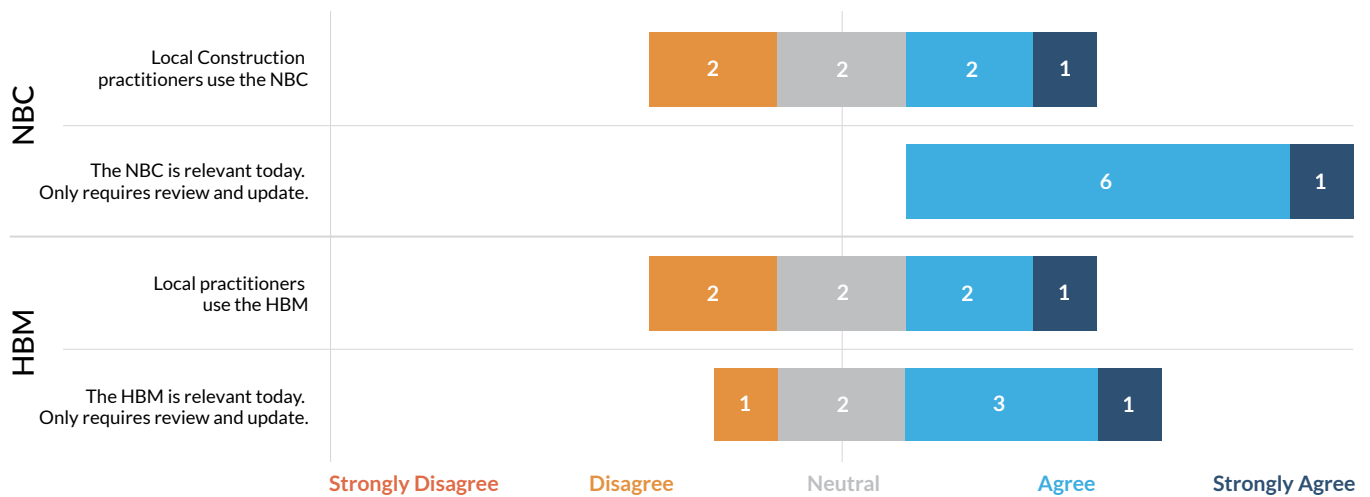
4.2 NBC and HBM – Relevance and Use

Views were sought from PIC government departments responsible for regulating their NBCs on the relevance and use of NBCs and HBMs. The bar graphs (Figure 3) indicate the distribution of views among various PICs from strongly agree (green) to disagree (red).

There is general agreement that NBCs are relevant today but require review and updating. There were mixed reviews as to whether the NBC was widely used by practitioners and as to whether the HBM is relevant today and used by practitioners.



Figure 3: NBC & HBM Relevance and Use



Source: Stakeholder surveys.

Abbreviations: NBC = National Building Code; HBM = Home Building Manual

Best Practice Case Study – Home Building Manuals

SOLOMON ISLANDS BUILDING MANUAL

The 1990 Solomon Islands HBM, which is almost identical to other HBMs developed in the late 1980s under the PBSP, has eight wind loadings and seven timber strengths which have made it difficult to navigate and use. The graphics and examples of typical building typologies are outdated. Simple single-storey buildings such as classrooms, places of worship and clinics are not included. Reference to the use of Local timbers use rudimentary.

The Solomon Islands Infrastructure Management Bill Assistance project is updating the 1990 Solomon Islands HBM to a 2022 Solomon Islands Building Manual (SIBM). The project has extended the scope of buildings covered under the SIBM to include all simple single-story buildings such as classrooms, places of worship, clinics, and other public buildings on custom land. The target audience is paraprofessionals and local builders. Key revisions from the 1990 Solomon Islands HBM are:

1. Number of wind speeds for design purposes reduced from 8 to 3, and their classifications now reference the topographical factors:
 - “Flat and Shielded” for 45m/s
 - “Ridge and Shielded” for 57 m/s
 - “Flat and Open” for 57 m/s
 - “Ridge and Open” for 69 m/s
2. Guidelines for the use of local timbers
3. Recommendations for improved material durability
4. Removal of masonry section
5. Removal of two-story building section
6. Simplification and improvement of text (simple English), diagrams, and tables
7. Improved layout and graphics

NBC HBM Relevance and Use Lessons Learned

The age and lack of awareness of NBCs can create an environment where practitioners are potentially designing buildings to a different code or standard and/or are utilizing more recent Australian and New Zealand codes and standards. This can create inconsistencies in quality and resilience and may create unfair competition between designers where building controls are ineffective.

Recommendation: HBMs need to be updated to make them more accessible to the target audience of paraprofessionals and local builders.

4.3 NBC Thematic Areas

PICs provided a range of responses regarding strength and weaknesses of their NBCs to address major thematic areas; noting that the local construction context, geography, and national priorities/policies may differ between PICs.

Based on views expressed in the survey responses, PIC regulators indicated that the top five priorities for future NBC amendments and additions are:

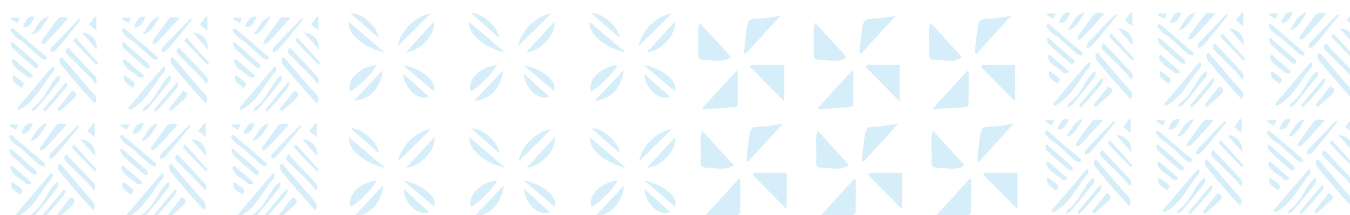
- Traditional design and local materials;
- Climate change mitigation and adaptation;
- Electrical;
- Building energy efficiency and renewable energy; and
- Rainwater collection and water conservation.

Other thematic areas of interest to the regulators included:

- Durability requirements and maintenance;
- Social inclusion and accessibility;
- Use of hazardous materials (asbestos, lead products, etc.);
- Sewerage and sanitation;
- Modern design and construction techniques; and
- Natural hazards and disaster resistant construction.

Conclusions drawn from the survey responses and stakeholder discussions:

- Integration of traditional design and local materials is a priority that has been further confirmed through the desire to create national and regional standards.
- Accessibility, sewage and sanitation requirements, and natural hazard/disaster-resistant design are a lower priority, indicating that there is either less concern or that development partner initiatives may be filling this gap (though NBCs have yet to be updated to address this area of concern).
- Low-maintenance and durable material requirements appear to be a lower priority even though infrastructure investment plans and stakeholder consultations indicate that there is a lack of resources and budget to maintain buildings in harsh coastal and tropical island environments that may not integrate low-maintenance and durable materials design philosophies. Integrating low-maintenance and durable materials in building design and construction should theoretically reduce budget and resource needs.
- Recent initiatives around climate change and building energy efficiency rank highly due to promotion, awareness, and national commitments. From a practical standpoint, energy efficiency, natural ventilation, water conservation, and natural lighting can reduce building operation costs and reduce the rate of utility infrastructure expansion, and thus budgets, as urban centres expand.
- Natural hazard design parameters should be reviewed more closely considering scientific developments and climate change.



