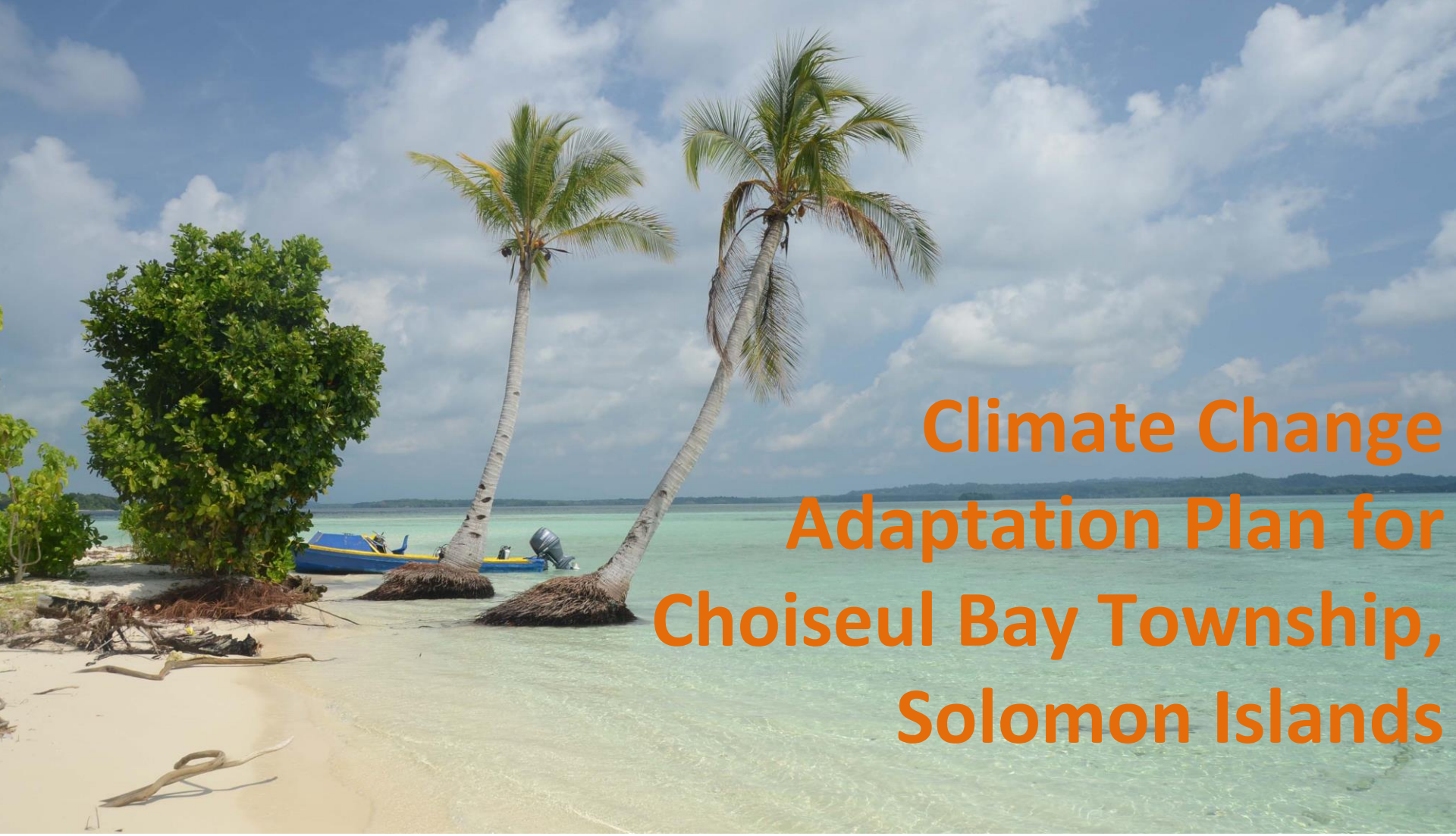


Climate Change Adaptation Plan for Choiseul Bay Township, Solomon Islands

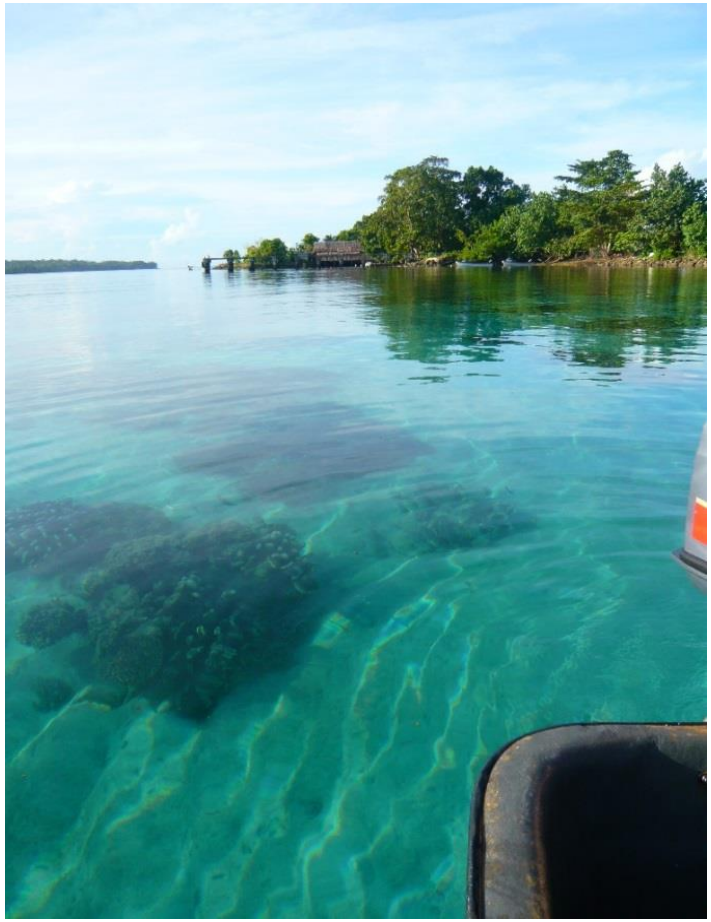
Dr Philip Haines and Ms Shannon McGuire

Sustainable Engineering Society - Technical Session

17 March 2015

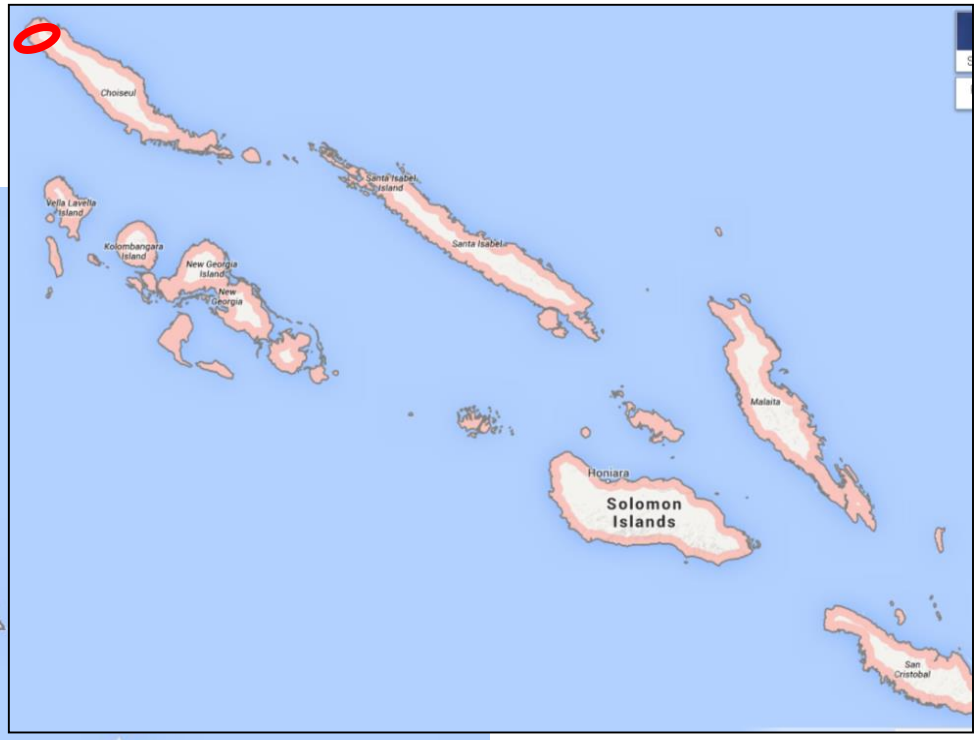
Presentation outline

- Context
- About the Choiseul Bay Climate Change Adaptation Plan
- Defining and managing natural hazards and risk in Choiseul Bay
- Community engagement
- Planning for a new provincial capital
- Best practice tips and tricks



Context


West Papua
Papua
Bismarck Sea
Papua New Guinea
Arafura Sea
Solomon Sea
Solomon Islands
Vanuatu
Fiji
Coral Sea
New Caledonia
Northern Territory
Queensland
Australia


Choiseul
Santa Isabel Island
Vella Lavella Island
Kolombangara Island
New Georgia Island
New Georgia
Santa Isabel
Malaita
Honiara
Solomon Islands
San Cristobal

Project drivers

- Taro Island very low lying
- Major coastal hazards:
  - Tsunami (2007 event and recent evacuations)
  - coastal storms and storm tide inundation
  - shoreline erosion
- Climate change & sea level rise impacts
- Limited land supply
- Community want to relocate
- Land acquired for new township site
- Need action plan to manage risks and relocation

Study area


Parama Island
Emerald Entrance
Choiseul Bay
TAREKUKURE
LOT 9
Sipozae Island
Mbochombochoro Island
Sull River
LOT 277
Taro Island
TARO

