

Community Integrated Management Plan

Lotofaga District - Upolu



Implementation Guidelines 2018

Foreword

It is with great pleasure that I present the new Community Integrated Management (CIM) Plans, formerly known as Coastal Infrastructure Management (CIM) Plans. The revised CIM Plans recognizes the change in approach since the first set of fifteen CIM Plans were developed from 2002-2003 under the World Bank funded Infrastructure Asset Management Project (IAMP) , and from 2004-2007 for the remaining 26 districts, under the Samoa Infrastructure Asset Management (SIAM) Project.

With a broader geographic scope well beyond the coastal environment, the revised CIM Plans now cover all areas from the ridge-to-reef, and includes the thematic areas of not only infrastructure, but also the environment and biological resources, as well as livelihood sources and governance.

The CIM Strategy, from which the CIM Plans were derived from, was revised in August 2015 to reflect the new expanded approach and it emphasizes the whole of government approach for planning and implementation, taking into consideration an integrated ecosystem based adaptation approach and the ridge to reef concept. The timeframe for implementation and review has also expanded from five years to ten years as most of the solutions proposed in the CIM Plan may take several years to realize.

The CIM Plans is envisaged as the blueprint for climate change interventions across all development sectors – reflecting the programmatic approach to climate resilience adaptation taken by the Government of Samoa. The proposed interventions outlined in the CIM Plans are also linked to the Strategy for the Development of Samoa 2016/17 – 2019/20 and the relevant ministry sector plans.

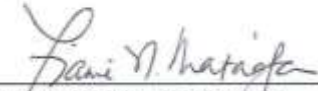
We wish to acknowledge the significant contributions of our District and Village communities and our key government partner stakeholders and implementing agencies, in particular:

Ministry of Women Community and Social Development (MWCSO)
Ministry of Works Transportation and Infrastructure (MWTI)
Ministry of Natural Resources and Environment (MNRE)
Ministry of Agriculture and Fisheries (MAF)
Electric Power Corporation (EPC)
Land Transport Authority (LTA)
Samoa Water Authority (SWA)
Ministry of Health (MOH)
Ministry of Finance (MOF)

We acknowledge also our key international donor partners: the World Bank, the Pilot Program for Climate Resilience and Adaptation Fund, Adaptation Fund Project, through the UNDP, for the financial support that enabled the review and update of the CIM Plans.

Finally, I commend these CIM Plans to all relevant stakeholders from government ministries to districts and village communities and development partners to implement with the utmost urgency. It is assured that the implementation of the CIM Plans further enhance the resilience of Samoa to the impacts of climate change.

Thank you



Hon. Fiamé Naomi Mata'afa
Minister of Natural Resources and Environment

Participants in the Plan

The Community Integrated Management (CIM) Plan is a Partnership between the Government of Samoa and the villages within the plan. The Plan area starts from the ridge extending to the reef broadly covering four thematic areas; Infrastructure; Environment and Biological Resources; Livelihood and Food security; and Governance. Both partners have responsibilities for issues and solutions and the Plan gives an integrated approach to the provision of services and improvement of resilience now and in the future.

This Plan incorporates the Constituency of Lotofaga (Matatufu, Lotofaga and Vavau) District

The village representatives participated in the preparation of this CIM Plan in partnership with the Government of Samoa.

Date of Signing: 22nd June 2018

Representatives:

Signature

Matatufu Village

- Utaulu Misilemi
- Nasareta Viali
- Muavaa Avia Faatili
- Leua Manuele Leua
- Sailivao Taumaloto Lam Sam



Handwritten signatures of the representatives from Matatufu Village, each on a horizontal line. From top to bottom: a stylized signature, 'N.V.', 'Turo Sava Uvaiaiafa', 'Leua Manuele Leua', and 'Lam Sam'.

Lotofaga Village

- Leugamata Tanielu
- Otila Tupa'i
- Faalii Sitagata
- Sitagata Talifano
- Musu Faamutu



Handwritten signatures of the representatives from Lotofaga Village, each on a horizontal line. From top to bottom: 'Daniel', 'Otila Tupa'i', 'Faalii Sitagata', 'Sitagata Talifano', and 'Musu Faamutu'.

Vavau Village

- June Ailuai
- Faapaia Aitasi
- Tolotea Gafa
- Seamalepua Ailuai
- Mitilupe Ualesi



The Government of Samoa adopts the Community Integrated Management Plan for the Lotofaga (Matatufu, Lotofaga and Vavau) District as a Management Plan for the Implementation of the Community Integrated Management Strategy (CIMS).

The Ministry of Natural Resources and Environment, as lead organization of Government, on behalf of the participating Government Ministries and Corporations, confirms the participation of the Government of Samoa in the preparation of this Community Integrated Management Plan and its adoption as a Management Plan for the implementation of the Community Integrated Management Strategy 2015.



Ulu Bismarck Crawley
Chief Executive Officer, MNRE

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Acronyms

ASCH	Areas Sensitive to Coastal Hazards
BCA	Benefit Cost Analysis
CBFMP	Community Based Fisheries Management Plan
CDCRM	Community Disaster & Climate Risk Management
CEP	Community Engagement Plan
CHZ	Coastal Hazard Zone
CEHZ	Coastal Erosion Hazard Zone
CFHZ	Coastal Flooding Hazard Zone
CIM	Community Integrated Management (Plan) or (Strategy)
CLHZ	Coastal Landslip Hazard Zone
COEP	Code of Environmental Practice
CSO	Civil Society Organization
CSSP	Civil Society Support Programme
DSP	District Sub Project
EbA	Ecosystem based Adaptation
ECCCR	Enhancing Coastal Community Climate Resilience
ECR	Enhancing Climate Resilience
EMP	Environmental Management Plan
EPC	Electric Power Corporation
ERN	Emergency Radio Network
HCSI	High Coastal Sensitive Index
IAS	Invasive Alien Species
KBA	Key Biodiversity Area
KPI	Key Performance Indicator
LTA	Land Transport Authority
LTO	Long Term Output
MAF	Ministry of Agriculture and Fisheries
MET Office	Meteorological Office
MoH	Ministry of Health
MNRE	Ministry of Natural Resources and Environment
MWCSD	Ministry of Women Community and Social Development
MWTI	Ministry of Work Transport and Infrastructure
NAP	National Action Programme
NBSAP	National Biodiversity Action Plan
NDMP	National Disaster Management Plan
NESP	National Environment Sector Plan
NISP	National Infrastructure Strategic Plan
NRW	Non Revenue Water
PA - KO	Priority Area - Key Outcome
PUMA	Planning Urban Management Agency
PPCR	Pilot Programme Climate Resilience
R2R	Ridge to Reef
SIAM	Samoa Infrastructure Asset Management
SOE	State of Environment
SWA	Samoa Water Authority
UNDP-GEF SGP	United Nations Development Programme Global Environment Facility Small Grants Programme
WB	World Bank
WCR	West Coast Road
WMP	Watershed Management Plan
WSSP	Water Sanitation Sector Plan

Glossary

Coastal Hazard Zones	Defined areas landward of the coast which are or are considered likely to be subject to the effects of hazards over a defined assessment period. In this study, reference is made to four coastal hazard zones: ASCHs (areas sensitive to coastal hazards); CEHZs (coastal erosion hazard zones); CFHZs (coastal flood hazard zones) and CLHZs (coastal landslip hazard zones).
“Do Minimum”option	A Management option that involves continuing with the present maintenance and upgrading programme on and when required basis.
Emergency Management	To provide communities with skills, facilities and materials so that they may adapt, respond and recover more quickly in the event of emergencies.
Hazard	A source of potential harm or a situation with a potential to cause loss.
Infrastructure	Built structures and networks which support the national, regional or local community.
Lifeline infrastructure	Infrastructure that contributes directly to the survival of the community and its ability to respond and recover at the time of extreme events.
Secondary infrastructure	Infrastructure that contributes to the every-day development of the community.
Implementation Guidelines	A document to guide land use and resource practices to achieve specified goals, objectives and policies and provide a framework for the implementation of defenses and works.
Issue	A specific concern regarding both cause and effect.
Land and Resource Use	The use of land and resources by the community for social, economic or other benefit (e.g. land use includes areas used for villages or crops, resource use includes activities such as sand mining, gravel extraction or fishing).
Monitoring	Process of measuring the effectiveness or impacts of projects and works against predicted standards, levels or outcomes.
Resilience	The ability to be adaptive, responsive and quick to recover.
Community Resilience	The ability for the community to be adaptive, responsive and quick to recover from the adverse effects of hazard.
Natural Resilience–	The ability of natural systems to be adaptive, responsive and quick to recover from natural processes or hazards.
Risk	The chance of something happening that will have an impact on objectives. It is measured in terms of consequence and likelihood. In the Community Integrated Management Plan context it is the likelihood that infrastructure, environment and biological resources and agricultural and marine resources (food security) will be subject to inland and coastal hazards and the potential for loss of property, life or land due to natural processes.
Stakeholders	Those people and organizations who may affect, be affected by, or perceive themselves to be affected by, a decision or activity. The term stakeholder may also include interested parties.

Strategy	Direction or course of action to achieve a define division.
Susceptibility	The degree to which infrastructure at risk is likely to be damaged by coastal hazards and how easy/difficult, expensive/cheap it is to replace. In the context of the CIM Plan the term susceptibility is equivalent to the term vulnerability as the Samoan phrase for both susceptibility and vulnerability is the same.
Vision	A desired destiny.
Livelihood	A livelihood is a means of making a living. It encompasses people's capabilities, assets, income and activities required to secure the necessities of life Food availability: The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports (including food aid).
Food access	Access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet. Entitlements are defined as the set of all commodity bundles over which a person can establish command given the legal, political, economic and social arrangements of the community in which they live (including traditional rights such as access to common resources).
Utilization	Utilization of food through adequate diet, clean water, sanitation and health care to reach a state of nutritional well-being where all physiological needs are met. This brings out the importance of non-food inputs in food security.
Stability	To be food secure, a population, household or individual must have access to adequate food at all times. They should not risk losing access to food as a consequence of sudden shocks (e.g. an economic or climatic crisis) or cyclical events (e.g. seasonal food insecurity). The concept of stability can therefore refer to both the availability and access dimensions of food security.