Best Practice Case Study – Hazardous Materials

SOLOMON ISLANDS – NAURU ASBESTOS DEMOLITION AND REMOVAL

An important issue raised during the consultation process was asbestos removal during demolition. Asbestos was widely used as a building material in the Solomon Islands during the 1950s and 60s. In the 1990 building code (and other building codes developed under the PBSP) asbestos demolition and removal was not raised as an issue.

A clause was added into the Solomon Islands NBC noting that, where buildings to be demolished include either Bonded Asbestos Material (BAM - asbestos fibers compressed in fibro sheets) or Friable Asbestos Material (FAM - unbounded asbestos-containing material), an Asbestos Removal Control Plan must be prepared and approved by the Approval Authority and removed in accordance with the Plan by an Asbestos removal contractor approved by the Approval Authority.

There is also widespread use of asbestos on Nauru. The majority of buildings on Nauru were built during the 1950s, 1960s and early 1970s (the heyday of phosphate mining) using asbestos-based materials. In 2022, SPREP let a contract for the creation of a Nauru Asbestos Code of Practice.

Best Practice Case Study – Unexploded Ordnance

UNEXPLODED ORDNANCE REMOVAL

In 2011, the Pacific Islands Forum carried out an important study of unexploded ordnance in four PICs (Solomon Islands, Kiribati, Palau, and Papua New Guinea). The recommendations have been incorporated into the Solomon Islands NBC and will be used to inform the Kiribati NBC.



Best Practice Case Study – Social Inclusion

PDF –SOCIAL INCLUSION

The importance of social inclusion, and in particular accessibility, was a high-level issue raised during the Solomon Islands NBC consultation process.

The Pacific Development Forum (PDF), with the support of DFAT and Rights and Inclusion Australia, are in the process of developing accessibility design guidelines and standards for the Pacific. The 1990 NBCs reference the Australian Disability Standard AS 1428. This standard requires public buildings to have specialist fittings, e.g., specialist door hardware, tapware, sanitary fittings, tactile floor mats, etc., which are not available in most PICs. They can be imported but are very expensive relative to what is available at local hardware shops.

PDF and their Solomon Islands partner, People with Disabilities Association of Solomon Islands, were consulted on improvements to NBC social inclusion requirements. Important revisions included:

1. Substituting AS 1428 with the DFAT: Accessibility Design Guide: Universal Design principles for Australia's Aid Program - Annex A – Built Environment - (Available free of charge DFAT website) until such a time as the accessibility design guidelines and standards for the Pacific have been finalized and adopted by PDF; and
2. Removal of the clauses on concessions and adding of clauses on common building elements for accessibility.



Challenges accessing public buildings are common across the Pacific. Source: Tim Stats, Suva.

4.4 Standards and Standards Bureaus

Access to and adaptation of Australian, New Zealand, and International Standards

PICs have identified access to standards and the relevance of some Australian, New Zealand, and international standards as a barrier to compliance and enforcement. PICs have indicated that key NBC referenced standards should be freely viewable and accessible (AS, NZS, US, etc.).

Referenced Standards Lessons Learned

South Pacific: There are indications that there is a need to adapt certain AS and NZS standards to be relevant or practical to fully implement/enforce in PIC contexts (for example, fire, mechanical, plumbing/sanitation, and accessibility standards).

North Pacific: There are indications that the requirements of the ICC Model Codes and their referenced standards may require adaptation to the tropical island context. In addition, RMI, FSM, and Palau appear to indicate that international designers have difficulties in adapting standards to local context and environment which creates inefficiencies and challenges.

Recommendation: A feasibility study should be undertaken to determine the scope, technical challenges, and adaptation needs to adapt specific ICC, AS and NZS standards and codes to be relevant or practical to PICs.

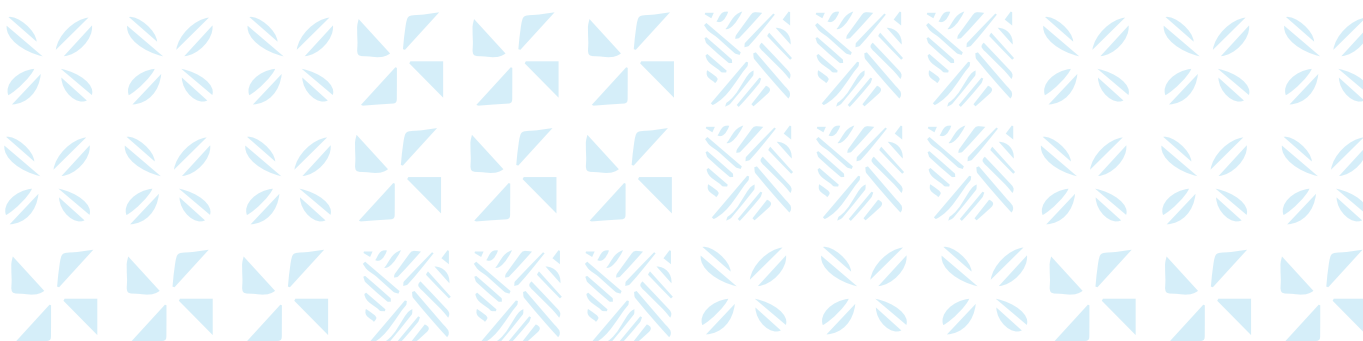
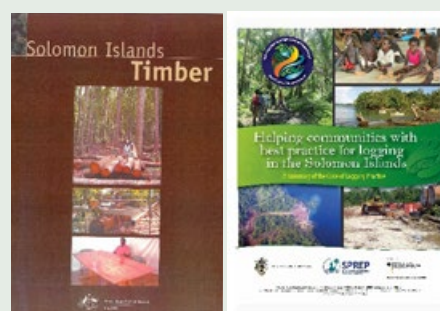
National and Pacific Regional Construction Standards for Local Materials and Practices

Regional activities and stakeholder feedback indicate a need to develop local material and traditional construction standards (traditional construction, coral masonry, coral concrete masonry blocks, and local timber) that could be referenced in NBCs to ensure preservation of local/traditional practices and utilization of locally available materials while ensuring resilience and quality. For example, the Cook Islands indicated the need for coral masonry standards; Vanuatu, Solomon Islands, and Tonga indicated needs for local timber standards; and, from experience, coral- and basalt-based concrete block standards and coral- and basalt-based concrete standards are relevant across the Pacific.

Best Practice Case Study – Nature-based materials

SOLOMON ISLANDS TIMBER GUIDELINES

Incorporation of local materials linked to nature-based infrastructures and Guidelines for the use of Solomon Islands timbers was high-level issue raised during the Solomon Islands consultation process. The Solomon Islands Ministry of Forestry and Research has produced “Helping Communities with Best Practice for Logging in the Solomon Islands – A Summary of the Code of Logging Practice” (supported by SPREP) and “Solomon Islands Timber” (published in 2005 under the Solomon Islands Forestry management Project supported by DFAT) wherein 20 timber species—14 indigenous and six exotic species—are described together with physical and mechanical properties, workability, and seasoning properties. These guidelines were reviewed by the structural engineers consulting on the new SIBM and key elements of the studies incorporated into it.



Local Materials and Practices Lessons Learned

NBCs generally reference material and design standards that are aimed at modern techniques and materials that may have to be imported and in some cases are inappropriate to PIC conditions.

Recommendation: To ensure that NBCs are relevant and context-appropriate, specific national and regional standards could help expand and improve NBCs/HBMs.