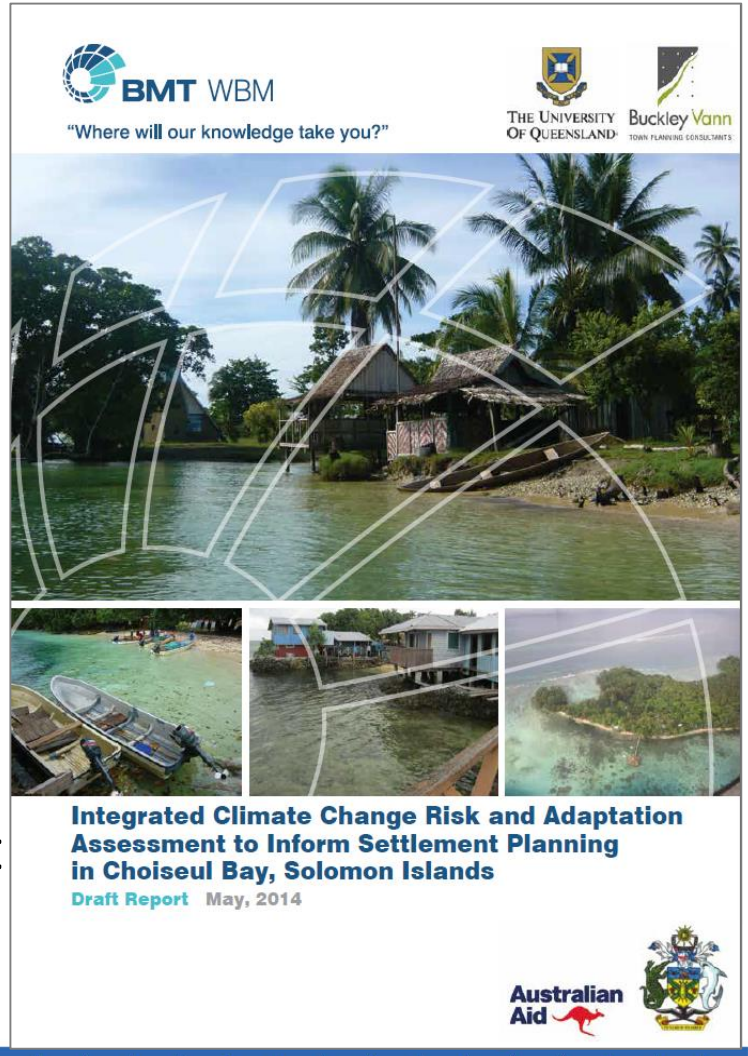
Project deliverables

- **Natural Hazard mapping**:
  - defined and quantified natural hazards
  - time periods: 2014, 2030, 2055 and 2090
  - used SLR projections based on 5th (IPCC) report
- **Risk** assessment and **adaptation** options
- **Vision** and **planning scheme**
- **Adaptation Plan** including **schedule of works** for relocation of capital

Choiseul Bay Township Climate Change Adaptation Plan

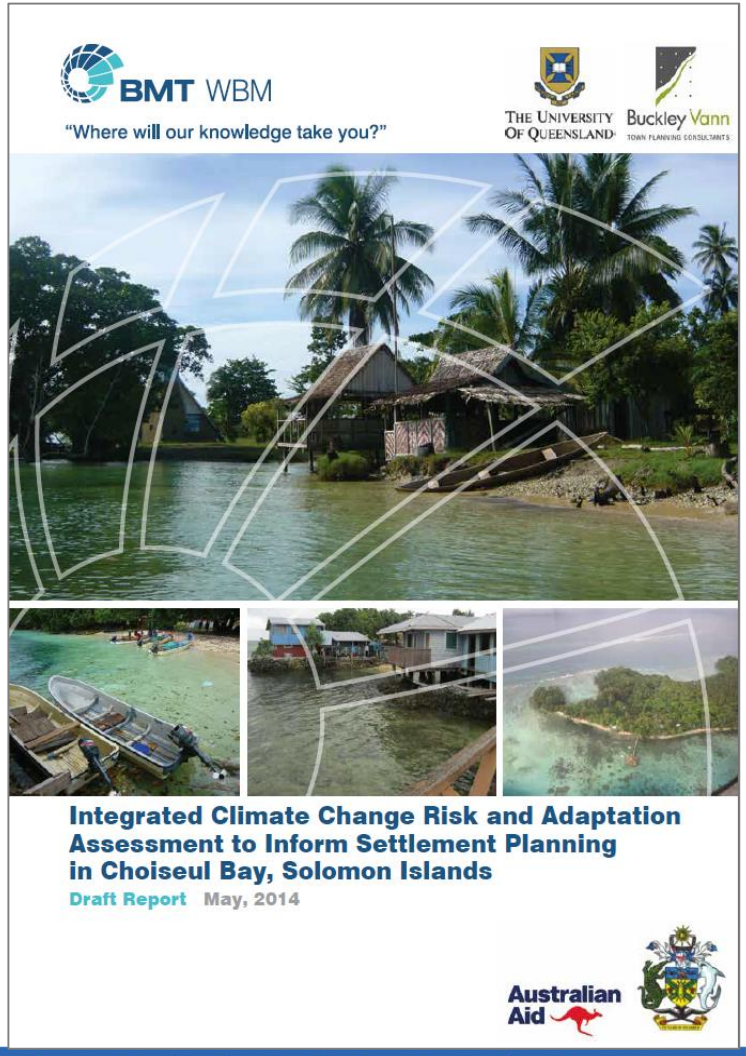
A plan has been prepared that:

- shows how climate change hazards are likely to affect Taro Island and new town site;
- makes recommendations about how to protect community and important areas from hazards & improve resilience;
- guides how and when new development & relocation should occur in future.

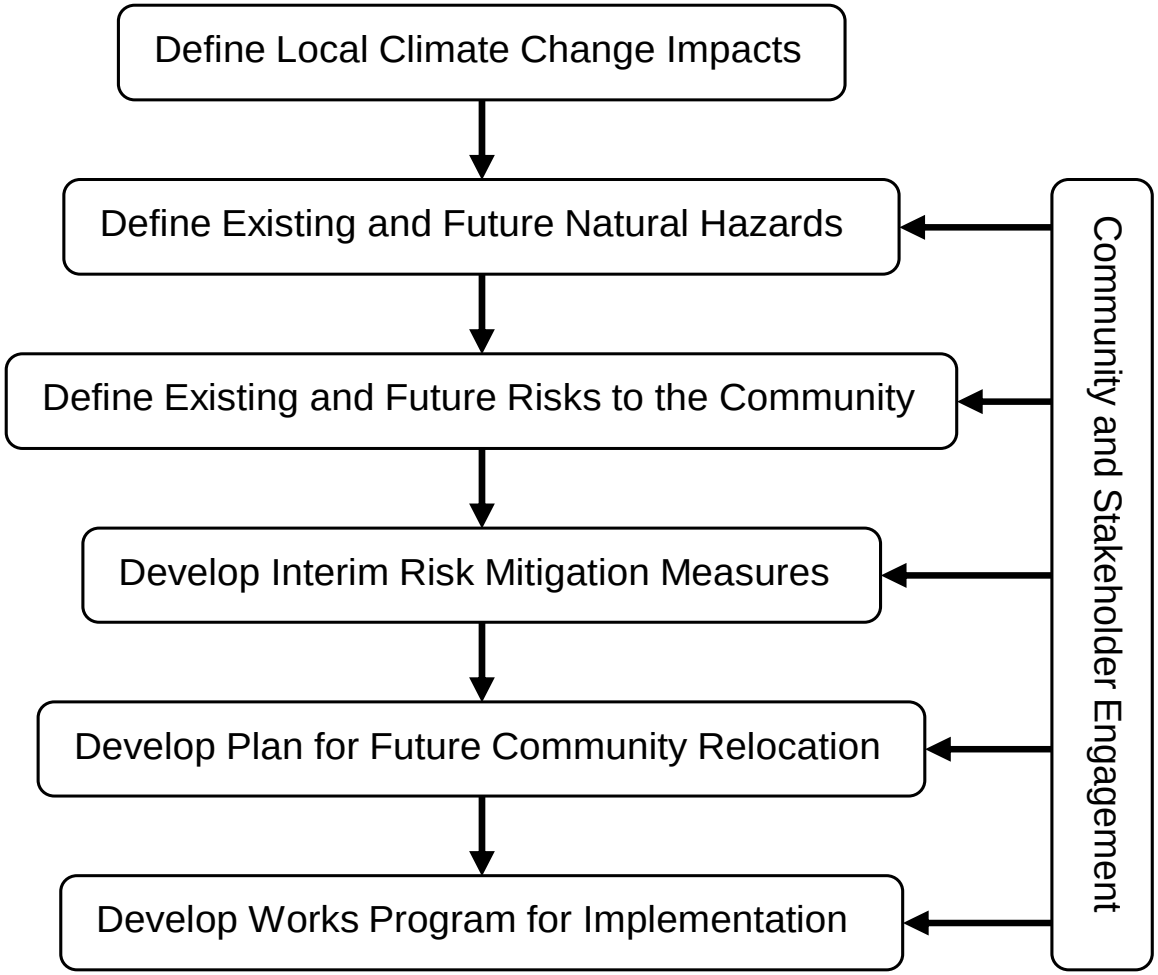


Choiseul Bay Township Climate Change Adaptation Plan

- Emergency Response Plan
- Asset and infrastructure management
- Shoreline revegetation
- Monitoring
- **VISION AND PLANNING SCHEME FOR NEW TOWN DEVELOPMENT**