1. Introduction to the CIM Plan

1.1 The Strategic Vision

The District CIM Plan for Lotofaga District has been prepared under the Government of Samoa's Pilot Programme for Climate Resilience (PPCR) - Enhancing Climate Resilience for Coastal Resources and Communities Project. The CIM Plans is the primary means of implementing the CIM Strategy, which was formally approved by the Government of Samoa in February, 2001, and revised in August 2015, to provide Strategic direction for the management of government and community resources within the districts and villages.

The Strategy has as its central vision "Resilience – Communities and their resources are Resilient to Natural Hazards". The CIM Plan takes this vision and provides the practical tools with which the communities and the government, in partnership, can implement the Strategy.

***To be resilient is to be adaptive, responsive and quick to recover so that communities are environmentally, socially and economically sustainable.
(CIM Strategy, August 2015)***

1.2 The Aim of the CIM Plan

The aim of the CIM Plan is to help communities and government improve climate resilience by identifying actions and solutions for sustainable development.

The CIM Plan will enable communities and government service providers to:

1. Enhance awareness of hazard risks from the ridge to reef;
2. Improve climate resilience planning and development
3. Better adapt, respond and recover from natural disasters and other extreme events

1.3 The Structure of the Plan

The CIM Plan consists of two parts each serving a separate and distinct purpose.

- ***Plan Development***, which describes the process undertaken to prepare the CIM Plan in conjunction with representatives of the Communities involved, the Government and other stakeholders with interests in the Plan area.
- ***Implementation Guidelines***, which describes the Plans and Actions recommended as outcomes of the process, together with the partner responsible for implementing these outcomes.

2. Implementation Guidelines

2.1 Purpose of the Implementation Guidelines (IG)

The Implementation Guidelines describe the solutions proposed to increase the resilience of communities as identified in the CIM Plan consultation and site assessments. The solutions are presented under four broad themes; Infrastructure; Environment and Biological Resources; Livelihood and Food Security; and Governance Institution in the District/village. Implementation of solutions is considered to be the joint responsibility for both the villages and the government in partnership as follows.

The CIM Plan Solution Matrix, shows five columns each correlates to the solution identified:

- Column 1: Indicates the issues or problem identified during the CIM Plan consultation and site assessments
- Column 2: Solutions – these are the interventions/ solutions identified by the CIM Plan team and village community representatives. The government agency or village as indicated in Column-2 under each action will be the lead agency or village responsible for implementing the said solution;
- Column 3: “Other benefits”, where one solution indicated in Column 2, will provide benefits to other items;
- Column 4: Provides guidance on how the solution is to be implemented and noting the relevant government action plan, policy, code of ethics, regulation or act to follow by the responsible government agency or district/village during implementation of the solution;
- Column 5: Provides an overall summary of how the solution being implemented supports or achieve the objectives or goals set-forth in the relevant government sector plans and linking them up to the Strategy for the Development of Samoa.

It is therefore worth noting that climate change adaptation and mitigation actions or interventions identified in the CIM Plan solution demonstrates the national commitment to enhancing Samoa’s climate resilience portfolio.

2.2 Funding options to support CIM Plan Implementation:

Implementation of solutions that were identified from the CIM Plan consultations with each district communities will not be possible without the availability of funds. Like the previous CIM Plans infrastructural related solutions to protect government assets located in the coastal area are executed by the government through bi-lateral or multi-lateral donor funded projects. For example the NAPA (National Adaptation Programme of Action) project that supported the implementation of rock revetment or seawalls in most of the coastal villages, which is an outcome from the generation-1 CIM Plans were funded under multi-lateral donor. At the village level some villages were successful in sourcing small grants from existing mechanisms in country.

Similarly it is expected that funding support for the implementation of the updated revised CIM Plans during its 10 year lifespan, will be sourced from different development partners including the government of Samoa. All solutions and activities in the CIM Plans that have identified a government agency as the responsible agency for that particular action as outlined in the “CIM Plan Solution Matrix” will take up the responsibility for these activities as part of their on-going workplan and priorities for each districts/villages. Funding of these activities will be sourced either from their local budget or multi-lateral donors such as UNDP, FAO, World Bank, ADB, and GEF to name a few, as well as bi-lateral donors like New Zealand, Australia, Japan, USA and China. Implementation of activities that are under the responsibilities of village communities will source support from small grants opportunities available from the following programs and agencies: CSSP, the UNDP-GEF SGP, Global Green Grant and Discretionary Funds from different Diplomatic Mission in country like New Zealand High Commission, Australia, Japan and China.

2.3 Duration of the Plan:

The CIM Plan is reviewed every ten years. During the Plan period, the solutions implemented are monitored to ensure that they are effective in improving resilience. Some solutions are likely to take longer than the original five years for implementation.

The review of the Implementation Guidelines and the solutions proposed the following:

1. The CIM Plan full review will be undertaken every 10 years or decade;
2. Once implemented, the solutions will be monitored on a bi-annual basis for progress and updated every five years in accordance with the Strategy for the Development of Samoa;
3. Detailed implementation of the solution will determine the monitoring requirements and Key Performance Indicators (KPI).

3. Description of Lotofaga District Environment

3.1 Physical and Natural Resource Setting

Lotofaga district is made up of all sub-village of the Lotofaga which are Matatufu, Lotofaga and Vavau. The district is located on South-eastern end of the Le Mafa Pass Road on Upolu. The marine environment is exposed barrier reef that is broken by steep lava cliffs which fall onto steep and narrow lava cliffs and with a narrow coastal plain. Much of the coral reefs along this coast were damaged by the 2009 tsunami, it is therefore not uncommon to find most of the growth in the reef populated by small corals. Coastal erosion has affected all the villages in the district that most of have relocated inland. Very few families still reside along the beachfront but only where seawalls have been erected. The seawalls have also created several environmental problems with sand deposits now moving along to the river estuaries and blocking the rivers from flowing straight into the sea. The blockages in the estuaries have affected the health of the wetland ecosystems while also creating back flooding inland where some residences are located (Figure 1).

The coastline they flow into is very diverse with outcrops of volcanic rock interspersed with pockets of coral sand beaches. At the western end of the district is a wetland area that contributes to the biodiversity of the area. Away from the coast, land-use practices, such as deforestation, cattle farming and agriculture are increasing both the rate of inland erosion and the supply of silt to the coast. These practices can affect the amount of flooding in coastal areas, and the amount of silt deposited on nearby reefs. Silt can suffocate coral and seriously reduce the strength of reefs making the entire coastline more vulnerable to damage during cyclones.

Lotofaga district has had old coconut plantations and developments dating back to the early European settlers where they had large coconut plantations in the area. As such, a lot of the indigenous forests were clear over 100years ago, leaving mostly mixed vegetation of coconut plantations and secondary forest. Several of the old cleared lands for plantations and cattle farms have been left fallow. Between Lotofaga and Vavau is the only remaining indigenous forest located in the district, although much of this area is also considered disturbed forest as a lot of the big forest trees were felled by the cyclones since the 1990s'.

As high rainfall area with rich and fertile soils, the district has some very large rivers such as the Mulivaifagatoloa that drains into Falealili district although it starts from Afulilo and Etemuli which are both upland areas of Lotofaga. There are five major streams and a number of smaller ones that dissect the district. They generally run north-south and can have large volumes of water in them after heavy rain. The invasive trees and shrubs are present around the village settlements as well as along the access roads throughout the district. *Spathodea campanulate* (African tulip) *Merremia peltata*, pulu vao *Funtumia elastica*; and pulu mamoe *Castilla elastica* are the common one's present. Myna birds and red-vented bulbuls were found in abundance along the whole northern Savaii especially closer to settlements.

3.2 Social and Economic Setting

The district of Lotofaga has a total population of 1,816 people during the 2016 national census. The three villages of Matatufu, Lotofaga and Vavau were once located directly on the coast, because the villages suffered serious damages during the earlier cyclones of the 1990's two of the communities, Lotofaga and Vavau, re-located up along the main road and Matatufu moved inland up a side road off the main road. However, there were still some families who remained in the coastal area in the old Vavau Village and Lotofaga. These families who stayed within the Coastal Erosion Hazard Zone or within the Coastal Flood Hazard Zone had to relocate inland after the 2009 Tsunami which destroyed all their homes and belongings.

The main road and the paved side road to Matatufu are part of the Country's main road network and are therefore lifeline infrastructure. They are away from the coast and are not subject to serious coastal erosion or flooding, but they can be flooded on occasion from blocked culverts. There are important cultural sites located in the hazard

zones that need special protection. There are also natural attraction sites for tourism such as the To-sua Ocean trench, the Sopoaga waterfalls and garden.

The local schools, a small resort currently being redeveloped as a major resort at Vavau and several local shops (including a bakery at Lotofaga) provide employment and income for a number of local villagers. The resorts were heavily damaged during the 2009 Tsunami and support were provided via government for the Tsunami recovery plan for all the resort businesses. At Matatufu is the Saletoga resort, which employs most of the people from Matatufu Village and Lotofaga, as well as people from Falealili villages of Sapoe and Utulaelea. A few others are employed in Apia and commute there on a daily basis. However, generally, the cash economy of the District is dominated by traditional work including subsistence agriculture and fishing.