Additional building construction standard needs should be explored further with PIC focal points. There are potential opportunities to be identified:

- additional construction standard needs;
- which construction standards are country-specific and which could be developed as Pacific regional standards;
- whether there are international construction standards that could be adopted and/or adapted as national or Pacific regional standards; and
- whether a specific material or practice should be standardized or if a guideline/regulation would be more appropriate.

Pacific regional and national standards could be developed with the assistance of PQI.

Guidelines/standards should be developed for nature-based materials which could be referenced in the NBCs and HBMs.

Enforcement of Standards and Testing Capacity

Stakeholder engagement and literature review have indicated that PICs have limited capacity and capability to enforce standards and have no or very limited facilities to test materials/ products/ equipment (except Fiji, which has a testing laboratory run by the private sector). Adding to this, an institutional review of how building inspection functions could be adjusted to increase effectiveness, including a carrot and stick approach that would mix punitive measures with positive incentives within a specific economic and social context, would be useful.

Materials Testing and Quality Control Lessons Learned

PICs have limited capacity and capability to enforce standards and have no or very limited facilities to test materials/ products/ equipment.

Recommendation: From the viewpoint of building construction imports and exports, it would be prudent to perform an institutional and regulatory analysis to understand responsibilities and capacity for administration and enforcement of imported and exported construction materials. i.e., Trade and Customs Controls, Standards Bureaus, etc. Furthermore, this analysis could also determine a PIC's capabilities and facilities to test construction materials, products, and equipment. Such an analysis could also benefit all construction sectors, not just the building construction sector.

Interest in Standards Bureaus

Six PICs government focal points for building infrastructure were asked if they desired to legislate a "Trade Standards and Quality Control" Act/Decree to establish a Standards Bureau to adopt mandatory and voluntary standards (standards catalogue) to control the quality of imported, exported, and locally produced materials/equipment.

Strongly Agreed	South Pacific: Niue and Solomon Islands North Pacific: RMI
Agreed	South Pacific: Tonga North Pacific: Palau
Disagreed	South Pacific: Cook Islands



Standards Bureaus Lessons Learned

There is a general interest in establishing national standards bureaus.

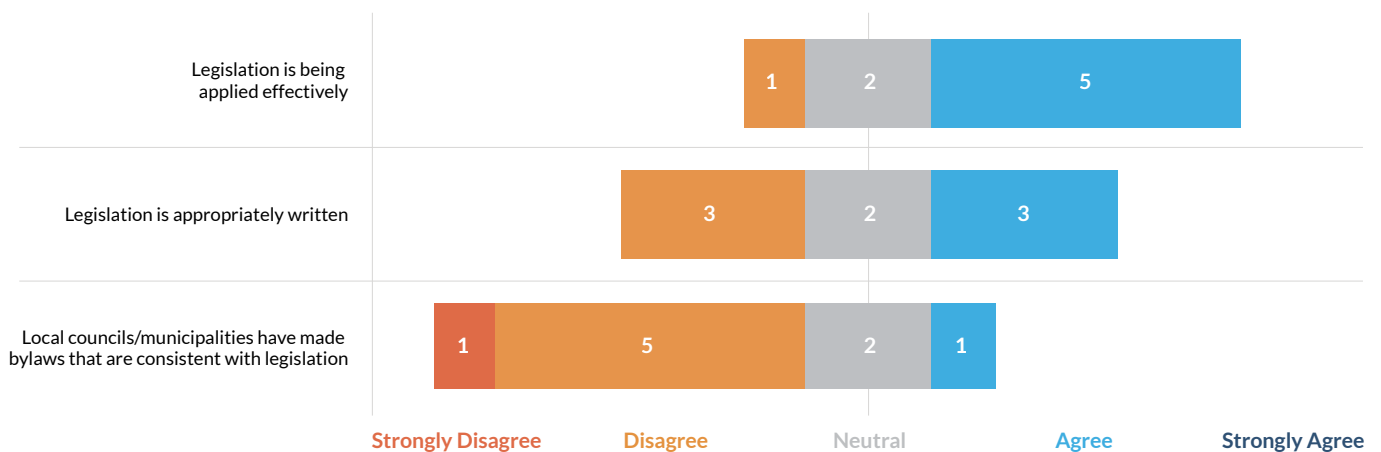
Recommendation: Further assessment should be performed to understand the resource and capacity to establish national standards bureaus, obtain confirmation from other government stakeholders, and understand how national standards bureaus could interface with the PQI project. Increasing the number of PIC standards bureaus could see benefits not only for building construction material trade but also for other trade activities.

Recommendation: PQI has a high potential to serve as a Pacific Region Standards Association to harmonize/coordinate national standard bureaus and assist in the development of Pacific region and national construction standards (and other trade standards), i.e., promoting and harmonizing trade development and construction quality through standards and processes

4.5 Legislation, Building Regulation

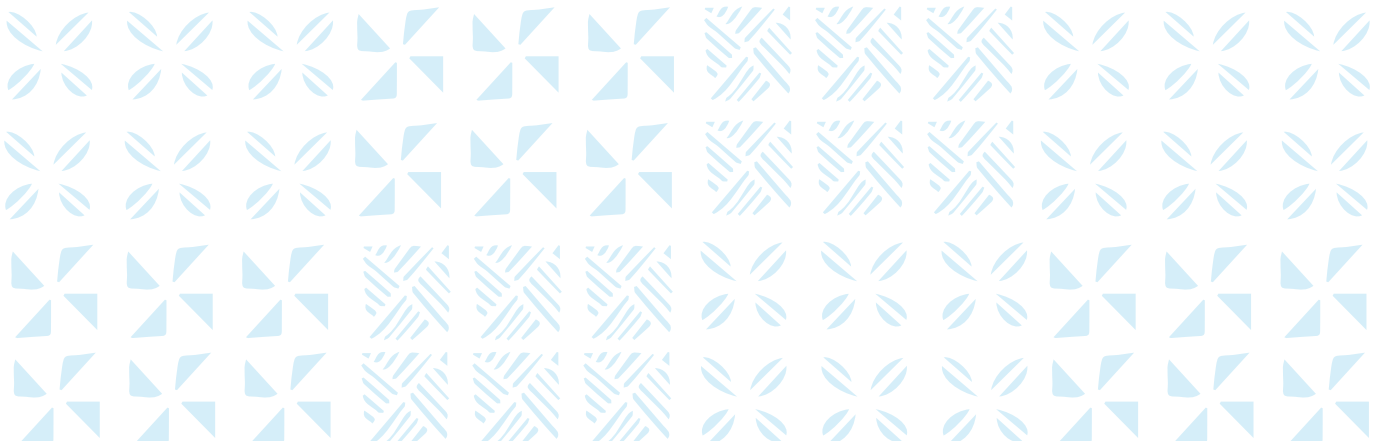
Views were sought from PIC government departments responsible for regulating their NBCs on the effectiveness, appropriateness and consistency of NBC legislation and building regulation. The bar graphs (Figure 4) indicate the distribution of views among various PICs from strongly agree (green) to disagree (red).

Figure 4: Legislation



Source: Stakeholder surveys

There is general agreement that current building construction legislation is being applied effectively at a national level, but results are mixed on whether legislation and building regulations are appropriately written to enable easy interpretation by construction designers, builders and inspectors. There are strong indications that at a local government level local ordinances and bylaws may not align with national legislation and building regulations.