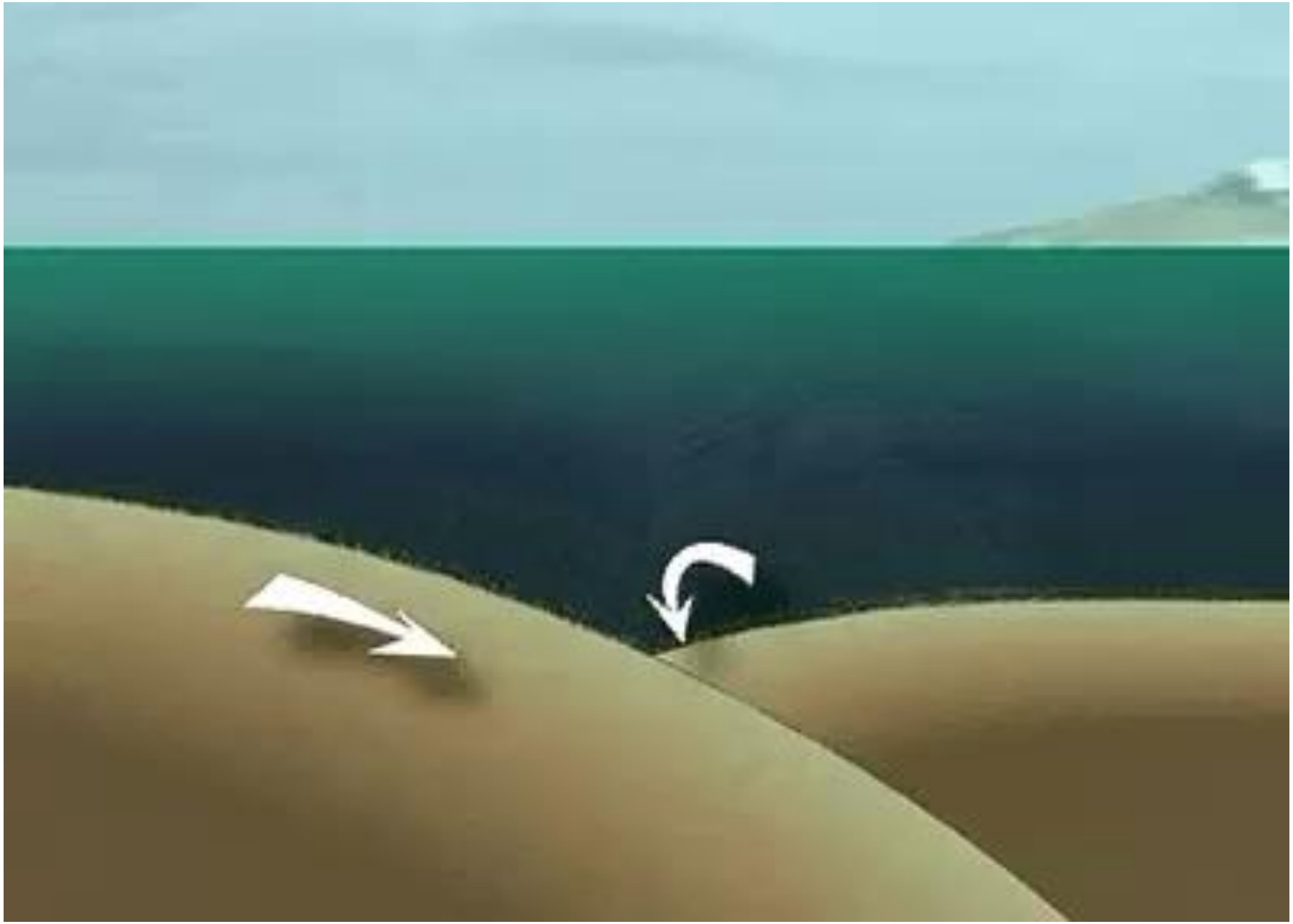


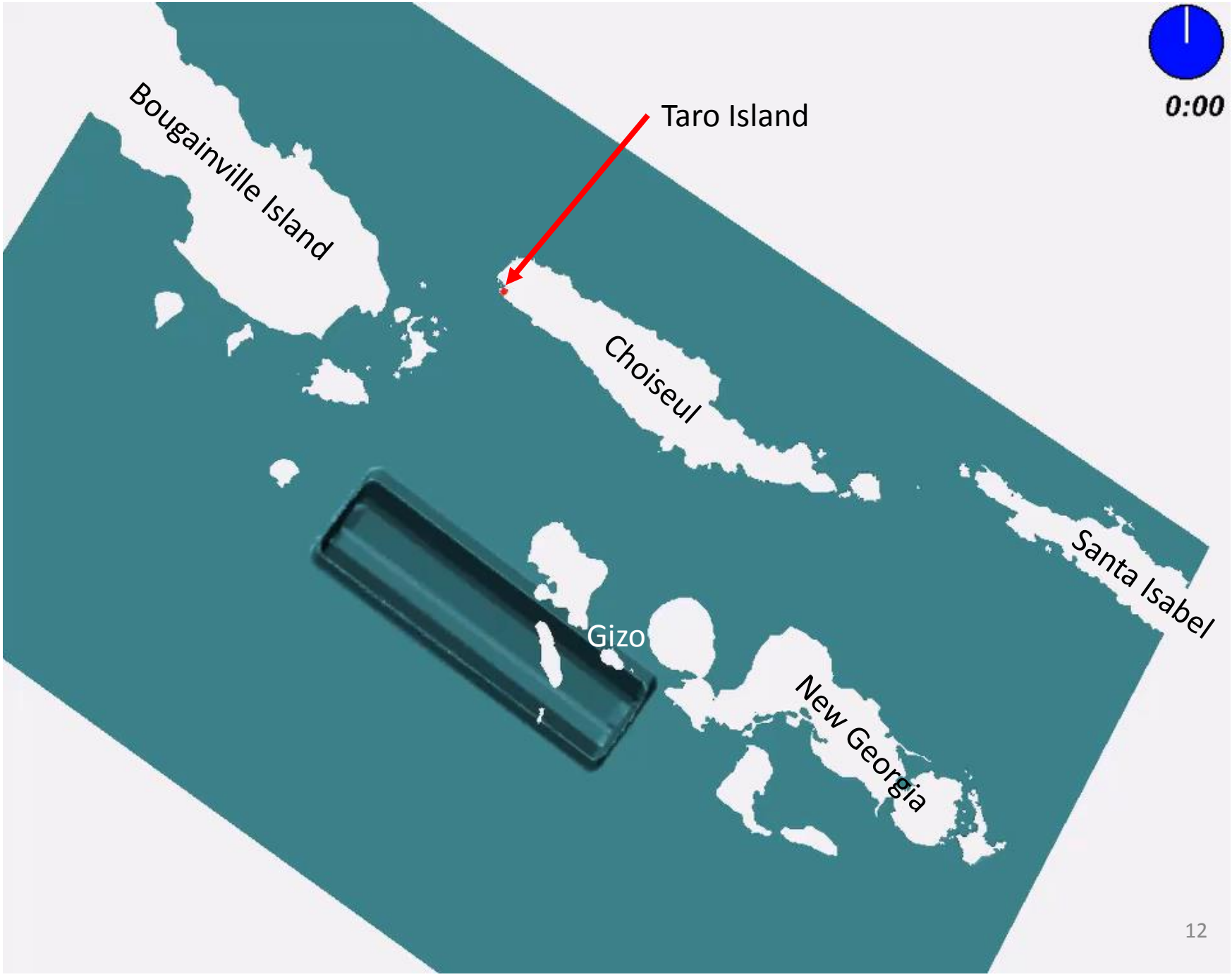
An integrated risk-based process



Types of Hazards

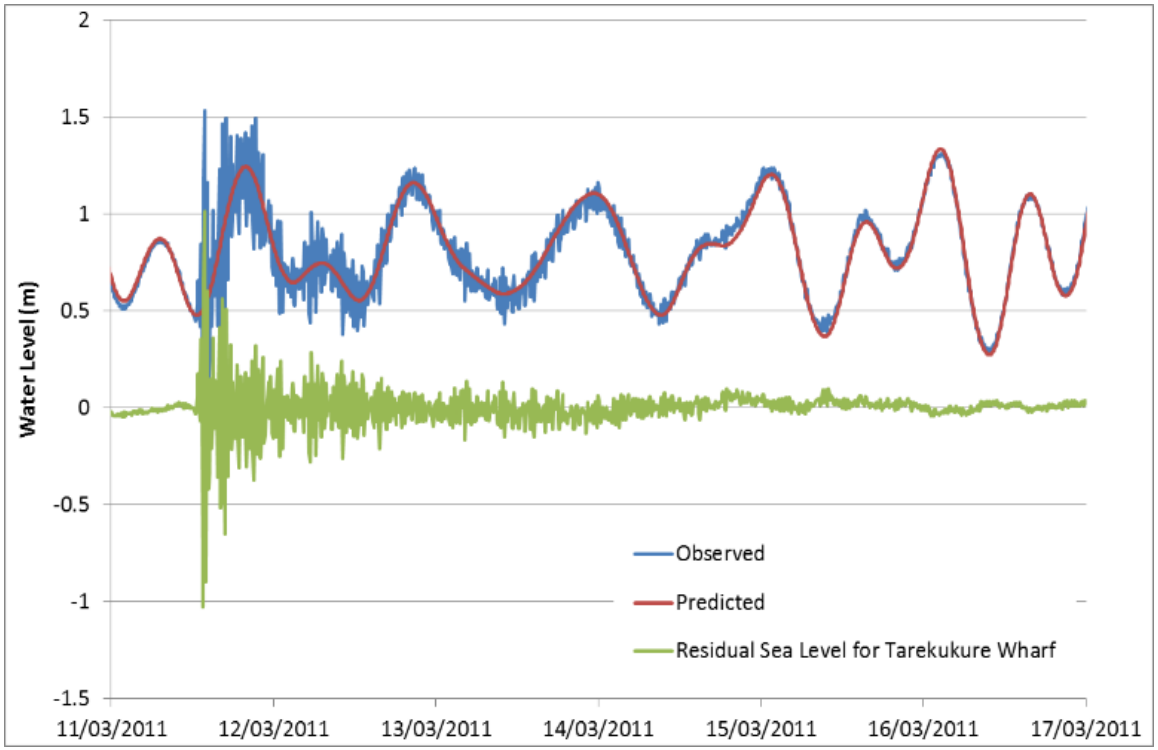
- Tsunami
- Coastal storms
  - Winds
  - Waves - erosion
  - High sea levels (ocean flooding)
- Rainfall / flooding
- Drought
- Heat wave
- Earthquake
- Landslip
- Climate change (exacerbate above hazards)




0:00
Taro Island
Bougainville Island
Choiseul
Santa Isabel
Gizo
New Georgia

Japan Tsunami, March 2011

- 2m amplitude (high to low)
- Coinciding with low tide and in middle of night, so peak not noticed by locals
- 7-8hrs after 9.0 earthquake in East Japan



Definition and quantification of natural hazards

- Tsunami + climate change (2014, 2030, 2055, 2090)
- Coastal storms + rainfall / flooding
- Coastal storm + rainfall / flooding + climate change (2014, 2030, 2055, 2090)
- SLR projections based on IPCC AR5, 2013