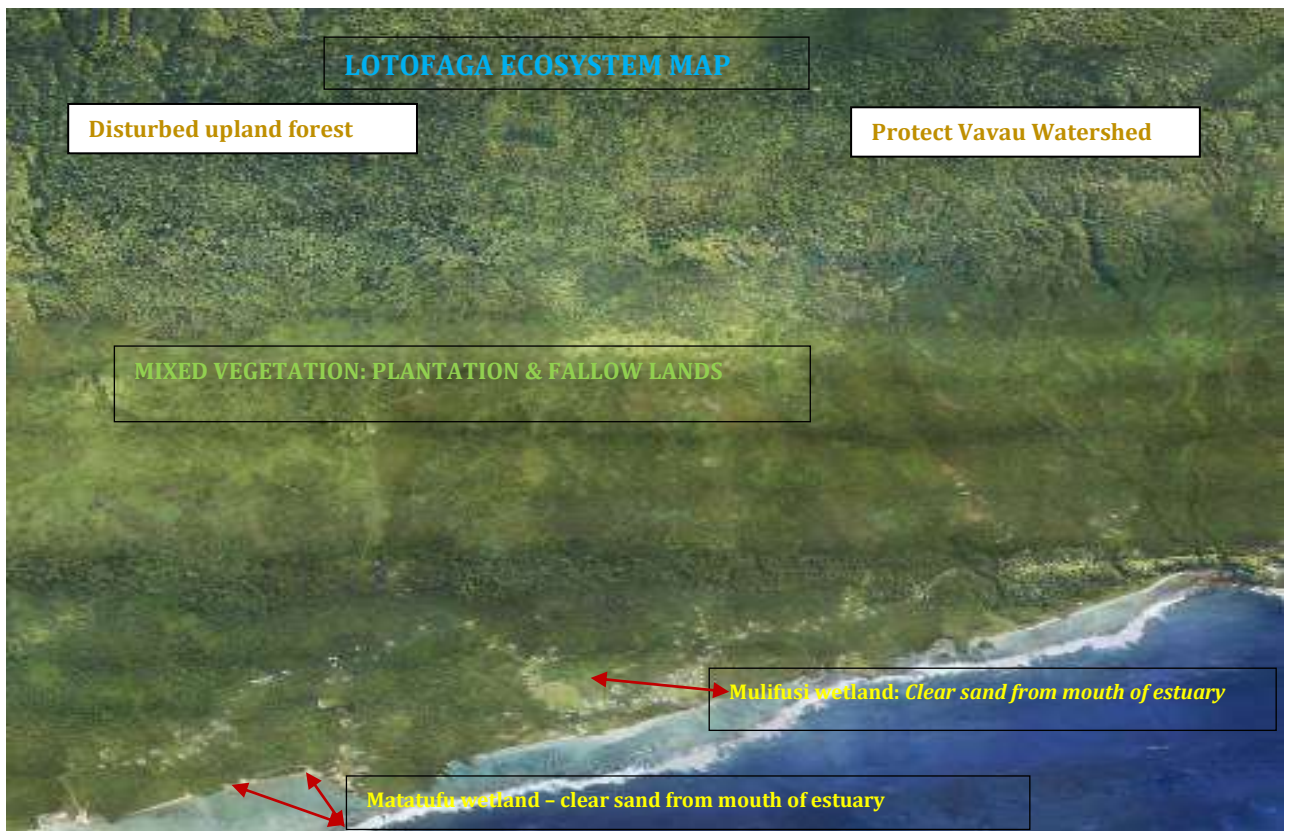


Figure 1 Ecosystem map of Lotofaga district and sites of estuaries potential for sand mining.
Map credit: Toelesulusulu C Schuster, 2017

3.3 Climate Risk and Resilience:

There is an urgent need for communities to understand the changes in Samoa's climate and future projection. A study has been completed in 2011¹ which summarizes changes in Samoa's climate at present and in the future, from 1990 -2030 up to 2090. The assessment showed that: Samoa's temperature will increase with very hot days; more extreme rainfall days expected; there would be a decrease in number of tropical cyclone but increase in intensity; sea level rise will continue and ocean acidification is increasing in Samoa's water threatening coral reef ecosystems and marine biodiversity.

The Lotofaga landscape rises from a lower coastal plateau that has scattered wetlands and mangrove areas, with defined waterways on the lower mid-slope plateau. The upper plateau has a more dissected landscape riddled with smaller waterways, which may indicate high recharge areas. The coast has unique beautiful landscapes of small coves and offshore islets. The 2007 Lotofaga District CIM Plan mapped out all vulnerable areas along the coast and the lowland coastal areas identifying them as hazard zones given the exposure to climate change and extreme events causing flooding and erosion. There are changes in the catchment areas and land use hence the severe flooding downstream is caused by the concentrated flows from upland-catchment areas. As such the update of the CIM Plan considers a broader landscape hazards, climate risks and likely responses.

Like Falealili district, the Salani Formation covered most of Lotofaga district, whilst Fagaloa Formation is only exposes along deep valleys in the region. In Figure-2 it shows a collapsed portion of the southern section of the easternmost part of Upolu, generates a high elevation coastline between Lotofaga and Aleipata district. This collapsed section could generate tsunami that strong enough to devastate this part of Upolu in the past (Fepuleai, 2016). There are several sections between Lotofaga and Vavau that could generate another collapse of the same nature in the near future, as it continues increasing in seismic activity of fault/joint networks in the area (Figure 3).

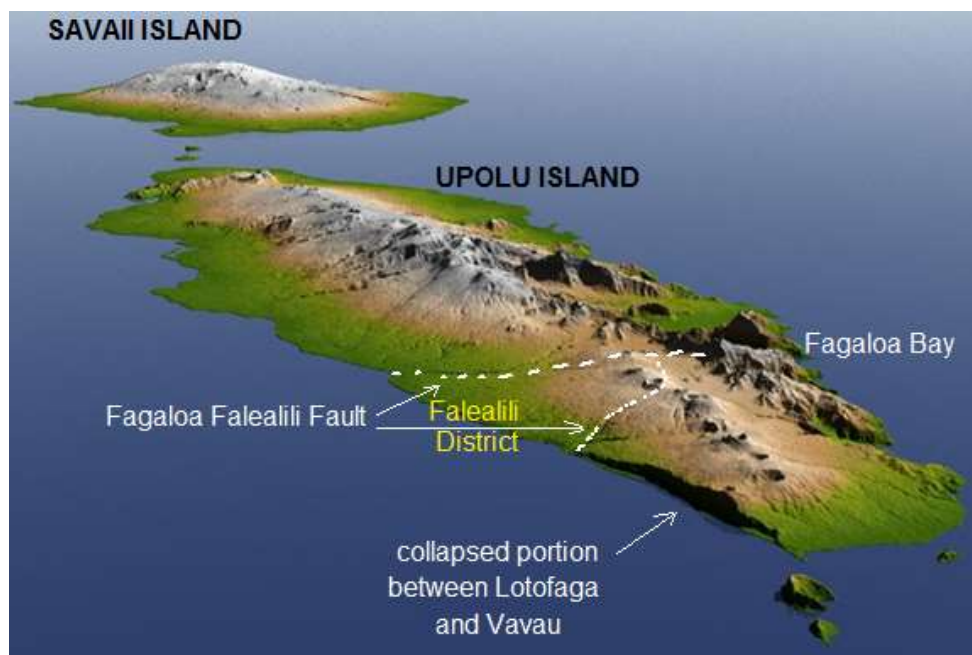


Figure 2 Satellite image shows the collapsed portion between Lotofaga and Vavau in the past which shaped how the district looks like today. **Map credit:** Aleni Fepuleai, 2017

Coastal Hazards and Risks: The headlands between Matatufu and To-sua trench act as groin with respect to the longshore littoral drift of sediment at this part of Lotofaga. This generates thick calcareous-dominated sediment at

¹ Pacific-Australia Climate Change and Adaptation Planning Program Partners (2015) Current and Future Climate of Samoa, Government Australia and Government Samoa.

Lotofaga area (Figure 2). High wave energy at To-sua trench could result in high erosion at this portion of Lotofaga district. On the other hand sand mining operation between Matatufu and Lotofaga bay, can trigger a shift of sediment to the west and result in erosion to the eastern part of the bay. Wide and deep reef-channel networks, high energy wave activities together with continuing sand mining at Vavau, contribute to high coastal erosion in the area. Thus sea level rise will only exacerbate the problem in the coastal area.

There are several high elevation coastal sections between Lotofaga and Vavau, which are vulnerable to collapse (Figure 3). This section is also indicated in Figure 2 as a part of previous collapsed coastal area. These highly fractured, jointed and weathered lava suites of Salani Formation, where groundwater source seeps through series of local fault networks. The collapse at this part of Upolu could destroy many sections of the main road infrastructure and devastate communities along the coast. Like Falealili district, the Lotofaga district is also elongate opposite the Northern Terminus zone of the Kermadec Tonga Trench, where expects to devastate by more tsunami in the near future. Tsunami wave will destroy more low lying coastal area and increase it flows speed as it reaches narrow passage of streams and rivers expose along the coast.



Figure 3 Coastal section between Matatufu and Vavau of the Lotofaga district. Orange oval indicates the high risk vulnerable area prone to collapse in the future. Blue arrows show landslide direction along this section. Yellow arrows indicate reef channels that contribute to major sand erosion in the coastal area.

Map credit: Aleni Fepuleai, 2017

Inland Hazards and Risks: The Vavau and Lotofaga water catchment area inland is critical for a restoration program. A reserve drinking water reservoir expose along the coast of Vavau, has high potential of contamination at source due to the fact that, part of this water is well exposed at inland residential area and along the main road before it seeps through hairy fracture/joint networks of rocks toward the coast.

Overall activities such as coastal replanting in several sections, rebuilds of reef resilience and sustain the extension in marine habitats of the area, will help reduce erosion and improve natural breakwater activity along the coast. Sand mining activity in the Lotofaga district is not an appropriate idea at this part of Upolu. However, it can be operated in a short period of time at rivers/streams delta, where it expects a recovery of removal sediment through the longshore littoral drift process and terrestrial materials from drainage system.