Best Practice Case Study- Legislation

VANUATU LEGISLATION

In 2012, the Vanuatu Ministry of Infrastructure and Public Utilities, with the assistance of the Public Works Department and DFAT, drafted legislation for a Building Bill to provide for the Vanuatu NBC 2000 edition. The bill was based on Victorian legislation and was enacted in 2013 as Building Act no. 36 of 2013. Preparation of the act involved extensive consultation at national and sub-national levels and with representatives from the Vanuatu construction industry.

The legislation defines the buildings to which the Act applies and sets out the responsibilities for maintaining, administering, and enforcing the act in unambiguous terms. The Act sets out requirements for building permits, inspections and enforcement, and offenses and penalties. The Act is strongly supported by the Ministry of Infrastructure and Public Utilities and Port Vila and Luganville municipalities. The Ministry of Infrastructure and Public Utilities Director General is a strong advocate of the legislation and provided a presentation of the Act at the recent workshop conducted by PRIF for the NBC diagnostic study.

The consultation undertaken at the local level and the simple language used to describe how the Act can be applied by regulators, local construction practitioners and inspectors is a good example for the drafting of new bills and the review and update of existing NBC legislation in other PICs.

Best Practice Case Study-Institutional Strengthening

FIJI - NBC LEGAL AND INSTITUTIONAL ARRANGEMENTS STRENGTHENING

The 2019 PRIF diagnostic study of the constraints in the application of building codes in the Pacific determined that updating and revising building codes alone will not be enough to improve the built environment. The effective implementation of building codes and the realization of safe buildings requires robust governance mechanisms, institutional frameworks, planning tools, effectual compliance enforcement and awareness among construction industry practitioners, regulators, civil servants, politicians, and the public.

In 2021, the Government of Fiji requested ADB assistance to review, update, and revise the Fiji NBC and HBM. When considering this support, ADB determined that the Fiji NBC and HBM review and update should be part of a holistic assessment of Fiji's building control environment that includes strengthening the regulatory and institutional frameworks and compliance enforcement. To accommodate this holistic approach, ADB proposed to the Government of Fiji that the technical assistance include the following additional components:

1. Fiji NBC legal and institutional arrangements strengthened;
2. Fiji NBC compliance enforcement procedures strengthened;
3. Fiji NBC/HBM awareness raising strategy developed.

The Government of Fiji accepted these proposals. The technical assistance was started mid-2022 for completion in mid-2023.

The legal and institutional strengthening component includes:

1. Review, investigate, summarize, and benchmark Fiji's institutional arrangements, regulatory frameworks and building control legislation against recent comparable PIC legislation and building codes.
2. Recommend how the building control legislation should be improved and rationalized, the building legislation harmonized with related legislation, and how institutional arrangements can be strengthened and better administered.
3. Prepare FNBC Bill legal drafting instructions and assist the relevant responsible ministry to prepare a policy document for the new FNBC Bill and a ministerial briefing paper.
4. Assist the Office of the Solicitor General to progress the FNBC Bill and any amendments to other related Acts for Cabinet approval and presentation to Parliament.

These legal and institutional arrangements could be used as a model for development partner support for review and update of NBCs in other PICs

Legislation and Regulations Lessons Learned

Although legislation and building regulations can be applied effectively at a national level there is often a disconnect between National and Local/Municipal Council laws.

Recommendation: There is a need to review and provide recommendations to align national, municipal, urban, and rural legislation.

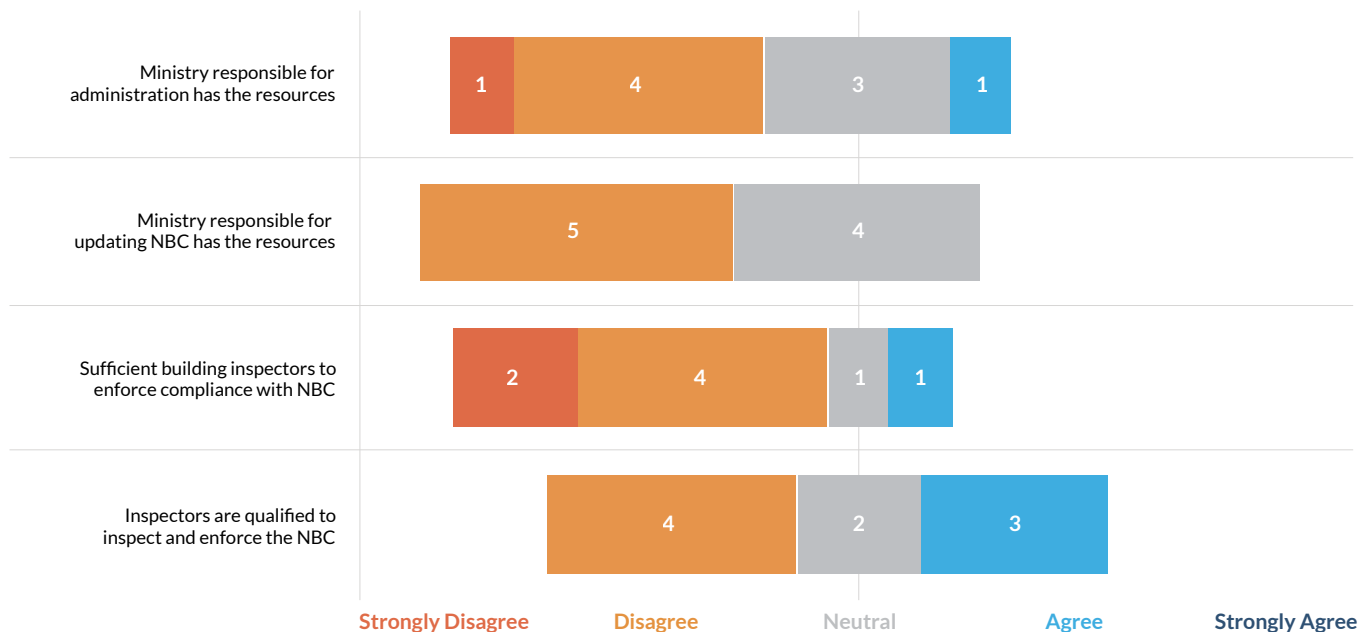
Strong ownership of legislation is critical to ensuring its effective application.

Recommendation: Extensive consultation at national and sub-national levels with representatives from the local construction industry needs to be conducted when drafting new legislation or reviewing and updating existing legislation. Draft legislation then needs to be widely disseminated for public, in particular home owner, review and input.

4.6 Building Control Institutional Frameworks

Views were sought from PIC government departments responsible for regulating their NBCs on whether their building control institutional frameworks have the capability and capacity to manage, administer and enforce compliance of their NBCs. The bar graph (Figure 5) indicates the distribution of views among various PICs from strongly agree (green) to disagree (red).

Figure 5: Building Control Institutional Framework



Source: Stakeholder surveys

There is general agreement that Ministries/Departments are at capacity or have limited/insufficient resources to administer and update their building codes. At the same time, numerous PICs have indicated that there are insufficient building inspectors to enforce NBC compliance with mixed indications as to whether inspectors are qualified to inspect or enforce the NBC.

Institutional Frameworks Lessons Learned

The capacity and effectiveness to administer, enforce and keep the NBC relevant is a weakness regionally.

Recommendation: The building control institutional framework, budget, resources, and large geographic area of the PICs are some of the key factors that have an impact on administration and enforcement. The building control institutional framework should be appropriately designed to match the budget and resources of the various actors involved. The building control institutional framework should not be developed in isolation of budget and resources.

Different models of NBC governance, especially under a ministry vs. independent authority, could be explored, including principal certifying authorities allowing the private sector to act on behalf of a government to review a building permit application.