Worst case conditions

Definition and quantification of risk

RISK

=

LIKELIHOOD OF A HAZARD OCCURRING

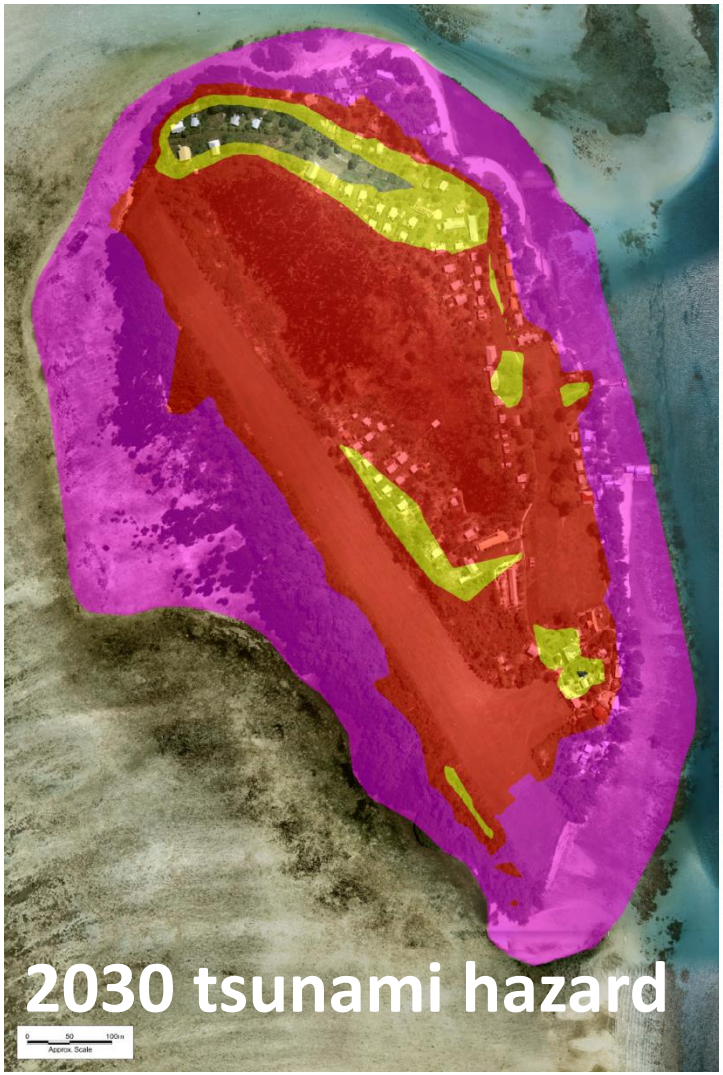
X

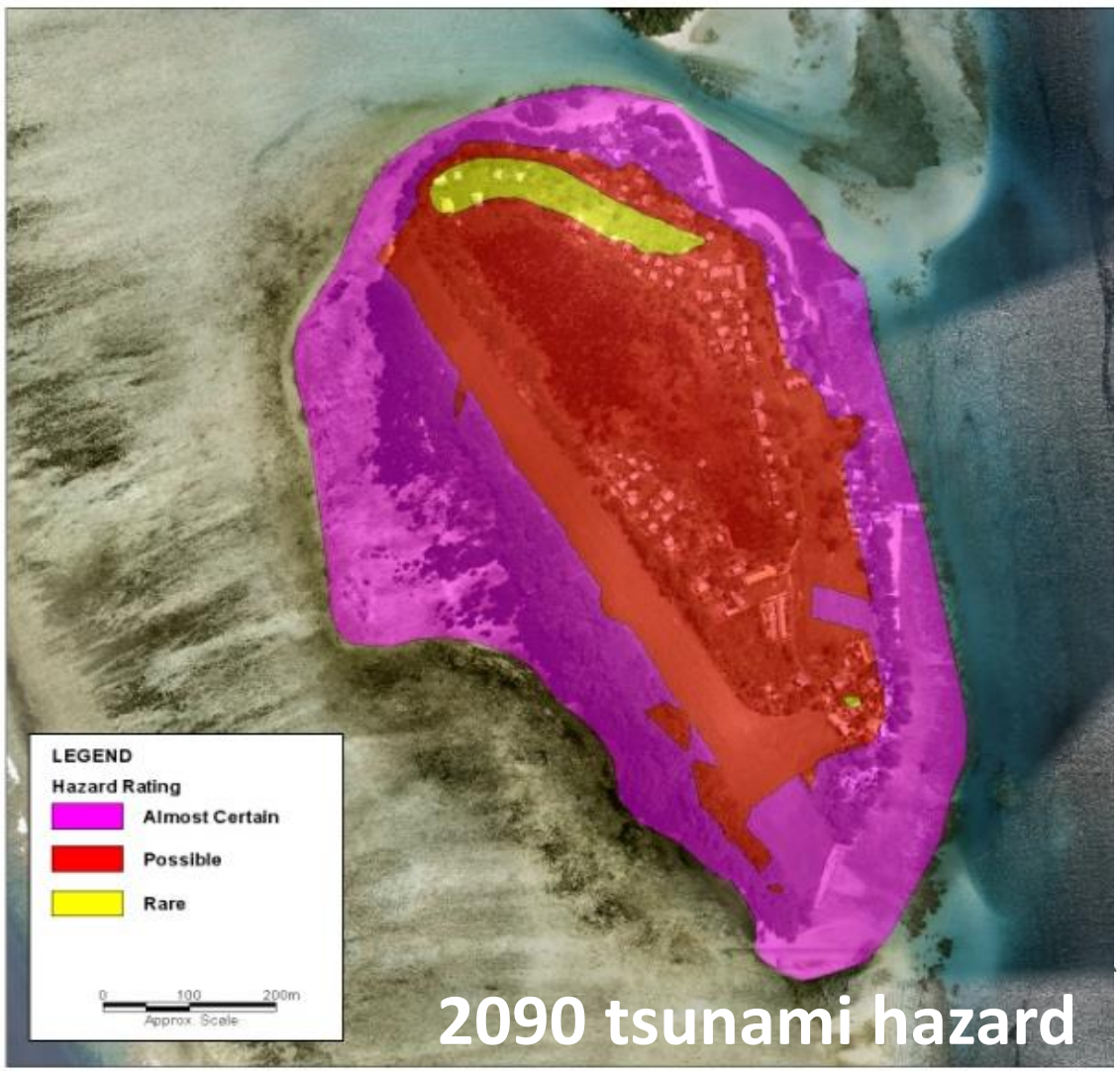
CONSEQUENCE OF IMPACT IF IT DOES OCCUR

Risk Matrix

		CONSEQUENCE				
		Insignificant	*Minor*	*Moderate*	*Major*	*Catastrophic*
LIKELIHOOD	Almost Certain	Low	Medium	High	Extreme	Extreme
	Possible	Low	Low	Medium	High	Extreme
	Rare	Low	Low	Low	Medium	High