4. Lotofaga District Interventions

CIM Plan Solutions

Infrastructure	Best Solutions	Other Benefits	Guidelines to assist Implementation	Relevant Sector Plans
Access Road	<p>Reconstruction of access roads: Matatufu: 2 access road to plantation and 1 to coastal village Vavau: access road to plantation also noted in the LTA list: Length – 630 m Estimated Cost: SAT\$ 226,800.00</p> <p>Include roadside drainage</p> <p>Responsibility: LTA / district</p>	<p>Improve rate of recovery</p> <p>Increase number of families relocate to higher grounds</p> <p>Increase opportunities to utilize land for farming</p> <p>More lives saved during times of emergency</p>	<p>Construction of access roads should be guided by government requirements as stated in the following policies, strategies and action plans:</p> <p>Environmental and Social Safeguard policy</p> <p>Samoa Code of Environmental Practice (2007)</p> <p>Review of National Road Standards in Samoa (2016)</p> <p>Vulnerability Assessment of the Samoa Road Network (2017)</p> <p>National Infrastructure Strategic Plan (NISP) 2011</p> <p>Programme road safety activities into budget and work programme</p>	<p>Community Integrated Management Strategy, August 2015</p> <p>Transport Sector Plan 2014-2019</p>
Electricity Supply	<p>Install and connect power supply for inland residents</p> <p>Install streetlights along the roads where needed for community safety.</p> <p>Relocate overhead lines to a more resilient location when being replaced</p> <p>Responsibility: EPC / MWTI / Villages</p>	<p>Maintain electricity supply at all times including during natural disasters.</p> <p>Avoid accidents from fallen electricity posts.</p>	<p>Monitor distribution networks to avoid overloading poles and contributing to line failures</p> <p>EPC to installed electricity lines to reach families residing inland and streetlights</p> <p>Consider energy efficiency developments for communities using renewable energy guided by existing framework –</p> <p>Development of a Renewable Energy and Energy Efficiency Framework, 2016</p>	<p>Samoa Energy Sector Plan 2017-2022</p>

<p>Emergency Management</p>	<p>Identify schools and churches outside of the CEHZ and CFHZ as Evacuation Shelters and include in the DMO program for retrofitting</p> <p>Prepare a District Emergency Response Plan identifying resources needed for the Evacuation Shelter</p> <p>Prepare signs in English and Samoan to be erected throughout the District identifying actions in the event of emergencies including a location map of nearest emergency facilities and Evacuation Shelter</p> <p>Implement the Community Disaster Climate Risk Management Plan for district and village</p> <p>Responsibility: MNRE / District / village</p>	<p>Improve preparedness of district for climate change and extreme events</p> <p>Improve resilience and ability to respond</p>	<p>MNRE-DMO monitoring program for all existing Evacuation Shelter places should follow these guidelines:</p> <p>Application of National Building Code 2002</p> <p>PUMA Act 2004</p> <p>Identify safe location on CIM Plan maps for Evacuation Shelters</p>	<p>National Disaster Management Plan 2017-2021</p>
<p>Environment & Natural Resources</p>	<p>Best Solution</p>	<p>Other Benefits</p>	<p>Guidelines to assist Implementation</p>	<p>Relevant Sector Plans</p>
<p>Coastal Areas (littoral vegetation, coastal herbaceous marsh, mangrove areas, estuaries) Sand mining causing rapid coastal erosion, blocked estuaries affecting wetlands</p>	<p>Dredge sand in river estuaries that are blocking the river flow and affecting wetlands</p> <p>Clear debris and logs blocking river flows to avoid further inland flooding</p>	<p>Village gains benefit from sand mining activities</p> <p>Reduce impact to natural coastal protection mechanism via control of scale and site of extraction</p>	<p>MNRE monitoring of sand extraction operations</p> <p>Alii Faipule and landowner provide consent</p> <p>NAP – Sustainable Land Management Plan 2015-2019</p> <p>Consideration of EIA assessment of impact prior to any extraction</p>	<p>National Environment Sector Plan 2017-2021</p> <p>PUMA Act 2004</p>

	<p>conduct a study to identify location and appropriate quantity for small scale sand mining in the village for house building</p> <p>Mass media awareness on sustainable sand mining practices</p> <p>Develop sand mining regulation</p> <p>Responsibility: MNRE / District</p>	<p>Improve village resource management and sustainable development</p>		
Marine Environment	<p>Implement a marine protected area that includes fish reserves, and mangrove, wetland rehabilitation:</p> <p>Implement an integrated coastal resource management program for the district covering all coastal communities</p> <p>Conduct community education and awareness program on the importance of marine ecosystems (coral reef, wetlands and mangroves)</p> <p>Strengthen existing village marine management plan with an over-arching district marine protected area management plan</p> <p>Responsibility: MAF / MNRE / District & Villages</p>	<p>Improve sustainable livelihood and food security</p> <p>Natural barriers and protection from storm surges</p> <p>Increase biodiversity</p> <p>Improve ecological resilience of marine ecosystems</p> <p>Reduce impact of land-based pollution</p> <p>Reduce impact of coral bleaching</p> <p>Improve resilience of coral reef ecosystem to combat climate change</p> <p>Reduce loss of marine habitats</p>	<p>MAF –Fisheries Division and MNRE-DEC to work in collaboration with the district to revive the MPA for improved marine biodiversity and food security by implementing existing action plans such as:</p> <p>Community-based Fishery Management Plan</p> <p>NBSAP 2015-2020</p> <p>Update existing Management Plans for Marine Protected Area</p> <p>Implement the revival of the MPA by taking an Ecosystem-based Adaptation approach</p>	<p>Agriculture Sector Plan 2016-2020</p> <p>National Environment Sector Plan 2017-2021</p>

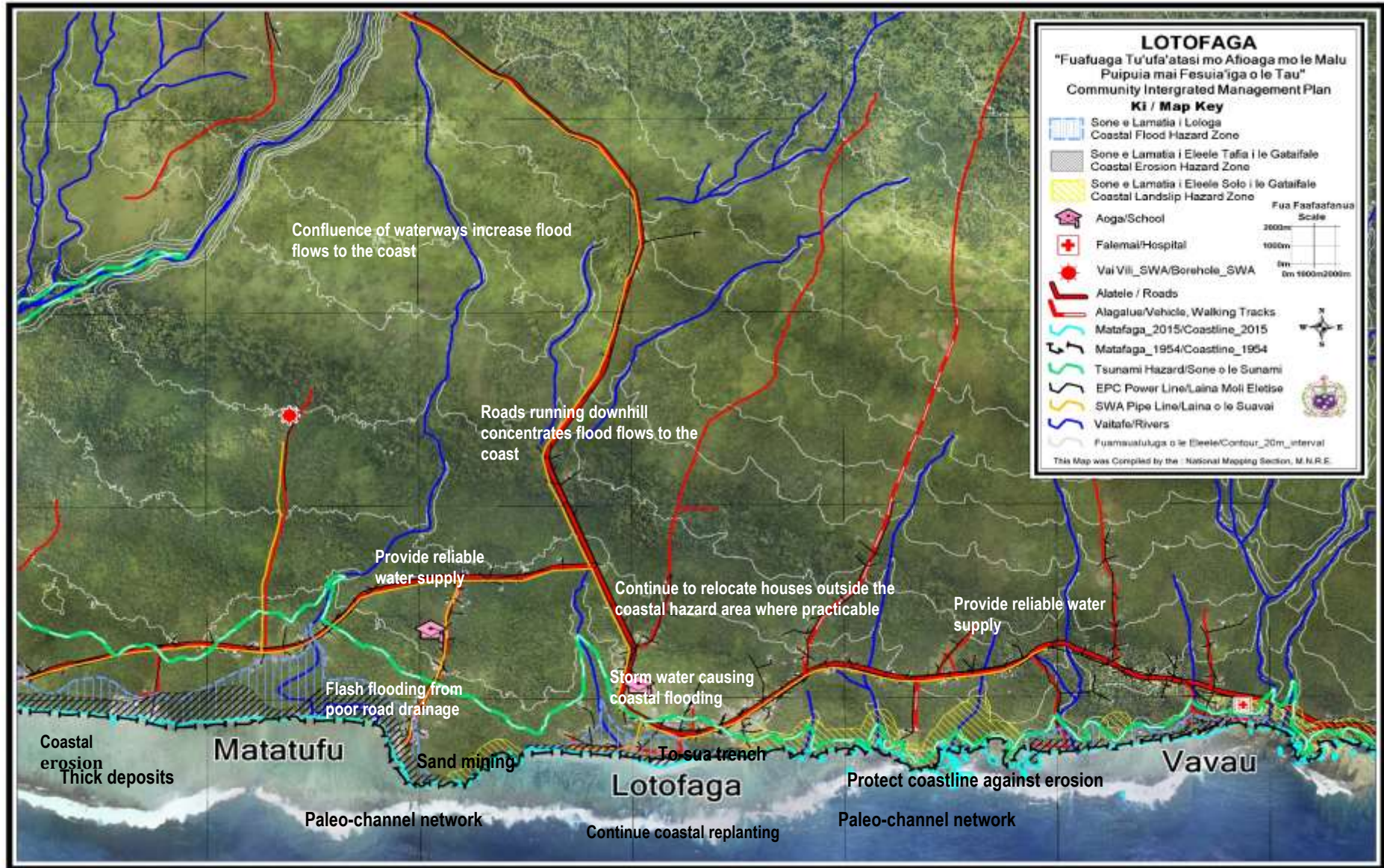
<p>Water Catchment / Forest</p>	<p>Replanting or allow of natural regrowth along riparian areas</p> <p>Develop a district wide (Lotofaga) integrated watershed and forest management plan that can cover forests, craters, and watershed areas</p> <p>Responsibility: MNRE / District</p>	<p>Increase biodiversity of forest ecosystem</p> <p>Improve ecological resilience of forest area</p> <p>Reverse land degradation</p> <p>Increase number of plants to reach the 2million tree planting goal</p>	<p>MNRE – Forestry, Water Resources Division and Environment and Conservation Division to work with district / village to implement national action plans that addresses reforestation programs such as: NBSAP 2015-2020</p> <p>Restoration Operational Plan 2016-2020</p> <p>2 Million Tree Planting Strategy 2015-2020</p> <p>National Water Resource Strategy 2007-2017</p>	<p>National Environment Sector Plan 2017- 2021</p>
<p>Livelihood & Food Security</p>	<p>Best Solution</p>	<p>Other Benefits</p>	<p>Guidelines to assist Implementation</p>	<p>Relevant Sector Plans</p>
<p>Disturbed forests and plantation areas / invasive pests</p>	<p>Restore and utilize fallow lands closer to the village with plantations rather than clearing inland and upland forests</p> <p>Promote and facilitate planting of rootcrops (i.e yams, sweet potato which are more resilient to cyclones, droughts and floods.</p> <p>Implement sustainable land management practices.</p> <p>Implement integrated pest management programme</p>	<p>Improve food security and healthy living and increase community resilience and adaptive response to climate change</p>	<p>MAF CROP Division to support farmers through guidance and trainings from Agricultural experts and awareness programs on crop diversification to suit the prolonged periods of drought or rainy season</p> <p>Provide tools and planting materials to improve crop diversification and resilience – address pest issues etc. This will lead to improve food security</p> <p>Strengthen partnership with farming NGO’s such as the: Samoa Farmers Association; Samoa Federated Farmers Incorporated ; Women in Business Inc. and private sector to support rural farmers through training opportunities and marketing productivity</p> <p>Implementation of solutions are guided by the following:</p>	<p>Agriculture Sector Plan 2016-2020</p>