Recommendation: Reviews of NBC enforcement capacity and capability should include the following tasks:

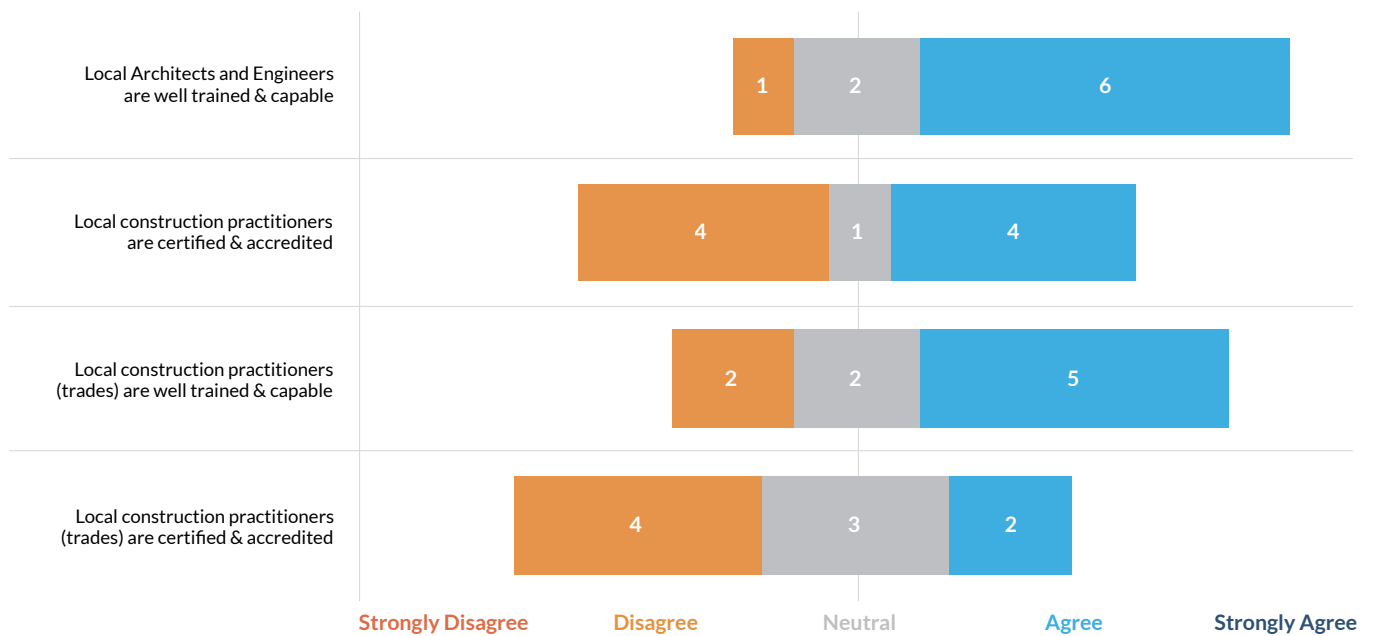
1. undertaking a gap analysis of the current building control regulatory human resource environment to identify shortfalls in regulatory resources and skills;
2. recommending a strategy for establishing and resourcing NBC compliance enforcement at local/municipal and provincial levels; and
3. preparing Terms of Reference for a 5-year program of capacity building and training targeted at strengthening NBC compliance.



4.7 Capability and Capacity of Construction Practitioners and Trades

Views were sought from PIC government departments responsible for regulating their NBCs on whether local architects, engineers and trades persons are well trained, capable and certified to design and construct buildings in accordance with the NBC. The bar graph (Figure 6) indicates the distribution of views among various PICs from strongly agree (green) to disagree (red).

Figure 6: Local Capacity & Qualifications of Practitioners and Trades



Source: Stakeholder surveys

Architects and Engineers

There is general agreement that architects and engineers are well trained and capable. Many Pacific architects and engineers received their training and experience overseas. Architects and engineers generally obtained their education and training in Papua New Guinea, Fiji, Australia, New Zealand, US, and Philippines.

Construction Practitioners and Trades

There is general agreement that construction trades are well trained and capable but mixed agreement on whether trades are properly certified and accredited.

TVET

There was general agreement among PICs that technical and vocational institutes where construction technology is taught do have the capability and capacity to incorporate the NBC into their curricula and have the capability and capacity to train technical construction practitioners (trades persons, technicians and building inspectors, etc.). Only Fiji has the capability for training professional construction practitioners (architects and engineers).



Capability and Capacity Lessons Learned

Regional universities and colleges play an important role in the training of building design professionals that can design code-compliant buildings. Many architects and engineers obtain chartered professional status following their university studies.

Recommendation: Curriculum needs to include courses on NBC application, compliance and enforcement.

In certain PICs, there are limited architects and engineers available.

Chartered/Professional licensing is an important step in gaining access to PIC Government and Development Partner projects that require building designs to be performed by chartered and licensed professionals. Not having a chartered/professional license is a potential barrier for PIC architects and engineers doing business nationally and in the Pacific region

Recommendation: The establishment of a regional Pacific Architect-Engineer mobility and licensing/chartering program would allow architects and engineers from other PICs to assist PICs where access to architects and engineers is limited. This program could potentially be recognized and/or managed by other regional international organizations.

Some PICs require development and/or strengthening of certification/accreditation programs of construction practitioners and construction trades.

Recommendation: Certification/accreditation programs could be reinforced with skills training that aligns with existing Australian or New Zealand certification/accreditation programs or the potential for a Pacific Adapted Accreditation and Certification program that allows mobility of construction personnel and trades across the Pacific, i.e., regional recognition and mobility programs.

For many homeowners and small businesspeople professional architects and engineers are unaffordable.

Recommendation: HBMs can bridge this affordability gap but allowing local paraprofessionals and builders to construct HBM compliant buildings without the need for an expensive engineering design.



Kiribati Housing Corp. Source: Rhys Gwilliam

4.8 NBC Awareness and Promotion

Views were sought from PIC government departments responsible for regulating their NBCs on awareness by national government, local government, construction industry practitioners, builders, suppliers and the general public of the benefits of buildings complying with the NBC. The bar graph (Figure 7) indicates the distribution of views among various PICs from strongly agree (green) to disagree (red).

There is a general agreement that most construction practitioners, government regulators, local municipalities, construction materials suppliers and the general public are aware of their building codes and the importance of good construction standards. There were mixed reviews on whether government and the construction industry actively promote public awareness of the NBC.

Figure 7: NBC Awareness and Promotion (Government perspective)



Source: Stakeholder surveys. Note: For Palau – Building Construction Requirements
NBC = National Building Code

When preparing a NBC awareness strategy consideration should be given to developing a NBC-HBM media strategy with a local media company to promote a consultative process with the public, including engagement with local press, TV, radio, and social media.