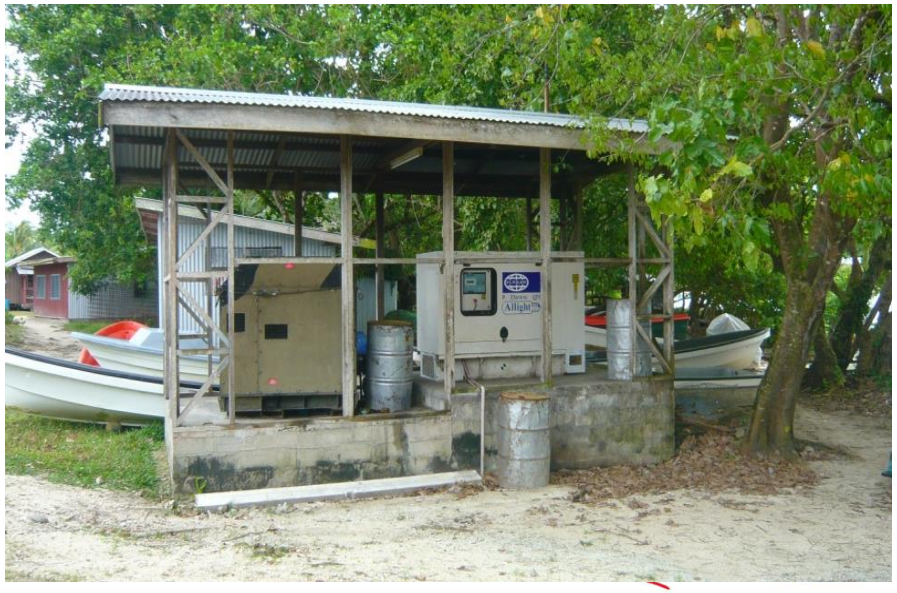
Extent and likelihood of hazards

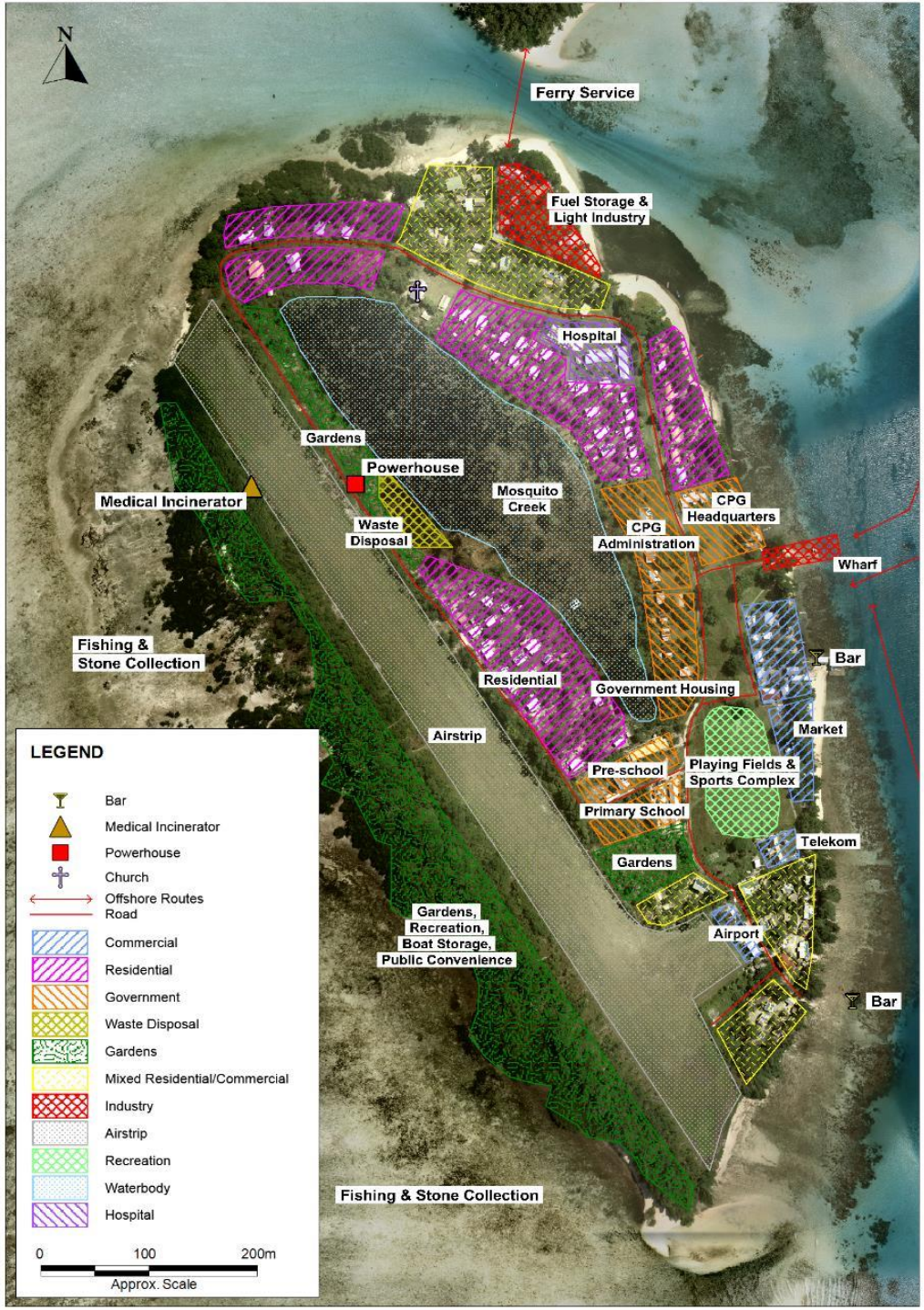




Consequence of impact

- Depends on value of assets affected
- Value is economic, social and environmental value
- Asset Register - assign importance based on if the asset was lost
- Temporary and permanent inundation – different consequences



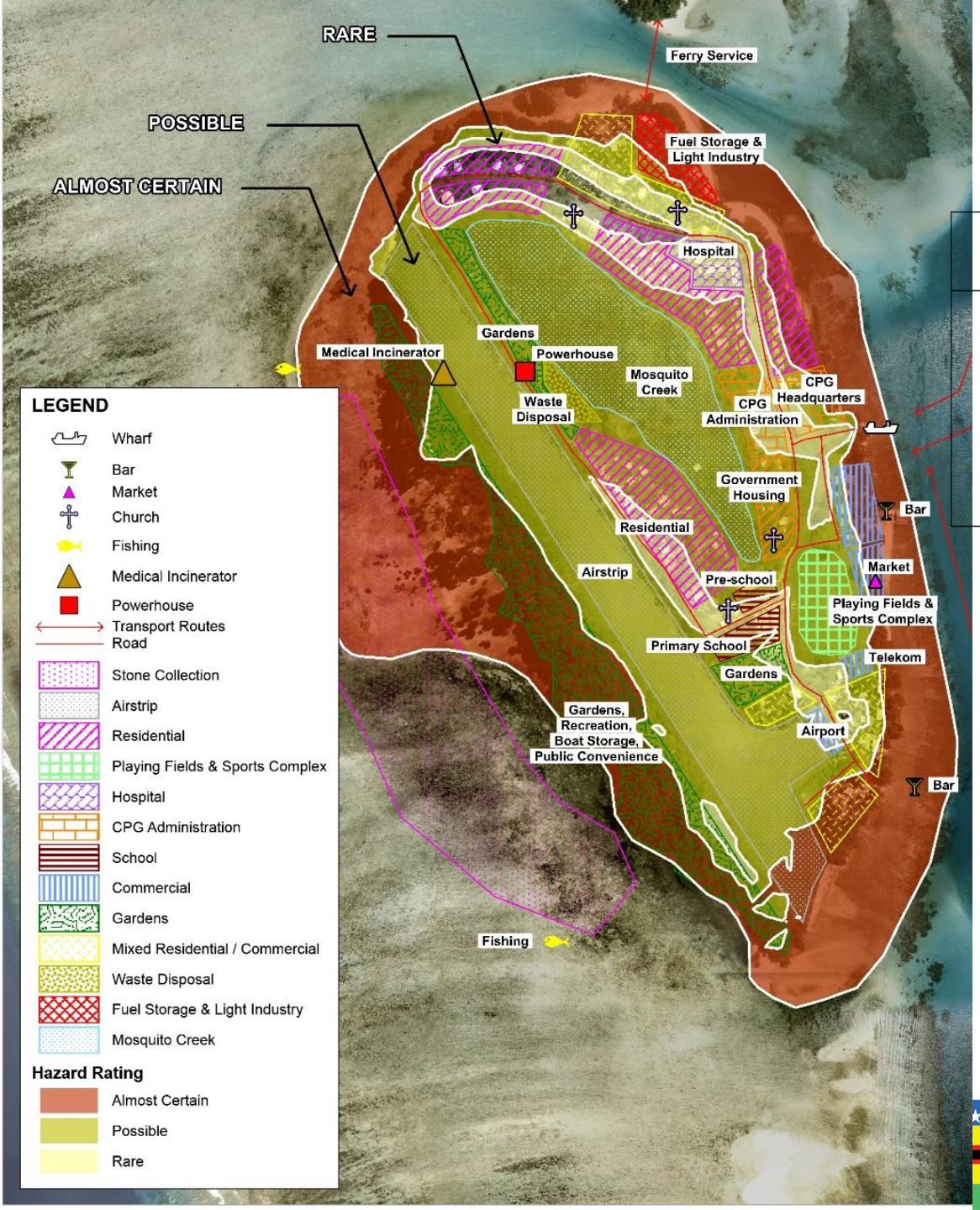


Valued Land, Assets and Infrastructure

What are the <u>functions or services</u> of the asset that are affected?

1. *Insignificant*
2. **Minor**
3. Moderate
4. ***Major***
5. **Catastrophic**

Tsunami Hazards at 2014



LIKELIHOOD	CONSEQUENCE				
	Insignificant	*Minor*	*Moderate*	*Major*	*Catastrophic*
Almost Certain	Low	Medium	High	Extreme	Extreme
Possible	Low	Low	Medium	High	Extreme
Rare	Low	Low	Low	Medium	High

Almost Certain: MHWL + 0.5m.
1.1m MSL

Possible level: 1 in 20yr tsunami (local 7.9 earthquake).
2.0m MSL

Rare level: 1 in 100yr tsunami (local 8.5 earthquake).
3.1m MSL

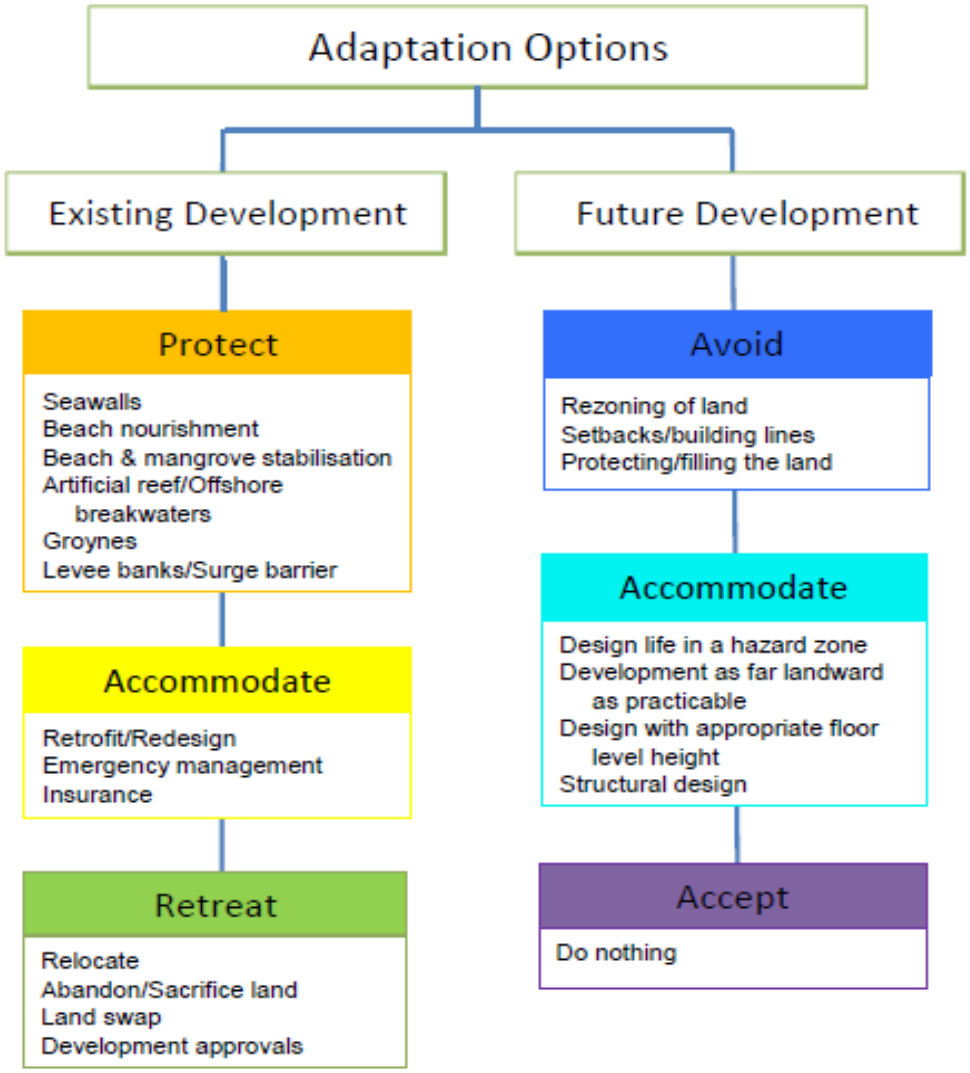
Risk Priorities

Tolerance	Risk Level	Action required
Intolerable	Extreme @ 2014 Extreme @ 2030 Extreme @ 2055 Extreme @ 2090 High @ 2014 High @ 2030	Requires risk treatment. Eliminate or Reduce the risk or Accept the risk provided residual risk level is understood
Tolerable	High @ 2055 High @ 2090 Medium @ 2014 Medium @ 2030	Reduce the risk or Accept the risk provided residual risk level is understood
Acceptable	Medium @2055 Medium @ 2090 Low @ 2014 Low @ 2030 Low @ 2055 Low @ 2090	Accept the risk & mange through existing risk management systems

		CONSEQUENCE				
		Insignificant	*Minor*	*Moderate*	*Major*	*Catastrophic*
LIKELIHOOD	Almost Certain	Low	Medium	High	Extreme	Extreme
	Possible	Low	Low	Medium	High	Extreme
	Rare	Low	Low	Low	Medium	High

Risks get progressively more intolerable with time due to sea level rise contributions

Adaptation Options



Is it an existing development?