	<p>Promote agro-forestry and mixed planting including fruit trees species to reduce crop vulnerability to pests and diseases. Diversify into other cash crops and fruit trees i.e cocoa, coconut, lemon and plant in suitable areas outside hazard zones</p> <p>Implement a control program to manage invasive pests both flora and fauna impacting on plantations – crops.</p> <p>Responsibility: MAF MNRE /villages</p>		<p>Draft Soil Resource Management Bill 2018</p> <p>Samoa National Action Programme to combat Land Degradation and to mitigate effects of drought 2015-2020</p> <p>National Invasive Species Strategy and Action Plan 2008-2011</p> <p>2 Million Tree Planting Strategy 2015-2020</p>	
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Community members after the consultation

Lotofaga District Map



4.1 Lotofaga Village Interventions

Infrastructure	Best Solutions Proposed	Other Benefits	Guidelines to assist Implementation	Relevant Sector Plans
Village infrastructure in hazard zones include: Households Schools Churches Businesses, Women's Committee House	Relocate outside hazard zones Investments within the hazard zone adopt appropriate mitigation measures such as: Raise building foundations at a level that takes into account the CFHZ in the vicinity Responsibility: Village/Families / MWTI/MWCSD	Reduce cost in ongoing maintenance mitigate potential damage from coastal erosion and flooding accommodating the hazard.	Village voluntary relocation should follow the following guidelines: Application of National Building Code 2002 PUMA Act 2004 Application of the National Building Code (2016) and permit compliance	CIM Strategy (2015)
Drainage issues	Address drainage system issues by: Implementing proper routine maintenance of existing culverts drainage channels on roadside and ensure surface runoff is properly channeled to the ocean; Install new properly sized outlets and drainage channels resulting from inland development Implement district/village drainage/ culvert clean-up and awareness program Responsibility: MWCSD / Village / MWTI and LTA	Improved rate of recovery Reduce potential for flooding in village areas Safer village houses and roads Improved safety community and resilience	MWTI to provide advice and guidance using the following documents and work programme to support the management of drainage system through application of: Environmental and Social Safeguard policy National Infrastructure Strategic Plan (NISP) 2011 Samoa Code of Environmental Practice (2007) Review of National Road Standards in Samoa (2016) Programme road safety activities into budget and work program Prepare assessment	Community Integrated Management Strategy, August 2015 Transport Sector Plan 2014-2019

			of road drainage systems Prepare a local education programme on need for keeping drainage systems clean	
Rainwater harvesting systems (water tanks)	Rainwater harvesting immediate action, supported by the installation of water tanks for families residing inland without access to water for consumption and domestic use and to provide alternative water source for families receiving saline water. Responsibility: CSSP / MWCSO / village	Improve community adaptive capacity to respond to climate change impacts	Conduct assessment of vulnerable families inland without access to water prior to approving rainwater harvesting system. National Water Resources Management Strategy 2007-2017	Water and Sanitation Sector Plan 2016-2020

Other Solutions Considered or Further Issues Raised

Infrastructure	Solutions/ Issues	Comment
Access road to old village on coast	Upgrade access track and re-established road to residents on the western extreme lower coastal part of the old village Responsibility: LTA / village	Access to the old village is via a steep graveled road with scattered developments. This would not be a good climate resilience option as it would only encourage people to move back to the hazard zone

Environment & Natural Resources	Best Solutions Proposed	Other Benefits	Guidelines to assist Implementation	Relevant Sector Plans
Marine Environment	Implement a marine protected area that includes fish reserves, and mangrove, wetland rehabilitation: Implement an integrated coastal resource management program for the district covering all coastal communities Conduct community education and	Improve sustainable livelihood and food security Natural barriers and protection from storm surges Increase biodiversity Improve ecological resilience of marine ecosystems Reduce impact of	MAF –Fisheries Division and MNRE-DEC to work in collaboration with the district to revive the MPA for improved marine biodiversity and food security by implementing existing action plans such as: Community-based Fishery Plan NBSAP 2015-2020	Agriculture Sector Plan 2016-2020 National Environment Sector Plan 2017-2021

	<p>awareness program on the importance of marine ecosystems (coral reef, wetlands and mangroves)</p> <p>Strengthen existing village marine management plan with an over-arching district marine protected area management plan</p> <p>Responsibility: MAF / MNRE / District & Villages</p>	<p>land-based pollution</p> <p>Reduce impact of coral bleaching</p> <p>Improve resilience of coral reef ecosystem to combat climate change</p> <p>Reduce loss of marine habitats</p>	<p>Update existing Management Plans for Marine Protected Area</p> <p>Implement the revival of the MPA by taking an Ecosystem-based Adaptation approach</p>	
Invasive species	<p>Implement an eradication or controlled program to remove invasive weeds and plants from forest area</p> <p>Responsibility: MNRE / village</p>	<p>Improve survival of native trees</p> <p>Increase biodiversity</p>	<p>MNRE to provide guidance in the removal of invasive species by implementing the following action plans:</p> <p>NBSAP 2015-2020</p> <p>Restoration of the Operation Plan 2016 - 2020</p> <p>National Invasive Species Plan 2008-2011</p>	National Environment Sector Plan 2017-2021
Sand mining for commercial and domestic use affecting the marine and coastal environment as well as terrestrial resources	<p>Assess and identify sustainable sources of sand for domestic and commercial use</p> <p>Village, government and the private sector to collaborate on designated areas for sand mining</p> <p>Extractive industries (mining) monitored and corrected in the riverbank and coastal fringe</p> <p>Strengthen sand mining monitoring and enforcement</p> <p>Mass media awareness on</p>	<p>Village gains benefit from sand mining activities</p> <p>Reduce impact to natural coastal protection mechanism via control of scale and site of extraction</p> <p>Improve village resource management and sustainable development</p> <p>Minimize impacts of coastal inundation and erosion</p> <p>Improve the sustainable management of sand as a natural resource</p>	<p>Follow existing MNRE guidelines for sand mining or extracting such as:</p> <p>MNRE monitoring of sand extraction operations</p> <p>Secure relevant permits before any sand mining occurs</p> <p>Incorporate environmental and social safeguards concerns including consultations with any affected community</p> <p>Village environmental management plans established including annual monitoring systems</p>	National Environment Sector Plan 2017 - 2021

	<p>sustainable sand mining practices</p> <p>Develop sand mining regulation</p> <p>Responsibility: MNRE / District & Village</p>		<p>For access to sites, obtain written consents from Alii Faipule and landowners.</p> <p>Lands and Survey Environment Act 1989</p> <p>Consideration of EIA assessment of impact prior to any extraction</p> <p>PUMA Act 2004</p> <p>NAP – Sustainable Land Management Plan 2015-2019</p> <p>(draft) Sand Mining Policy 2001</p> <p>Draft Soil Resource Management Bill 2018</p>	
<p>Catchment area / lowland coastal</p>	<p>Village to protect 100m buffer zone between ravines and land used for plantations and cattle farms</p> <p>Fencing and relocation of livestock 50m away from catchment</p> <p>Replanting or allow of natural regrowth along riparian areas</p> <p>Established a forest protected area between Vavau and Lotofaga villages to safeguard watershed area</p> <p>Continue on-going replanting of catchment area and monitoring</p> <p>Responsibility: MNRE / Village</p>	<p>Improve ecological resilience of watershed areas</p>	<p>MNRE-Water Resources and Forestry to provide guidance and support to village through implementation of action plan such as:</p> <p>NBSAP 2015-2020</p> <p>National Forestry Plan 2016-2020</p> <p>National Water Resource Strategy 2007-2017</p> <p>Water Resources Management Act 2008</p> <p>Restoration Operational Plan 2016 – 2020</p> <p>2 Million Tree Planting Strategy 2015-2020</p>	<p>National Environment Sector Plan 2017 - 2021</p>