Awareness and Promotion Best Practice Case Study

TUVALU FACT SHEETS

Under the Tuvalu government's 2021 Tuvalu NBC review and update, supported by the World Bank, fact sheets were developed to assist construction practitioners and persons lodging building permits to better understand the permitting process and the benefits of constructing building in accordance with Tuvalu's NBC. These facts addressed:

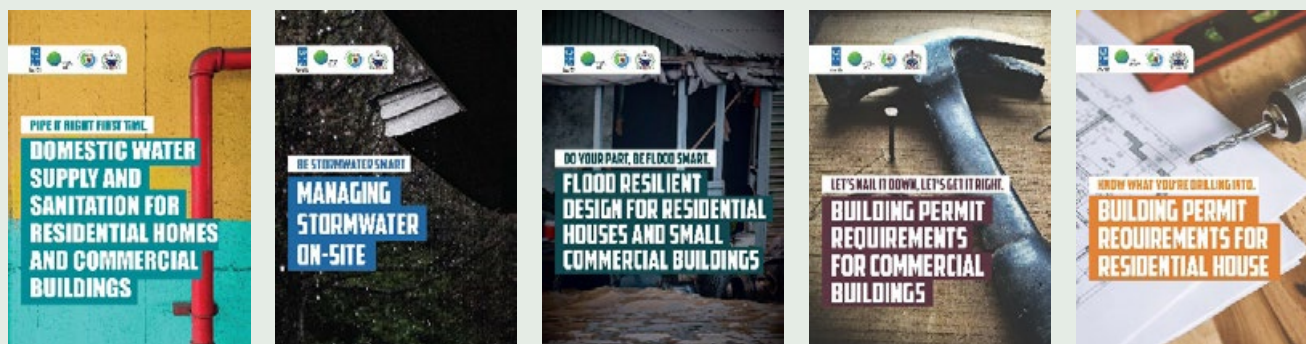
1. The building regulatory framework.
2. The building approval process, including an application process flow chart.
3. The NBC.
4. What the building regulatory framework means for those implementing it.
5. What the changes mean for commercial, public and group dwellings.
6. What the changes mean for single dwellings and outbuildings.
7. Existing buildings – Do I need a building permit?
8. New buildings – Do I need a building permit?
9. Dangerous buildings.
10. Ensuring compliance during construction.
11. Frequently asked questions.

The fact sheets, developed by the World Bank consultants, have been well received by the Tuvalu regulator and will be implemented once the new Tuvalu NBC is enacted.

The fact sheets have been adapted by the Solomon Islands Ministry of Infrastructure and Development as the basis for their own set of Fact Sheets for the updated Solomon Islands NBC.

Awareness and Promotion Best Practice Case Study

SAMOA BUILDING CODE HANDBOOKS



In 2017, the Samoa Ministry of Works Transport and Infrastructure, with support from UNDP, undertook an extensive review and update of its NBC. To support the introduction of the new NBC, the Ministry developed five handbooks:

1. Building permit requirements for residential buildings.
2. Building permit requirements for commercial buildings.
3. Flood-resilient design for residential houses and small commercial buildings.
4. Managing stormwater on site.
5. Domestic water supply and sanitation for residential homes and commercial buildings.

The handbooks are available in English (and some in Samoan) free of charge from the Ministry offices on the purchase of the NBC. The handbooks address common queries such as:

1. why is a building permit necessary?
2. difference between a commercial building permit and residential building permit?
3. when is a building permit required?
4. do you need to hire a professional to assist with permit application?
5. what can happen if you fail to apply for a building permit?



Promotion and Awareness Lessons Learned

The benefits of adopting NBCs are not widely understood by the public.

Recommendation: Strategies need to be developed by PIC regulators to promote the benefits and universal adoption of building codes and the supply of building materials that comply with the building codes and standards.

Recommendation: NBC Fact Sheets and handbooks available online or in hard copy from regulators offices are a useful tool for promoting NBC awareness and ensuring a smooth NBC application process.

4.9 Improved Regional Harmonization – Establishment of Regional NBC Secretariat

Views were sought from PIC government departments responsible for regulating their NBCs on the benefits of coordination and harmonization of NBCs and standards at a regional level. There was general agreement among all PICs that the establishment of a Pacific regional building construction forum supported by a secretariat to coordinate, advocate, monitor, and advise/support PICs on building legislation, regulations, codes, design criteria and standards, including the establishment of a Pacific Architect-Engineer licensing program, would be of significant value in promoting the construction of resilient and inclusive infrastructure in the Pacific. A framework, engagement mechanism, and mandate would need to be established through regional consultation.



Caption: Architects working on blueprints. Source: Dreamstime.com



5. Recommendations

Overview

Based on the findings, lessons learned, and best practice examples from the:

- documentation mapping exercise
- stakeholder discussions and survey responses, and
- years of experience the INBCSP team have of managing NBC compliant construction projects in the Pacific, short-, medium- and long-term recommendations that will improve NBCs and standards outcomes have been developed for consideration by PIC members, development partners and regional stakeholders.

Recommendations have been grouped under the following nine themes:

- Country Specific Actions and Recommendations
- NBC HBM Relevance and Use
- Hazard mapping
- Standards and Standards Bureaus
- Legislation and building regulation
- Building Control Institutional Framework -Capability and Capacity
- Technical and Vocational Institutes
- Awareness and Promotion
- Regional Coordination and Harmonization

Key recommendations are summarized in the Executive Summary.

5.1 Country-Specific Actions and Recommendations

Numerous actions can be taken by PICs that require different levels of funding and effort. From a practical point of view, there are four key actions that should be performed in the short term that will have the highest direct impact on PIC building construction:

Short term

1. **Action Plans:** Create and/or update a Building Code Action Plan that is realistic and practical through the designated Building Code Technical Working Group or Council. Advocate for budget, financing, and resources to implement Building Code Action Plan.
2. **National Building Code Updates:** Update, legislate, train, and/or promote the use of the NBC. At a minimum, update the key reference standard and review the hazard design parameters. If budget and effort permits, integrate climate change and traditional materials/practices. Plan and budget NBC reviews every 5-10 years.
3. **Home Building Manual Update:** Update the HBMs to make more relevant to para-professional designers and local builders and train and promote its use. Place substantial effort and focus on engaging and consulting local construction practitioners and trades in the updating process.

4. Legislation, Regulations and Building Control Institutional Framework & Budget/Resource Management: Assess the effectiveness of Building Construction legislation, regulations, and building control institutional framework (building administration, permitting, and enforcement). In parallel, perform a needs and gap assessment of resources and budget to administer and enforce legislation, regulations, and codes. Based on these two assessments, decide whether:
 - Legislation, regulations, and building control institutional frameworks need to be adjusted to fit current resources and budget;
 - OR whether Budget and Resources must be increased to achieve the appropriate level of enforcement of legislation, regulations, and building control;
 - OR a combination or variation thereof.

Medium and Long term

1. Country-specific building code action plans and technical advice covering medium- and long-term actions can be developed in partnership with PIC countries based around these short-term actions.

5.2 NBC and HBM Relevance and Use

Short term

1. South Pacific: Cook Islands, Niue, Samoa, Tonga, and Vanuatu should consider reviewing and updating their NBCs/HBMs, noting that Niue and Samoa may only require minor review to update their standards and hazards.

Medium term

1. **General:** Undertake a regional review of individual PIC NBC chapter sections and tailor nationally to specific thematic areas.
2. **Regional Harmonization and Coordination:** Carry out ongoing regional reviews of individual PIC NBC updates and share lessons learned and best practice with other PICs.
3. **Country-Specific Hazard Studies** (wind, seismic, flood, etc.) to be commissioned that will provide NBCs with updated design parameters (refer hazard, mapping recommendations outlined in the next section).
4. **North Pacific:** Advocate for Palau to pursue a building code or guide. Advocate for regional harmonization between RMI, FSM, and Palau.
5. **NBC Priority Themes:** Initial precursor studies should be pursued in the top five key thematic areas for each PIC to collect and perform more detailed analysis and recommendations for updating NBCs/HBMs in these areas.
6. **Other Key Themes for the NBC:** Initial precursor studies should also be pursued on low-maintenance, durable materials, accessibility, and sewage and sanitation. These should provide recommendations for updating NBCs / HBMs in these areas.