Is it future development?

Community suggestions

Best practice options

Practical, effective and economic assessment

- Depends on the <u>type of risk</u> (e.g. tsunami vs beach erosion)

- Depends on the <u>timeframe for risk</u> (e.g. 2014 or 2090)

Recommended Options

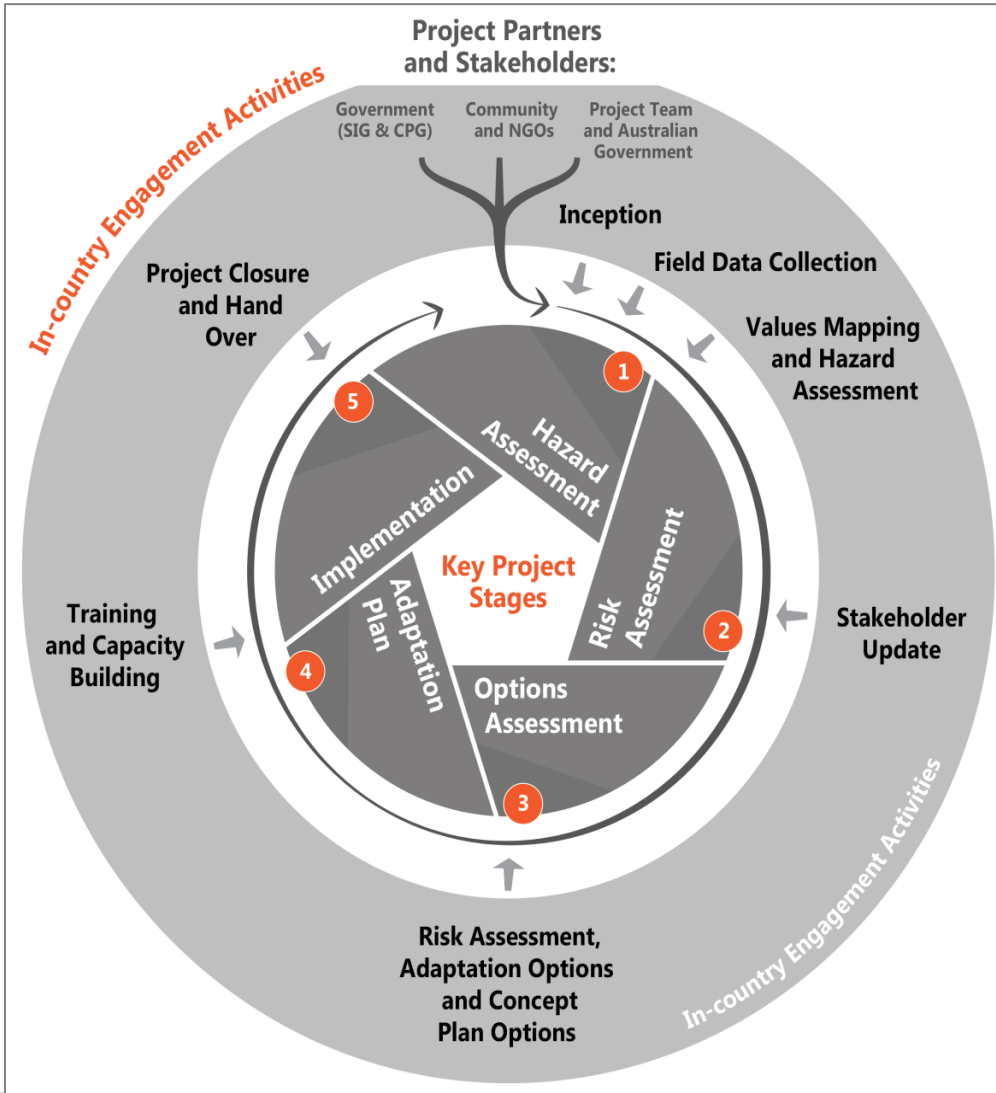
- **Progressive relocation of capital *(long term option)***

In the short term though…

- Emergency response plan
- Asset and infrastructure management (modify existing; repair/replace as required; new works – Islands and Mainland)
- Future development planning provisions
- Shoreline revegetation
- Monitoring

Community engagement

- **Fundamental** to every stage of climate change adaptation planning
- Community & political ownership essential for success
- Engagement strategy for 'whole of community'



In total, the project team spoke to over 300 community members!

Community engagement

What did we do?

- 7 in-country visits over 8 months
- Creative, inclusive, culturally responsive & to build trust
- Whole of community activities
- Draw out and validate community values
- Show how feedback was reflected in:
  - Adaptation options
  - Vision and planning for new town

Community engagement con't

- Lead the community on a '*technical journey*'
- Make complex things simple
- Use appropriate engagement materials – highly graphical
- English is not their first language

"The project followed the ways of our traditions – talking with people, listening to people and reflecting the desires of the people."

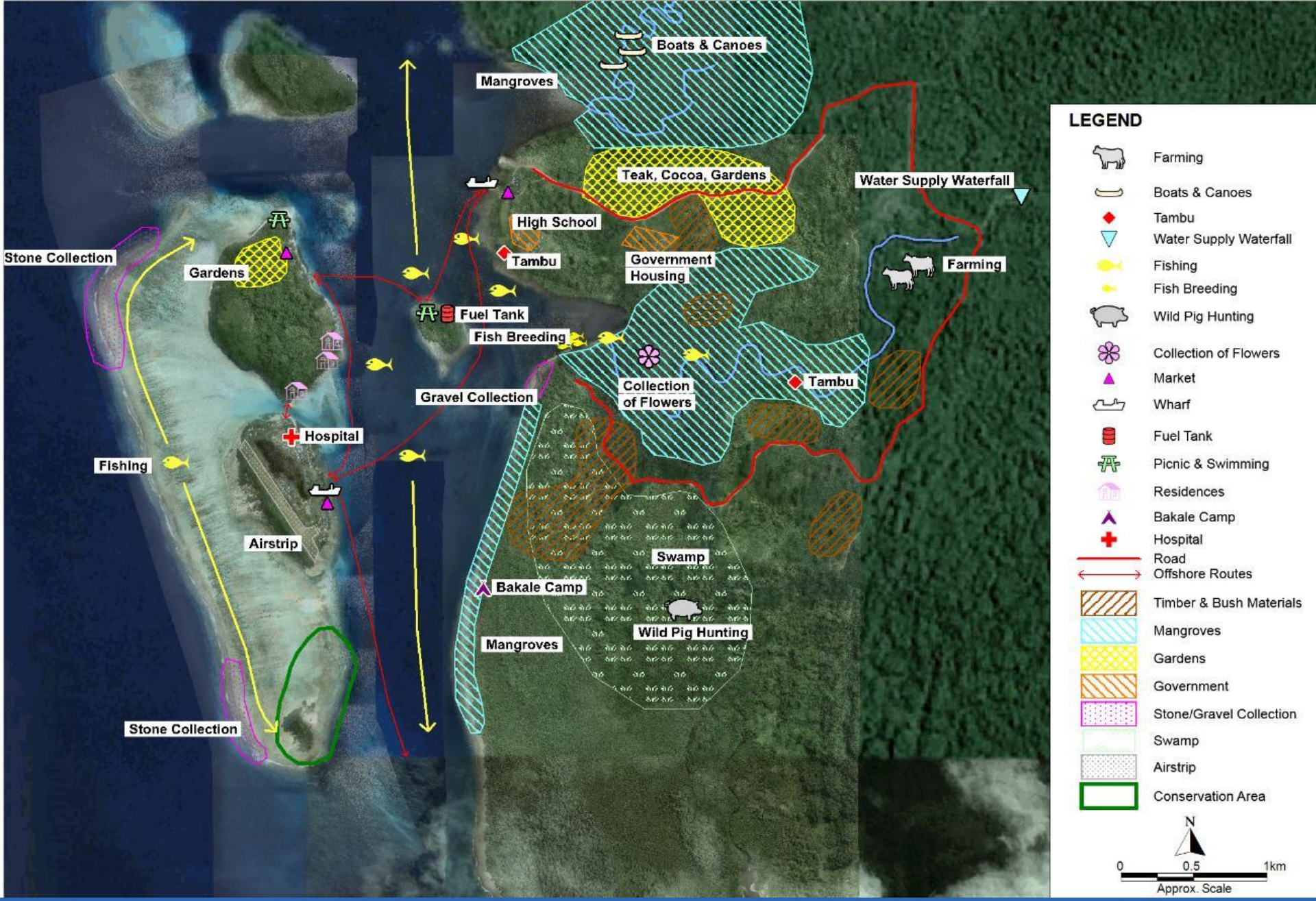
Premier, Jackson Kiloe, Premier Choiseul Province