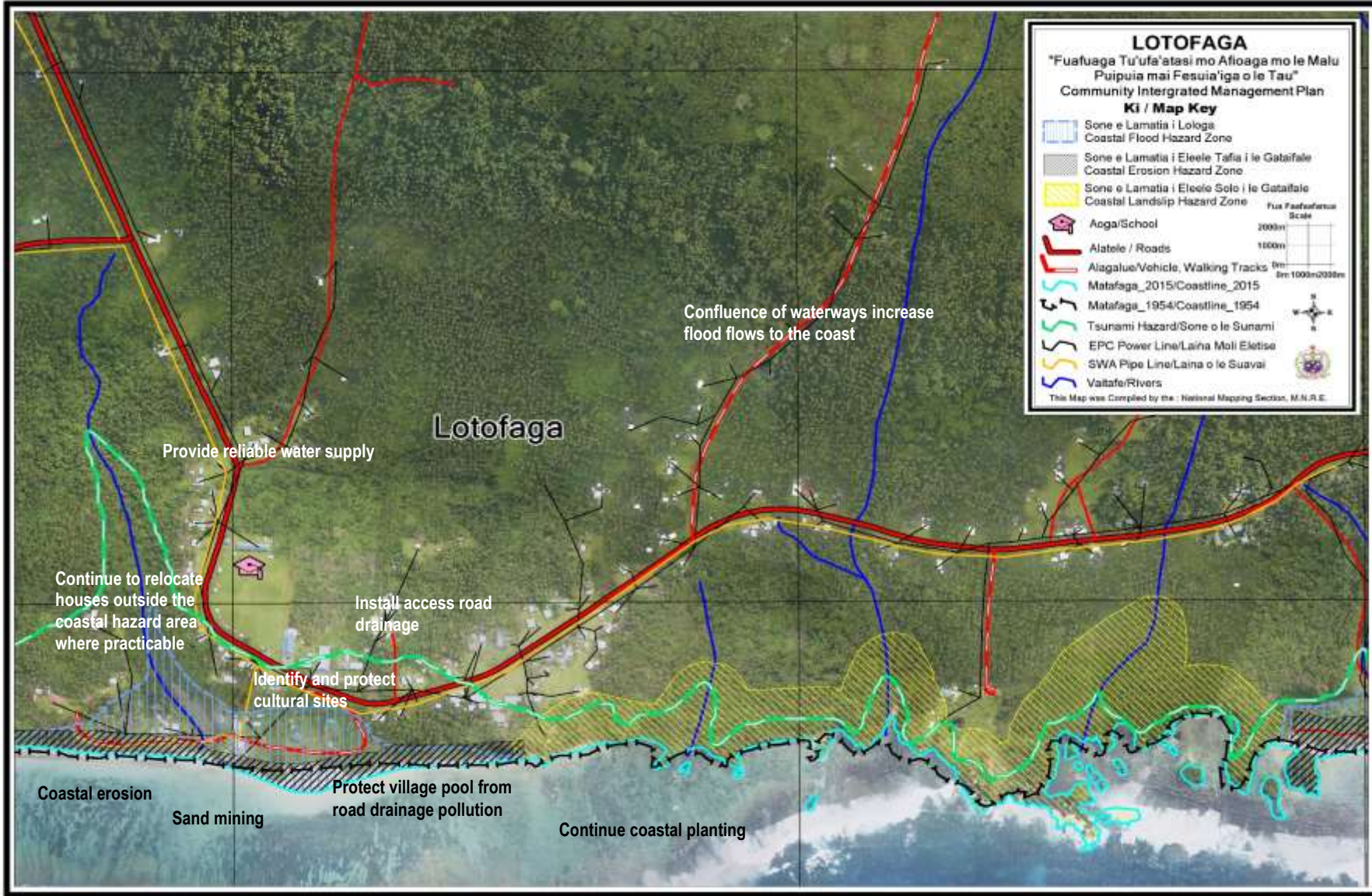
Livelihood and Food Security	Best Solutions and Other Solutions Proposed	Other Benefits	Guidelines to assist Implementation	Relevant Sector Plans
<p>Disturbed forests and plantation areas / invasive pests</p>	<p>Restore and utilize fallow lands closer to the village with plantations rather than clearing inland and upland forests</p> <p>Promote and facilitate planting of rootcrops (i.e yams, sweet potato which are more resilient to cyclones, droughts and floods.</p> <p>Implement sustainable land management practices.</p> <p>Implement integrated pest management programme</p> <p>Promote agro-forestry and mixed planting including fruit trees species to reduce crop vulnerability to pests and diseases.</p> <p>Diversify into other cash crops and fruit trees i.e cocoa, coconut, lemon and plant in suitable areas outside hazard zones</p> <p>Implement a control program to manage invasive pests both flora and fauna impacting on plantations – crops.</p> <p>Responsibility: MAF MNRE /villages</p>	<p>Improve food security and healthy living and increase community resilience and adaptive response to climate change</p>	<p>MAF CROP Division to support farmers through guidance and trainings from Agricultural experts and awareness programs</p> <p>Provide tools and planting materials to improve crop diversification and resilience – address pest issues etc. This will lead to improve food security</p> <p>Strengthen partnership with farming NGO’s such as the: Samoa Farmers Association; Samoa Federated Farmers Incorporated ; Women in Business Inc. and private sector to support rural farmers through training opportunities and marketing productivity</p> <p>Implementation of solutions are guided by the following:</p> <p>Draft Soil Resource Management Bill 2018</p> <p>Samoa National Action Programme to combat Land Degradation and to mitigate effects of drought 2015-2020</p> <p>National Invasive Species Strategy and Action Plan 2008-2011</p>	<p>Agriculture Sector Plan 2016-2020</p> <p>2 Million Tree Planting Strategy 2015-2020</p>



Figure 4 Lotofaga beach - sand has accumulated after 2009 Tsunami according to village representative



Lotofaga Village Map



4.2 Vavau Village Interventions

Infrastructure	Best Solutions Proposed	Other Benefits	Guidelines to assist Implementation	Relevant Sector Plans
Access road	<p>Extend sealing of access road to plantation noted in the LTA list – reconstruction of access road: Length: 630m Estimated Cost: SAT\$226,800.00</p> <p>Include drainage in the design of the access road extension</p> <p>Request other service infrastructure</p> <p>Responsibility: LTA / MWTI / village</p>	<p>Improve rate of recovery</p> <p>Increase number of families relocate to higher grounds</p> <p>Increase opportunities to utilize land for farming</p> <p>More lives saved during times of emergency</p>	<p>Construction of access roads should be guided by government requirements as stated in the following policies, strategies and action plans:</p> <p>Environmental and Social Safeguard policy</p> <p>Samoa Code of Environmental Practice (2007)</p> <p>Review of National Road Standards in Samoa (2016)</p> <p>Vulnerability Assessment of the Samoa Road Network (2017)</p> <p>National Infrastructure Strategic Plan (NISP) 2011</p> <p>Programme road safety activities into budget and work programme</p>	<p>Community Integrated Management Strategy, August 2015</p> <p>Transport Sector Plan 2014-2019</p>
Drainage system	<p>Address poor drainage system by:</p> <p>Implementing proper routine maintenance of existing culverts drainage channels on roadside and ensure surface runoff is properly channeled to the ocean;</p> <p>Install new properly</p>	<p>Improved rate of recovery</p> <p>Reduce potential for flooding in village areas</p> <p>Safer village houses and roads</p> <p>Improved safety community and resilience</p>	<p>MWTI to provide advice and guidance using the following documents and work programme to support the management of drainage system through application of:</p> <p>Environmental and Social Safeguard policy</p>	<p>Community Integrated Management Strategy, August 2015</p> <p>Transport Sector Plan 2014-2019</p>

	<p>sized outlets and drainage channels resulting from inland development Implement district/village drainage/ culvert clean-up and awareness program</p> <p>Responsibility: MWCS D / Village / MWTI and LTA</p>		<p>National Infrastructure Strategic Plan (NISP) 2011 Samoa Code of Environmental Practice (2007)</p> <p>Review of National Road Standards in Samoa (2016)</p> <p>Programme road safety activities into budget and work program</p> <p>Prepare assessment of road drainage systems</p> <p>Prepare a local education programme on need for keeping drainage systems clean</p>	
Water reservoir (storage)	<p>Immediate action supported by PPCR-ECR project is the implementation of water storage for inland residents</p> <p>Responsibility: CSSP / MWCS D-IWSA / village</p>	Improve community adaptive capacity to respond to climate change impacts	<p>Conduct assessment of vulnerable families inland without access to water prior to approving rainwater harvesting system.</p> <p>National Water Resources Management Strategy 2007-2017</p>	Water and Sanitation Sector Plan 2016-2020
Village Reservoir (Pool near the coast)	<p>Water flowing into the reservoir has a health flow rate and functioning well, to enhanced the water supply:</p> <p>Install a pump to enabled pumping of water into a storage tank; Assess potential of using a renewable source of energy for pumping water</p> <p>Another option is to install a wind turbine to pump water into a water storage tank</p>	Improve water supply back-up during drought period or when natural disaster strikes	<p>MNRE / MWTI to provide guidance to community for maintenance of coastal spring bathing and drinking water by application:</p> <p>Environmental Social Safeguard policy</p> <p>NBSAP 2015-2020</p> <p>National Water Resource Strategy 2007-2017</p>	National Environment Sector Plan 2017-2021

	<p>Conduct water quality testing for drinking water</p> <p>Responsibility: Village / MNRE / CSSP / MWTI</p>			
Emergency Management / Evacuation Shelter	<p>Identify schools and churches outside of the CEHZ and CFHZ as Evacuation Shelters and include in the DMO program for retrofitting</p> <p>Prepare a District Emergency Response Plan identifying resources needed for the Evacuation Shelter</p> <p>Prepare signs in English and Samoan to be erected throughout the District identifying actions in the event of emergencies including a location map of nearest emergency facilities and Evacuation Shelter</p> <p>Implement the Community Disaster Climate Risk Management Plan for district and village</p> <p>Responsibility: MNRE / District / village</p>	<p>Improve preparedness of district for climate change and extreme events</p> <p>Improve resilience and ability to respond</p>	<p>MNRE-DMO monitoring program for all existing Evacuation Shelter places should follow these guidelines:</p> <p>Application of National Building Code 2002</p> <p>PUMA Act 2004</p> <p>Identify safe location on CIM Plan maps for Evacuation Shelters</p>	National Disaster Management Plan 2017-2021

Other Solutions Considered or Further Issues Raised

Infrastructure	Solutions/ Issues	Comment
Old Access Track	<p>Village request to seal the road to old village on the coast</p> <p>Responsibility: LTA / MWTI</p>	Access to the old village is not well substantiated and there is only one family there. For one family the current state of the access road is possibly suitable.

Environment & Natural Resources	Best Solutions and Other Solutions Proposed	Other Benefits	Guidelines to assist Implementation	Relevant Sector Plans
Water Catchment	Conduct an assessment of the	Improve ecological	MNRE-DEC, WRD and Forestry Division to	National Environment Sector

	<p>natural water source / watershed area inland</p> <p>Review the Aufaga Watershed Management plan that includes Vavau and Lotofaga</p> <p>Fencing and relocation of plantations 20 meters and cattle farms about 50m away from catchment area</p> <p>Consultation with the villages on the catchment area</p> <p>Conduct water testing for quality of water</p> <p>Responsibility: MNRE / MoH / village</p>	<p>resilience of watershed area</p>	<p>provide advice such as: Awareness and government support in supply of nursery trees, for replanting</p> <p>Community to request through Forestry Division MNRE seedlings under their 2million tree replanting project</p> <p>NBSAP 2015-2020</p> <p>Restoration Operational Plan 2016-2020</p> <p>National Water Strategy Plan 2007-2017</p> <p>Water Resources Management Act 2008</p> <p>2 Million Tree Planting Strategy 2015-2020</p>	<p>Plan 2017-2021</p> <p>Water and Sanitation Sector Plan 2016-2020</p>
<p>Marine / Fisheries Reserve</p>	<p>Established a fishery reserves – Marine Protected Area</p> <p>Implement coral gardening</p> <p>Conduct training on village based monitoring programs for marine areas</p> <p>Implement all activities under the village Fisheries Management Plan</p> <p>Implement program to remove crown of thorns from inshore area</p> <p>Responsibility: MAF / Village</p>	<p>Reduce impact of land-based pollution</p> <p>Reduce impact of coral bleaching</p> <p>Improve resilience of coral reef ecosystem to combat climate change</p> <p>Reduce loss of marine habitats</p>	<p>MAF-Fisheries division to provide advice following existing guidelines:</p> <p>Community-based Management Fishery Plan</p> <p>NBSAP 2015-2020</p> <p>Update village Fisheries Management Plan</p>	<p>Agriculture Sector Plan 2016-2020</p> <p>National Environment Sector Plan 2017-2021</p>
<p>Sand mining for commercial and domestic use affecting the marine and coastal</p>	<p>Assess and identify sustainable sources of sand for domestic and commercial use</p>	<p>Village gains benefit from sand mining activities</p> <p>Reduce impact to</p>	<p>Follow existing MNRE guidelines for sand mining or extracting such as: MNRE monitoring of</p>	<p>National Environment Sector Plan 2017 - 2021</p>