Long term

1. Regional Harmonization and Coordination: Advocate for harmonization and coordination in the South Pacific and North Pacific and advocate for PICs to update their building codes simultaneously to keep NBCs harmonized and generally aligned in their reference standards. Potential for Regional NBC secretariat to monitor, facilitate, and coordinate regional harmonization.

5.3 Hazard Mapping

Medium term

The following studies are required to update design parameters referenced in the NBCs.

1. **Wind:**

South Pacific: Update Standards Australia HB 212 “Design Wind Speeds for the Asia-Pacific Region”, with a focus on providing greater geographic granularity for each PIC island group/chain. Provide an appropriate climate change multiplier that can be used with AS/NZS 1170.2. Engage PICs to integrate design parameters of a HB 212 into NBCs.

North Pacific: Perform a regional study covering FSM, Palau, and RMI that provides ASCE 7 wind design parameters that integrate climate change. Design parameters should provide wind speeds for different island groups and may also include special wind study areas.

2. **Flood (inland, storm surge, tsunami, sea level rise):** Perform a desktop review to identify existing flood studies and hazard maps, design parameters, gaps, and needs across all PICs. Pursue country studies that prepare maps for PICs that can be used for land-use planning, coastal management, and building design. Flood hazard maps should integrate climate change and sea level rise and be developed to be consistent with an AS/NZS standard for the South Pacific or the ASCE standard for the North Pacific. Update NBCs to explicitly provide flood-resistant design requirements that link to mapped flood hazard design parameters.

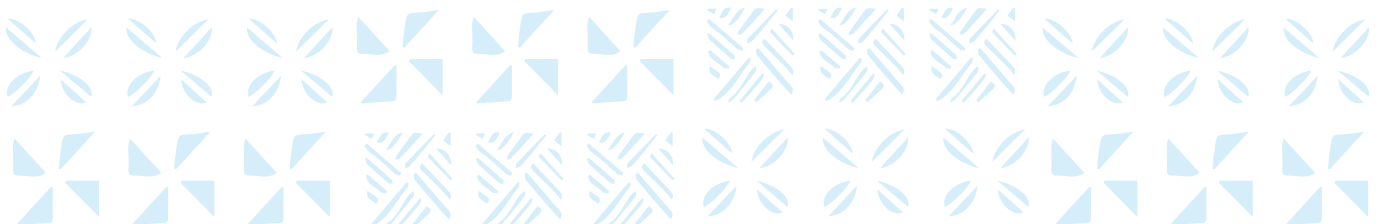
3. **Seismic:** Perform a desktop review to identify existing flood studies and hazard maps, design parameters, gaps, and needs across all PICs. Establish and create a Pacific region harmonized seismic source model (that also integrates volcanic seismicity) that can then be used to recommend seismic design parameters for use with the AS/NZS 1170 standard for the South Pacific and ASCE 7 standard for the North Pacific.

4. **Tsunami:** Perform a desktop review to identify existing tsunami studies and hazard maps, design parameters, gaps, and needs across all PICs. Using a Pacific region (Pacific, Asia, North America, and South America) harmonized seismic source model (that also integrates volcanic and under water landslide events) model and determine tsunami wave heights for different PIC Islands. Develop tsunami hazard maps (that include sea level rise) and recommend tsunami design parameters for use with the AS/NZS 1170 standards for the South Pacific and ASCE 7 standard for the North Pacific. Update NBCs to explicitly provide tsunami-resistant design requirements that link to tsunami hazard maps.

5. **Volcanic:** Perform a desktop review to identify existing volcanic studies and hazard maps, design parameters, gaps, and needs across PICs that have known volcanic activity and/or may be impacted by volcanic activity that occurs in the region. Prepare volcanic hazard maps (ash-fall, lahar flows, etc.) for land-use planning purposes and to provide any building design parameters. Update NBCs to explicitly provide volcanic design requirements for structure and electrical systems as required.

6. **Update and Maintenance:** Hazard studies, design parameters, and design requirements should be reviewed and maintained on a regular basis. In general, reviews should be performed prior to or as part of an NBC review (every 5–10 years).

7. **Landslides:** Landslides are another hazard that needs to be considered. While not directly NBC related, physical planning and siting of buildings in areas of potential landslides need to be considered.



5.4 Standards and Standards Bureaus

Short Term

1. **Referenced Standards:** Standards New Zealand, Standards Australia, and US Standards Institutes/Associations develop mechanisms that would enable key reference standards to be viewable to regulators and local design and construction practitioners at nil or a discounted fee.
2. **Fiji:** Update the Fiji DNTMS Standards Catalogue and any legislation that cites AS/NZS standards to match the updated Fiji NBC.
3. **Samoa:** Integrate the NBC of Samoa key reference standards into the National Standards Samoa Catalogue and include the latest edition of these standards (noting that some of the Samoa NBC referenced standards may have been superseded by newer AS/NZS versions).
4. **Vanuatu:** Integrate the NBC of Vanuatu key reference standards (latest edition of AS/NZS standards) into the VBS Standards Catalogue (in preparation for a future update of the NBC of Vanuatu).

Medium term

1. **National and Pacific Regional Construction Standards for Local Materials and Practices:** Perform a gap and needs assessment of national and pacific regional construction standards. Identify who can lead, assist, and support the development of these standards.
2. **General:** Coordinate a meeting between the three Standards Bureaus to discuss needs and share lessons learned, with a focus on building construction standards and potential cooperation. PQI and PRIF could partner to facilitate discussions.

Long term

1. **PQI assistance:** The Pacific Island Forums' (PIF) PQI project to assist PICs without national standards to establish standards bureaus.
2. **Materials/Equipment testing:** PQI to develop a strategy for the analysis of institutional and regulatory frameworks and capacities to enforce and test imported and exported construction materials/equipment.

5.5 Legislation and Building Regulation

Short term

1. **Legislative and Institutional frameworks:** Assist PICs to assess their national and subnational legislation, regulations, and building control institutional frameworks and address the disconnect between national NBC management and the administration and compliance enforcement at the sub-national level.

Medium term

1. **Regional legislative Review:** At a regional level, review NBC legislation from all PICs to identify case law examples and share best practice.

Long term

1. **Regional legislative Coordination:** Establish a regional Pacific organization to coordinate, advocate, manage, and advise/support PICs on building legislation, regulations, codes, design criteria and standards.

5.6 Building Control Institutional Framework – Capability and Capacity

Short-Medium term

1. **Gap Analysis:** Assist PIC Ministries/Departments, responsible for administration and enforcement of Building Construction, to perform a sustainable budget and resource management gap/need analysis that determines current effectiveness, identifies barriers, and proposes changes to legislation, budgets, and/or resource management. The tasks will include:
 - Gap analysis of the capability and capacity of individual PICS to manage, administer and enforce building legislation and codes.
 - Review of strategies to recruit qualified inspectors and strengthen the training of existing inspectors.
 - Capacity building and training strategies developed at a regional level that can be delivered nationally.

Long term

1. **Ease of doing business:** For the purposes of ease of doing business and creating regional qualifications, perform a regional feasibility study on establishing a Pacific region construction practitioner certification/ accreditation and mobility program that is linked to national societies. Verify whether Pacific tertiary education institutions require multi-lateral agreements with international and/or regional accreditation bodies.

5.7 Technical and Vocational Institutes

Medium term

1. **NBC Curricula Development:** At a regional level, develop curricula that would allow NBC-HBMs to be incorporated into construction training programs at secondary schools, technical institutes, and universities.