Planning for a new provincial capital

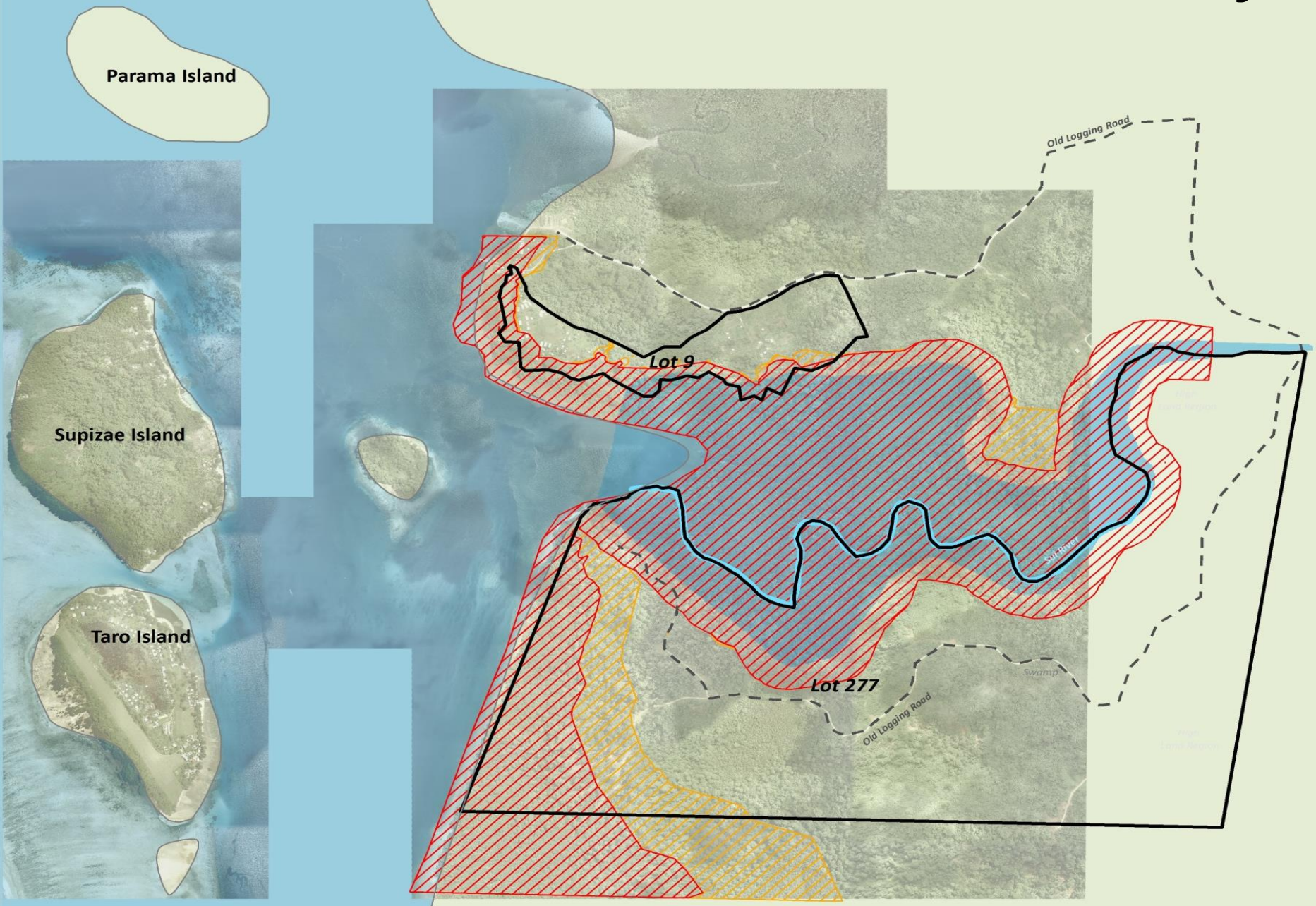
Key inputs into planning process:

- Background studies
- Natural hazard and risk assessment
- Site analysis of constraints and opportunities
- Community values and aspirations

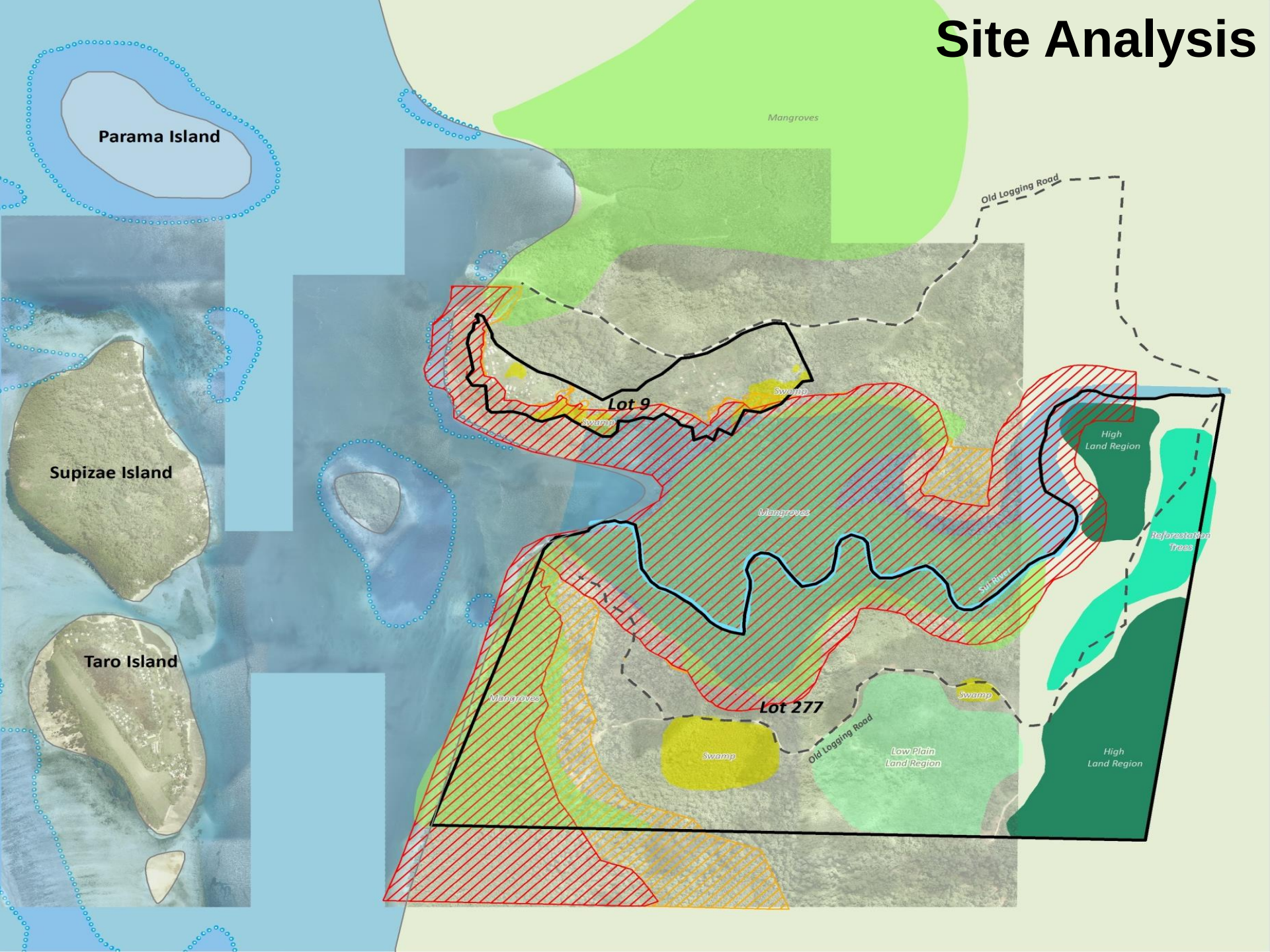
Vision for new town and draft concept plan options


Boats & Canoes
Mangroves
Teak, Cocoa, Gardens
Water Supply Waterfall
High School
Tambu
Government Housing
Farming
Stone Collection
Gardens
Fuel Tank
Fish Breeding
Collection of Flowers
Tambu
Gravel Collection
Hospital
Fishing
Airstrip
Swamp
Bakale Camp
Wild Pig Hunting
Mangroves
Stone Collection
LEGEND
Farming
Boats & Canoes
Tambu
Water Supply Waterfall
Fishing
Fish Breeding
Wild Pig Hunting
Collection of Flowers
Market
Wharf
Fuel Tank
Picnic & Swimming
Residences
Bakale Camp
Hospital
Road
Offshore Routes
Timber & Bush Materials
Mangroves
Gardens
Government
Stone/Gravel Collection
Swamp
Airstrip
Conservation Area
N
0
0.5
1km
Approx. Scale