<p>environment as well as terrestrial resources</p>	<p>Village, government and the private sector to collaborate on designated areas for sand mining</p> <p>Extractive industries (mining) monitored and corrected in the riverbank and coastal fringe Strengthen sand mining monitoring and enforcement</p> <p>Mass media awareness on sustainable sand mining practices</p> <p>Develop sand mining regulation</p> <p>Responsibility: MNRE / District & Village</p>	<p>natural coastal protection mechanism via control of scale and site of extraction</p> <p>Improve village resource management and sustainable development</p> <p>Minimize impacts of coastal inundation and erosion</p> <p>Improve the sustainable management of sand as a natural resource</p>	<p>sand extraction operations</p> <p>Secure relevant permits before any sand mining occurs</p> <p>Incorporate environmental and social safeguards concerns including consultations with any affected community</p> <p>Village environmental management plans established including annual monitoring systems</p> <p>For access to sites, obtain written consents from Alii Faipule and landowners.</p> <p>Lands and Survey Environment Act 1989</p> <p>Consideration of EIA assessment of impact prior to any extraction</p> <p>PUMA Act 2004</p> <p>NAP – Sustainable Land Management Plan 2015-2019</p> <p>(draft) Sand Mining Policy 2001</p> <p>Draft Soil Resource Management Bill 2018</p>	
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<p>Forest Loss (loss of indigenous forest due to cyclone damages and land clearance)</p>	<p>Replanting of native tree species in open fallow lands</p> <p>Rehabilitate fallow land and degraded area</p> <p>Implementation of replanting program for village of native tree species</p> <p>Implement replanting of coastal vegetation along the coastal area</p> <p>Responsibility: MNRE / village</p>	<p>Reverse land degradation</p> <p>Improve coastal and inland biodiversity</p>	<p>MNRE-Forestry Division to provide advice to community on reforestation / restoration program by providing tree seedlings for planting.</p> <p>2016-2020 National Forestry Plan</p> <p>NBSAP 2015-2020 NAP – Sustainable Land Management Plan 2015-2019</p> <p>NBSAP 2015-2020</p> <p>Restoration Operational Plan 2016 – 2020</p>	<p>National Environment Sector Plan 2017-2021 Two Million Tree Planting Strategy 2015-2020</p> <p>Forestry Management Act 2011</p>
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Livelihood and Food Security	Best Solutions and Other Solutions Proposed	Other Benefits	Guidelines to assist Implementation	Relevant Sector Plans
<p>Disturbed forests and plantation areas / invasive pests</p>	<p>Restore and utilize fallow lands closer to the village with plantations rather than clearing inland and upland forests</p> <p>Promote and facilitate planting of root crops (i.e yams, sweet potato which are more resilient to cyclones, droughts and floods. Implement sustainable land management practices.</p> <p>Implement integrated pest management programme</p> <p>Promote agro-forestry and mixed planting including fruit trees species to reduce crop</p>	<p>Improve food security and healthy living and increase community resilience and adaptive response to climate change</p>	<p>MAF CROP Division to support farmers through guidance and trainings from Agricultural experts and awareness programs on crop diversification to suit the prolonged periods of drought or rainy season</p> <p>Provide tools and planting materials to improve crop diversification and resilience – address pest issues etc. This will lead to improve food security</p>	<p>Agriculture Sector Plan 2016-2020</p>

	<p>vulnerability to pests and diseases. Diversify into other cash crops and fruit trees i.e cocoa, coconut, lemon and plant in suitable areas outside hazard zones</p> <p>Implement a control program to manage invasive pests both flora and fauna impacting on plantations – crops.</p> <p>Responsibility: MAF MNRE /villages</p>		<p>Strengthen partnership with farming NGO’s such as the: Samoa Farmers Association; Samoa Federated Farmers Incorporated ; Women in Business Inc. and private sector to support rural farmers through training opportunities and marketing productivity</p> <p>Implementation of solutions are guided by the following:</p> <p>Draft Soil Resource Management Bill 2018</p> <p>Samoa National Action Programme to combat Land Degradation and to mitigate effects of drought 2015-2020</p> <p>National Invasive Species Strategy and Action Plan 2008-2011</p> <p>2 Million Tree Planting Strategy 2015-2020</p>	
<p>Gardening and Handicrafts</p>	<p>Request support for Women’s vegetable garden program and handicraft activities for income generation</p> <p>Responsibility: MWCS D / WIBDI / Village</p>	<p>Increase opportunities for income benefits</p>	<p>Implementation and support should follow guidelines from relevant agencies</p>	<p>Community Development Plan 2016-2021</p>

Village Governance	Best Solutions Proposed	Guidelines to assist Implementation	Comments
Village By-laws	<p>Implement village by-laws for community to follow and include protection of natural resources both marine and terrestrial;</p> <p>Implement the CIM Plan for 2016-2028</p> <p>Village has strong governance system in place and program: Banned on shrimp farming in natural springs Banned outsiders from fishing in the village inshore fishing area</p> <p>Responsibility: Village / MWCS D</p>	<p>MWCS D to provide assistance to district /village in developing by-laws</p> <p>Community Development 2016-2021</p>	<p>Support the development of village by-laws that can guide governing structure of village and the implementation of government and non-government programs including CIM Plans.</p>

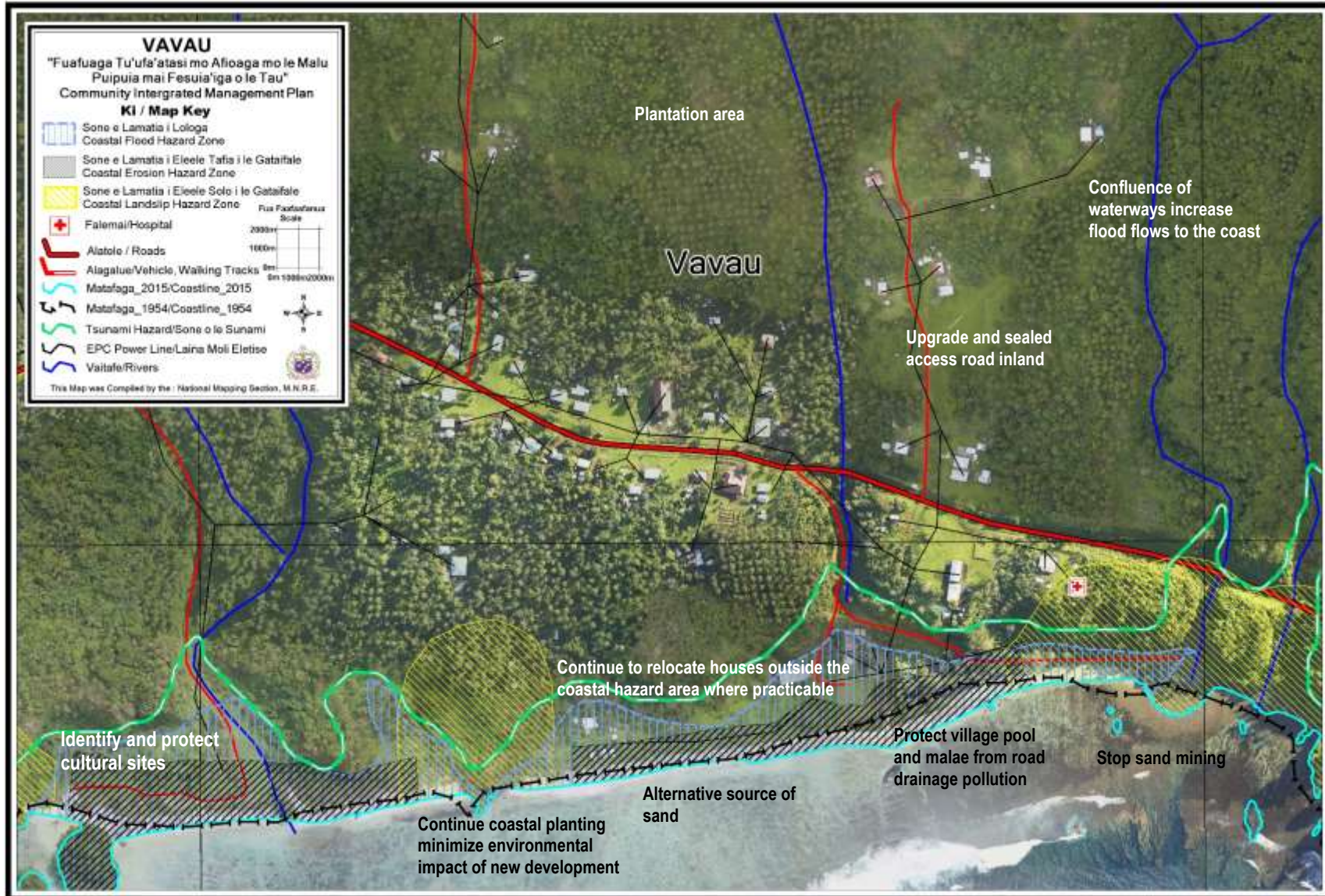


Evidence of sand mining activities in Vavau village beachfront. The beachfront has been raised according to village representative due to high volume of debris deposited