5.8 Awareness and Promotion

Medium-Long term

1. **Awareness Strategies-NBC:** Develop promotional and awareness activities at a regional level and tailor and deliver the activities at a national level to mainstream the use of NBCs and HBMs.
2. **Awareness Strategies-Building Materials:** Support the development of promotional and awareness materials that are targeted at material suppliers.
3. **Trade and Customs Controls:** Reinforce trade and customs controls and reinforce/establish standards bureaus to ensure that imported and locally produced construction materials follow the building code.

5.9 Regional Coordination and Harmonization

Short term

1. Perform a feasibility study on establishing a Pacific Region Building Construction forum and secretariat to advocate for and coordinate regional building construction harmonization, sustainable and resilient development, building construction practitioner certification/ accreditation and mobility, and ease of doing business. Draft a concept note, mandate, host arrangement, and framework engagement mechanism.

Regional organizations have mixed rates of success, so the feasibility study will need to provide a strong evidence-based case on why such a body is recommended for building codes. This would include weighing the pros/cons and investigating whether such a regional body would add bureaucracy to national building permitting processes. The potential for the secretariat to utilise regional building certifying officers to help review highly complex buildings in the region should also be explored.

Medium term

1. Undertake a regional review of individual PIC NBC chapter sections and tailor nationally to specific thematic areas and propose opportunities to harmonize chapter sections across multiple PICs.

Long term

1. Establish a PRBC forum and secretariat to coordinate, monitor, advocate, and advise/support PICs on building legislation, regulations, codes, design criteria and standards.

Potential activities of the secretariat could include, but are not limited to:

- i. Hosting an annual building construction forum to share lessons learned, coordinate, and determine current challenges and needs;
- ii. Coordinating and sharing best practices between PICs;
- iii. Publishing a biannual “Pacific Building Codes and Regulations Report Card” that tracks and monitors PIC building code progress, needs, and emerging issues against key indicators and/or national commitments;
- iv. Supporting and/or coordinating Institutional Framework and Building Code assessments;
- v. Advising PICs on stakeholder engagement and promotional activities;
- vi. Establishing and coordinating a regional mutual aid mechanism that would leverage the expertise of Pacific construction practitioners and government officials when PICs request assistance;
- vii. Advising and/or coordinating resources to support PICs and development partners;
- viii. Maintaining regional database/directory to support compliance.
- ix. Supporting and/or coordinating harmonized regional and national training and refresher programs focused on NBC administration and inspection;
- x. Establishing and coordinating regional qualification/certification and mobility programs for construction practitioners;
- xi. Advising and supporting the development of Pacific region and national building construction standards;
- xii. Advising, supporting, and advocating for hazard and climate change studies that can improve or be integrated into building codes;
- xiii. Advising, supporting, and advocating for traditional construction and local material studies/standards that can improve or be integrated into building codes;
- xiv. Advising and supporting other PIC Building Code/Standard related requests;
- xv. Advocating for PICs in other regional and international forums and conferences with regards to building codes and construction; and
- xvi. Insurance industry engagement and needs assessments.

The NBC secretariat could be led by a regional coordinator supported by key staff, with national coordinators engaged for specific NBC country requests. The secretariat could also be funded to engage specific consultants and/or firms to support PIC and development partner requests.

Considering the need to coordinate building standards with building codes, the Pacific regional building construction forum and NBC secretariat could potentially be hosted within the Pacific Island Forum Secretariat as a coordinating partner with PQI. A feasibility study should be performed to determine the most appropriate host and arrangements.



6. Importance of Regional Harmonization and Coordination

This TA has focused on the technical and operational aspects of building codes and standards through a coordination and harmonization lens. The analysis of NBCs and related documentation, stakeholder consultations, lessons learned, and recommendations have reinforced why retaining and maintaining NBC regional harmonization and coordination is beneficial and has numerous direct and indirect benefits for individual countries and the region. Disrupting regional harmony within the building construction sector can create barriers, disrupt existing practices, and create more effort.

The key reasons why retaining and maintaining regional harmonization and coordination is beneficial are outlined on Table 6.

Table 6: Importance of Harmonization and Coordination

Benefit	Comment
Ease of Doing Business	While noting real-world constraints due to sub-regional differences and affiliations, ensuring that regulations, codes, standards, and practices are of a similar nature across the South Pacific/North Pacific is conducive to national and international business. This could lead to greater opportunities for private and public sectors, reduces barriers for trade, improves building construction quality, increases mobility and opportunity for national and international building construction firms and personnel across the region, and builds regional confidence in investment and development.
Trade	Facilitating and adjusting to regional trade flows, while ensuring that building construction materials imports/exports meet the latest standards for quality and safety, reduces the potential for low-quality, hazardous, energy-inefficient imports being used by the Pacific regional building construction industry.
Insurance	<p>It has been noted that Contractors tendering for construction projects in the PICs are struggling to access the insurances and related risk engineering services required to deliver quality construction infrastructure projects funded by donors. The situation is gradually worsening as larger insurers reduce their positions in the region.</p> <p>To address this concern, PRIF have commissioned the ADB-PRIF Infrastructure Insurance Project. Confidence from the insurance industry to establish and provide building and construction insurance at the national and regional level will be enhanced by taking a coordinated and harmonized pathway to improving NBCs and standards across the Pacific.</p> <p>The draft ADB-PRIF Infrastructure Insurance Project report has a key recommendation that: “The Pacific Region should implement a program and systems for regional improvement of construction quality, based on consistent inspection and materials testing using the latest technology”</p> <p>This recommendation is supported by the findings from this TA.</p>
Regional Programs	Giving the Pacific region the ability to establish joint regional facilities, programs, rating systems, training programs, NBC updates, and standards development that benefit multiple countries simultaneously and enables development partners and donors to implement regional infrastructure and building construction programs more easily. Regional hazard studies can be more efficiently implemented, national regulators better informed and building code hazard parameters better designed to increase building construction resilience at the national and regional level. Regional programs offer the ability to increase funding/resource efficiencies and leverage results through single rather than multiple isolated programs.
Training and Qualifications	Providing the ability for PICs to establish regional training centers with harmonized curricula and qualification/certification programs for building construction professionals, trades, inspectors that aligns with building codes that are harmonized regionally.
Opportunity and Mobility	Increasing the potential for mobility of national construction firms, design firms, designers, builders, trades personnel, and inspectors to work easily across the Pacific due to familiarity with national NBCs that are harmonized regionally. This increases the potential opportunities for the private sector, gives PIC Governments access to the construction industry on other islands and provides the potential for a regional mobility and qualification/certification program.
Resource Sharing	Giving PICs the potential to request mutual aid between PIC governments and provide technical assistance or support after a disaster.
Lessons Learned and Information Sharing	Easing the sharing of information and lessons learned between PICs on the administration and enforcement of building codes and regulations and the leveraging of expertise across PICs to facilitate improvements and updates to national building codes and regulations.

Source: Authors. ADB = Asian Development Bank; NBC = National Building Code; PIC = Pacific Island Country; PRIF = Pacific Region Infrastructure Facility; TA = Technical Assistance.

Annexes

Annex A

Points of contact and current and recent projects with:

- PRIF development partners
- Ministries responsible for regulating building codes and building regulations
- Regional stakeholders

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Annex B

Outline of peer reviews undertaken

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Annex C

Bibliography

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Annex D

Typical NBC Survey Questionnaire (Vanuatu)

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