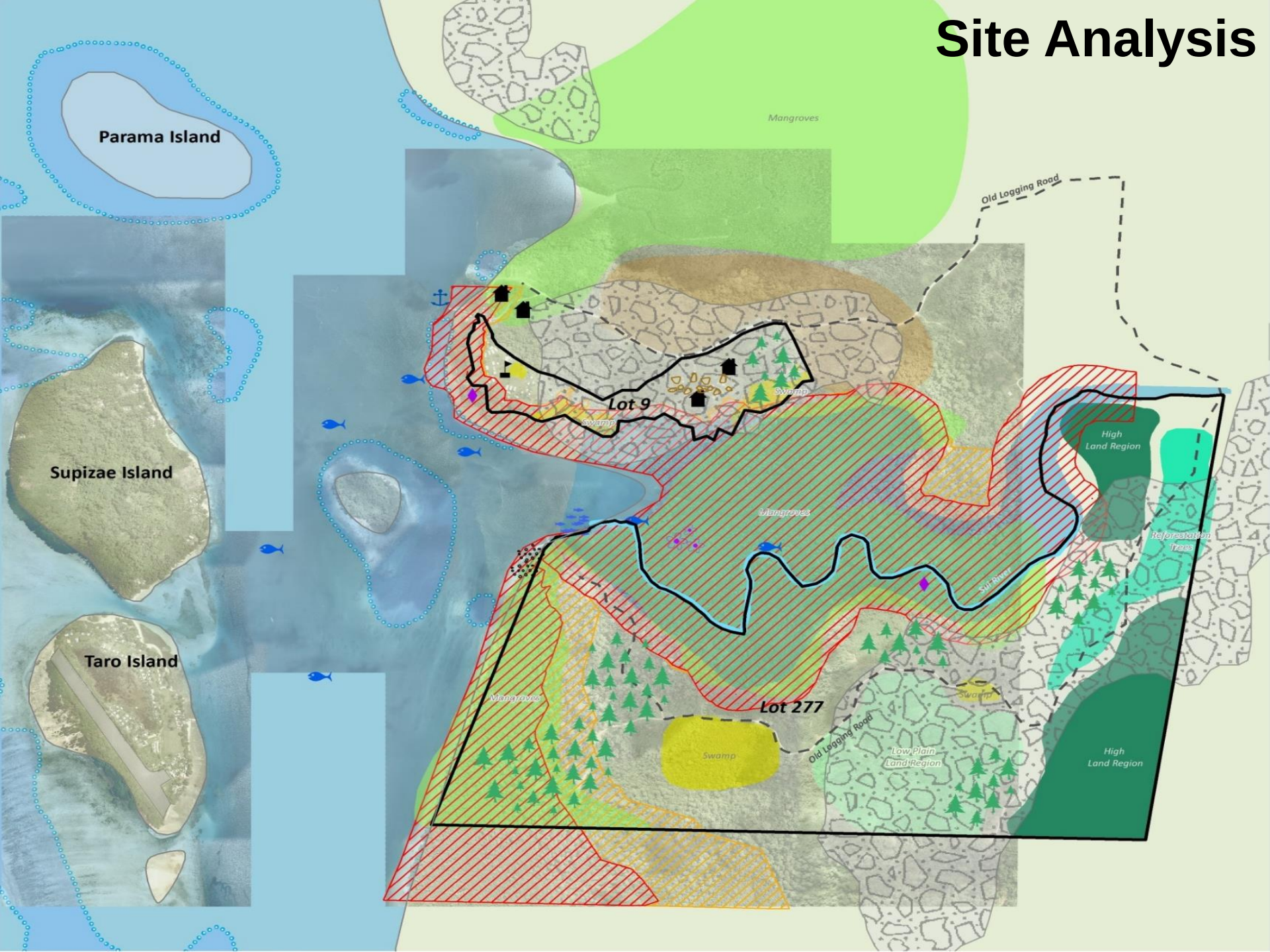
Site Analysis



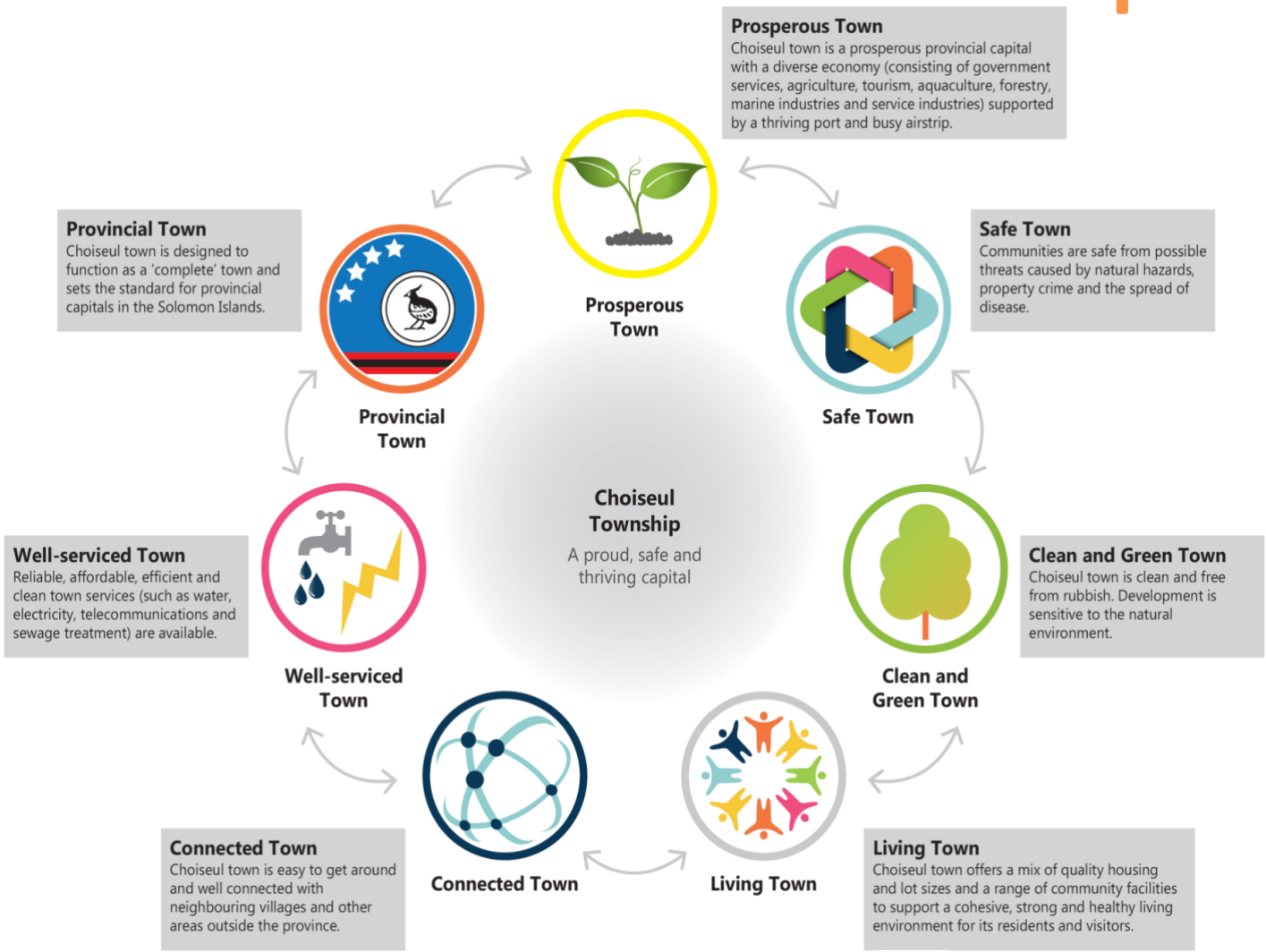
Site Analysis



Site Analysis



Vision for New Provincial Capital

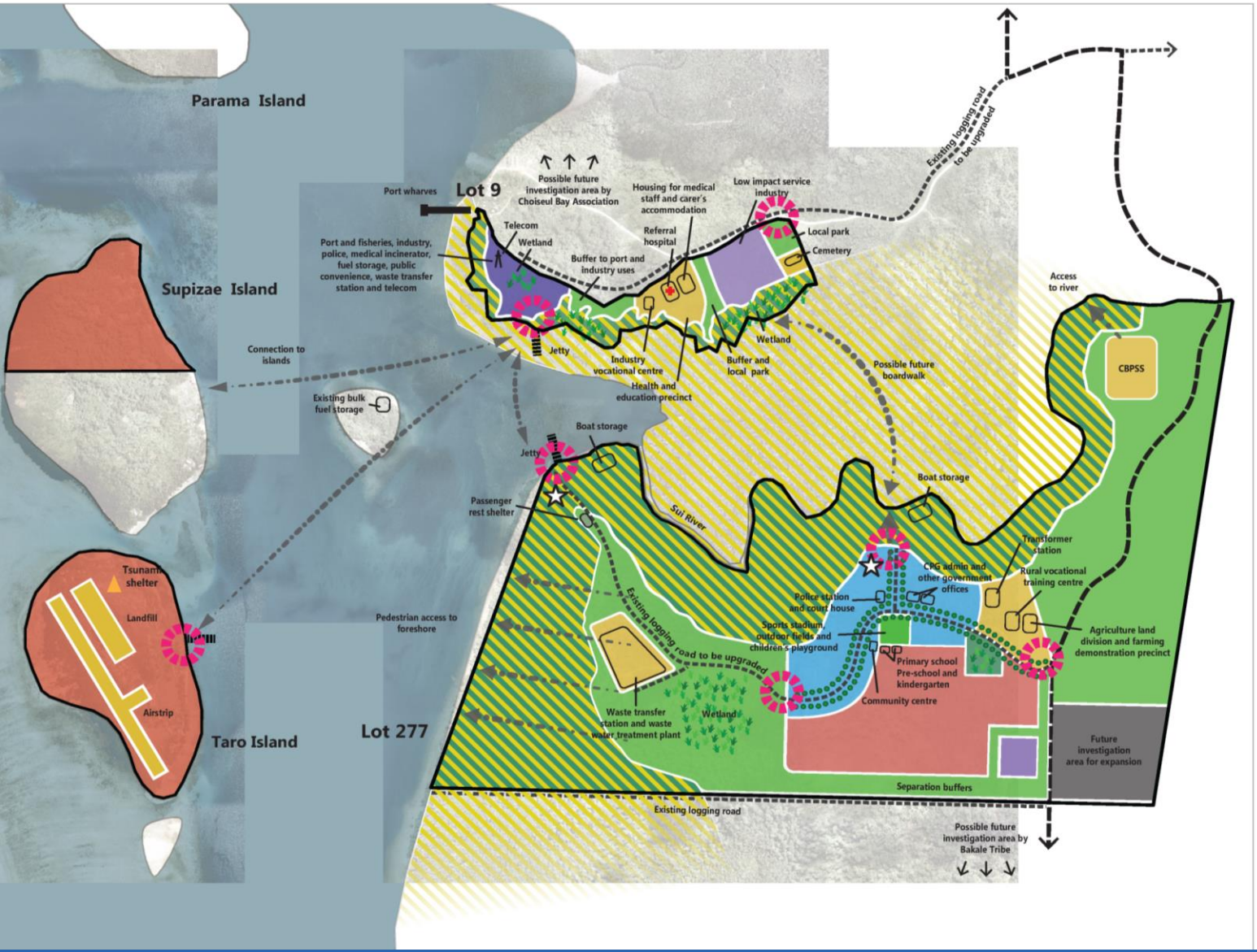


Buckley Vann

BMT WBM

Australian Aid

A Strategic Plan for the New Choiseul Bay Town



Strategic Plan

For Choiseul Bay Town and Taro Island

Legend

- Local planning scheme area and land owned by CPG

Zones

- Limited Development
- Environment and Conservation
- Open Space and Recreation
- Town Centre Core
- Community Living
- Port and Industry
- Low Impact and Service Industry
- Future Investigation
- Special Purpose

- Natural Hazard Area and Coastal Vegetation
- Indicative Location of Key Land Uses
- Gateway Entrance
- Indicative Location for Market
- Indicative Location for Future Highway
- Existing Logging Road
- Street Trees
- Key Access Routes
- Wetland
- Jetty Location (subject to detailed assessment)
- Tsunami Shelter

N

Buckley Vann
TOWN PLANNING CONSULTANTS

Integrating hazard and risk assessments into planning

- Planning scheme – statutory tool
- Shape and layout of town – 2090 hazard mapping
- Emergency evacuation informed planning outcomes
- Direct where development can occur and ‘no go’ areas
- Identify zones and uses that respond to risk and constraints
- Embed across all levels of scheme:
  - Vision & strategic policy to relocate over time
  - Detailed provisions eg: design & location requirements for hospital, tsunami refuge shelter and interim uses
  - Protecting reefs and mangroves

Honiara flood refuge centre

Best practice for Pacific context

- Multi-disciplinary team essential for integration
- Communicate science & risk simply
- Define extent and likelihood of natural hazards – good mapping is essential
- Understand risk and consequences over time

- Focus on priority risks and stage actions & planning responses
- Vision and community values – very powerful !!!
- Engage community at <u>every stage</u> - local knowledge, understanding and ownership
- Adaptation actions must be ‘fit for purpose’


Thank you