Access Road to Plantation in Vavau request tar sealing

Vavau Village Map



4.3 Matatufu Village Interventions

Infrastructure	Best Solutions and Other Solutions Proposed	Other Benefits	Guidelines to assist Implementation	Relevant Sector Plans
Access road	<p>Tar seal 2 access road to plantation and residential places inland</p> <p>Seal the access road to the coast to the main village location</p> <p>Include drainage in the design of the access road</p> <p>Responsibility: LTA / MWTI / village</p>	<p>Improve rate of recovery</p> <p>Increase number of families relocate to higher grounds</p>	<p>Construction of access roads should be guided by government requirements as stated in the following policies, strategies and action plans:</p> <p>Environmental and Social Safeguard policy</p> <p>Samoa Code of Environmental Practice (2007)</p> <p>Review of National Road Standards in Samoa (2016)</p> <p>Vulnerability Assessment of the Samoa Road Network (2017)</p> <p>National Infrastructure Strategic Plan (NISP) 2011</p> <p>Programme road safety activities into budget and work programme</p>	<p>Community Integrated Management Strategy, August 2015</p> <p>Transport Sector Plan 2014-2019</p>
Drainage system	<p>Address drainage issues by:</p> <p>Implementing proper routine maintenance of existing culverts drainage channels on roadside and ensure surface runoff is properly channeled to the ocean;</p> <p>Install new properly sized outlets and drainage channels</p>	<p>Improved rate of recovery</p> <p>Reduce potential for flooding in village areas</p> <p>Safer village houses and roads</p> <p>Improved safety community and resilience</p>	<p>MWTI to provide advice and guidance using the following documents and work programme to support the management of drainage system through application of:</p> <p>Environmental and Social Safeguard policy</p> <p>National</p>	<p>Community Integrated Management Strategy, August 2015</p> <p>Transport Sector Plan 2014-2019</p>

	<p>resulting from inland development</p> <p>Implement district/village drainage/ culvert clean-up and awareness program</p> <p>Responsibility: MWCS D / Village / MWTI and LTA</p>		<p>Infrastructure Strategic Plan (NISP) 2011</p> <p>Samoa Code of Environmental Practice (2007)</p> <p>Review of National Road Standards in Samoa (2016)</p> <p>Programme road safety activities into budget and work program</p> <p>Prepare assessment of road drainage systems</p> <p>Prepare a local education programme on need for keeping drainage systems clean</p>	
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Other Solutions Considered or Further Issues Raised

Infrastructure	Solutions/ Issues	Comment
Bridge	<p>Village request to rectify the damage on the bridge. Damaged caused by TC Evan.</p> <p>Responsibility: LTA</p>	<p>The initial damage mentioned seems to have exacerbated since small and larger rainfall events. The armoring of the bridge have been constructed to fend pressures from fluvial runoff during storm events. Armoring has not been including to guard against upstream pressures from high tides and storm surges. Flood flows seem to top over the bridge, and storm surges are likely to put undue pressure on the southern parts of the bridge. The work is long overdue however it is likely to be a LTA matter and the cost will exceed the budget for district sub-projects.</p>
Coastal Spring (Mata o Tufu)	<p>Village name came from coastal spring – upgrade parts of the spring that was damaged by the 2009 tsunami</p> <p>Responsibility: Village / NGO/ CSSP / UNDP-GEF SGP</p>	<p>There is need for further assessment as the current problem does not provide sufficient information for a climate resilience outcome. The pool is literally located in the sea and when it is high tide, there is strong possibility of saltwater intrusion into the pool. As such the drinking water would have high level of saline contamination. Current purpose is mainly recreational.</p>

Environment & Natural Resources	Best Solutions Proposed	Other Benefits	Guidelines to assist Implementation	Relevant Sector Plans
Coastal restoration	<p>Implement replanting of the coastal area with coastal vegetation</p> <p>Responsibility: MNRE / MAF-Fisheries /village</p>	<p>Improve natural barriers and resilience of coastal area reduce coastal erosion</p>	<p>MNRE – Forestry to provide guidance and advice coastal vegetation for replanting NBSAP 2015-2020</p>	<p>National Environment Sector Plan 2017-2021</p>

<p>Sand mining for commercial and domestic use affecting the marine and coastal environment as well as terrestrial resources</p>	<p>Assess and identify sustainable sources of sand for domestic and commercial use</p> <p>Village, government and the private sector to collaborate on designated areas for sand mining</p> <p>Extractive industries (mining) monitored and corrected in the riverbank and coastal fringe</p> <p>Strengthen sand mining monitoring and enforcement</p> <p>Mass media awareness on sustainable sand mining practices</p> <p>Develop sand mining regulation</p> <p>Responsibility: MNRE / District & Village</p>	<p>Village gains benefit from sand mining activities</p> <p>Reduce impact to natural coastal protection mechanism via control of scale and site of extraction</p> <p>Improve village resource management and sustainable development</p> <p>Minimize impacts of coastal inundation and erosion</p> <p>Improve the sustainable management of sand as a natural resource</p>	<p>Follow existing MNRE guidelines for sand mining or extracting such as:</p> <p>MNRE monitoring of sand extraction operations</p> <p>Secure relevant permits before any sand mining occurs</p> <p>Incorporate environmental and social safeguards concerns including consultations with any affected community</p> <p>Village environmental management plans established including annual monitoring systems</p> <p>For access to sites, obtain written consents from Alii Faipule and landowners.</p> <p>Lands and Survey Environment Act 1989</p> <p>Consideration of EIA assessment of impact prior to any extraction</p> <p>PUMA Act 2004</p> <p>NAP – Sustainable Land Management Plan 2015-2019 (draft) Sand Mining Policy 2001</p> <p>Draft Soil Resource Management Bill 2018</p>	<p>National Environment Sector Plan 2017 - 2021</p>
<p>Marine / Fisheries Reserve</p>	<p>Expand fishery reserves</p> <p>Implement coral gardening</p> <p>Conduct training on village based monitoring programs for marine areas</p>	<p>Reduce impact of land-based pollution</p> <p>Reduce impact of coral bleaching</p> <p>Improve resilience of</p>	<p>MAF-Fisheries division to provide advice following existing guidelines:</p> <p>Community-based</p>	<p>Agriculture Sector Plan 2016-2020</p> <p>National Environment Sector Plan 2017 - 2021</p>

	<p>Implement the Fisheries Management Plan</p> <p>Implement program to remove crown of thorns / seaweed from inshore area</p> <p>Consultation with the village for developing a marine reserve</p> <p>Enforce village by-laws</p> <p>Responsibility: MAF / Village</p>	<p>coral reef ecosystem to combat climate change</p> <p>Reduce loss of marine habitats</p>	<p>Management Fishery Plan</p> <p>NBSAP 2015-2020</p> <p>Update village Fisheries Management Plan</p>	
Wetland Protection	<p>Deepen the natural stream bed flowing into the wetland by dredging the sand blocking the mouth of the stream</p> <p>Allow better flushing into the sea</p> <p>Responsibility: MNRE / village</p>	<p>Reduce impact from flooding</p> <p>Improve recovery rate</p>	<p>MNRE monitoring of sand extraction operations and ensuring estuaries are free of debris for:</p> <p>Easy flow of water into the ocean from the wetland</p> <p>Alii Faipule and landowner provide consent</p> <p>NAP – Sustainable Land Management Plan 2015-2019</p> <p>Consideration of EIA assessment of impact prior to any sand dredging</p>	<p>National Environment Sector Plan 2017 - 2021</p> <p>PUMA Act 2004</p>
Forest Loss (loss of indigenous forest due to cyclone damages and land clearance)	<p>Replanting of native tree species in open fallow lands</p> <p>Rehabilitate fallow land and degraded area</p> <p>Implementation of replanting program for village of native tree species</p> <p>Implement replanting of coastal vegetation along the coastal area</p> <p>Responsibility: MNRE / village</p>	<p>Reverse land degradation</p> <p>Improve coastal and inland biodiversity</p>	<p>MNRE-Forestry Division to provide advice to community on reforestation / restoration program by providing tree seedlings for planting.</p> <p>2016-2020 National Forestry Plan</p> <p>NBSAP 2015-2020</p> <p>NAP – Sustainable Land Management Plan 2015-2019</p> <p>NBSAP 2015-2020</p>	<p>National Environment Sector Plan 2017 - 2021</p>

			<p>Restoration of the Operational Plan 2016-2020</p> <p>Two Million Tree Planting Strategy 2015-2020</p> <p>Forestry Management Act 2011</p>	
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Livelihood and Food Security	Best Solutions Proposed	Other Benefits	Guidelines to assist Implementation	Relevant Sector Plans
Disturbed forests and plantation areas / invasive pests	<p>Restore and utilize fallow lands closer to the village with plantations rather than clearing inland and upland forests</p> <p>Promote and facilitate planting of rootcrops (i.e yams, sweet potato which are more resilient to cyclones, droughts and floods.</p> <p>Implement sustainable land management practices.</p> <p>Implement integrated pest management programme</p> <p>Promote agro-forestry and mixed planting including fruit trees species to reduce crop vulnerability to pests and diseases.</p> <p>Diversify into other cash crops and fruit trees i.e cocoa, coconut, lemon and plant in suitable areas outside hazard zones</p> <p>Implement a control program to manage invasive pests both</p>	<p>Improve food security and healthy living and increase community resilience and adaptive response to climate change</p>	<p>MAF CROP Division to support farmers through guidance and trainings from Agricultural experts and awareness programs on crop diversification to suit the prolonged periods of drought or rainy season</p> <p>Provide tools and planting materials to improve crop diversification and resilience – address pest issues etc. This will lead to improve food security</p> <p>Strengthen partnership with farming NGO’s such as the: Samoa Farmers Association; Samoa Federated Farmers Incorporated ; Women in Business Inc. and private sector to support rural farmers through training opportunities and marketing productivity</p> <p>Implementation of solutions are guided by the following:</p>	<p>Agriculture Sector Plan 2016-2020</p>

	<p>flora and fauna impacting on plantations – crops.</p> <p>Responsibility: MAF MNRE /villages</p>		<p>Draft Soil Resource Management Bill 2018</p> <p>Samoa National Action Programme to combat Land Degradation and to mitigate effects of drought 2015-2020</p> <p>National Invasive Species Strategy and Action Plan 2008-2011</p> <p>2 Million Tree Planting Strategy 2015-2020</p>	
Gardening and Handicrafts	<p>Request support for Women’s vegetable garden program and handicraft activities for income generation</p> <p>Responsibility: MWCSO / WIBDI / Village</p>	Increase opportunities for income benefits	Implementation and support should follow guidelines from relevant agencies	Community Development Plan 2016-2021



Matatufu access road inland requesting to tar sealed



Matatufu Village Coastal spring pool – located inside inshore

Matatufu Village Map

