Environmental Assessment

INITIAL ENVIRONMENTAL EXAMINATION

Project No. 46351-002

Document Stage: Final

March 2017

TONGA: Climate Resilience Sector Project

Climate Proofing of Evacuation Roads Subproject

Prepared by the Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications and the Ministry of Finance and National Planning for the Asian Development Bank

NOTES In this report, "$" refers to US dollars unless otherwise stated.

Initial Environmental Examination (IEE)

Climate Proofing of Evacuation Roads

Tongatapu and Eua

Kingdom of Tonga

Prepared by PMU Climate Resilient Sector Project (CRSP)

For

Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC)

Project Number: ADB Grant 378 -TON

March 2017

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ABBREVIATIONS

ADB Asian Development Bank

APs Affected Persons

CCA Climate Change Adaptation

CIF Climate Investment Fund

DRM Disaster Risk Management

DRR Disaster Risk Reduction

EAC Environmental Assessment Committee

EARF Environmental Assessment Review Framework

EIA Environmental Impact Assessment

EMP Environmental Management Plan

ESU Environment and Social Unit

GFP Grievance Focal Point

GIS Geographic Information System

GoT Government of Tonga

GRM Grievance Redress Mechanism

IDF Rainfall Intensity Duration and Frequency curves

JNAP Joint National Action Plan On Climate Change Adaptation And Disaster Risk

JNAP-TWG Technical Working Group for JNAP coordinated by a Secretariat

MAFF Ministry of Agriculture And Food, Forests And Fisheries Management

MFNP Ministry of Finance and National Planning

MLNR Ministry of Lands and Natural Resources

MET Ministry of Education and Training

MOH Ministry of Health

MOI Ministry of Infrastructure

NEMO National Emergency Management Office

NGO Non-Government Organization

NIIP National Infrastructure Investment Plan

PIU Project Implementation Unit

PMU Program Management Unit

PPCR Pilot Program for Climate Resilience

SPCR Strategic Program for Climate Resilience

SPS ADB Safeguard Policy Statement (2009)

TWG Technical Working Group on Climate Change (See JNAP-TWG)

I.EXECUTIVE SUMMARY

A. Background

1. The Government of Tonga (GoT) has received assistance from the Asian Development Bank (ADB) through the Climate Investment Fund (CIF) to support investment for the Strategic Program for Climate Resilience (SPCR) under the Pilot Program for Climate Resilience (PPCR). The SPCR is broken down into three components:

1) Capacity Building;
2) Climate Change Financing; and
3) Climate Proofing Infrastructure and Ecosystem Resilience

2. Tonga is vulnerable to adverse climate change and extreme weather events. Roads have been damaged in recent cyclones through heavy rain, strong winds and flooding. The Tonga Government has requested ADB for financial support under Component 4 of the SPCR which relates to climate proofing infrastructure and ecosystem resilience. Funds will be used to repair, improve and climate proof four roads of which three are on Tongatapu and one on Eua.

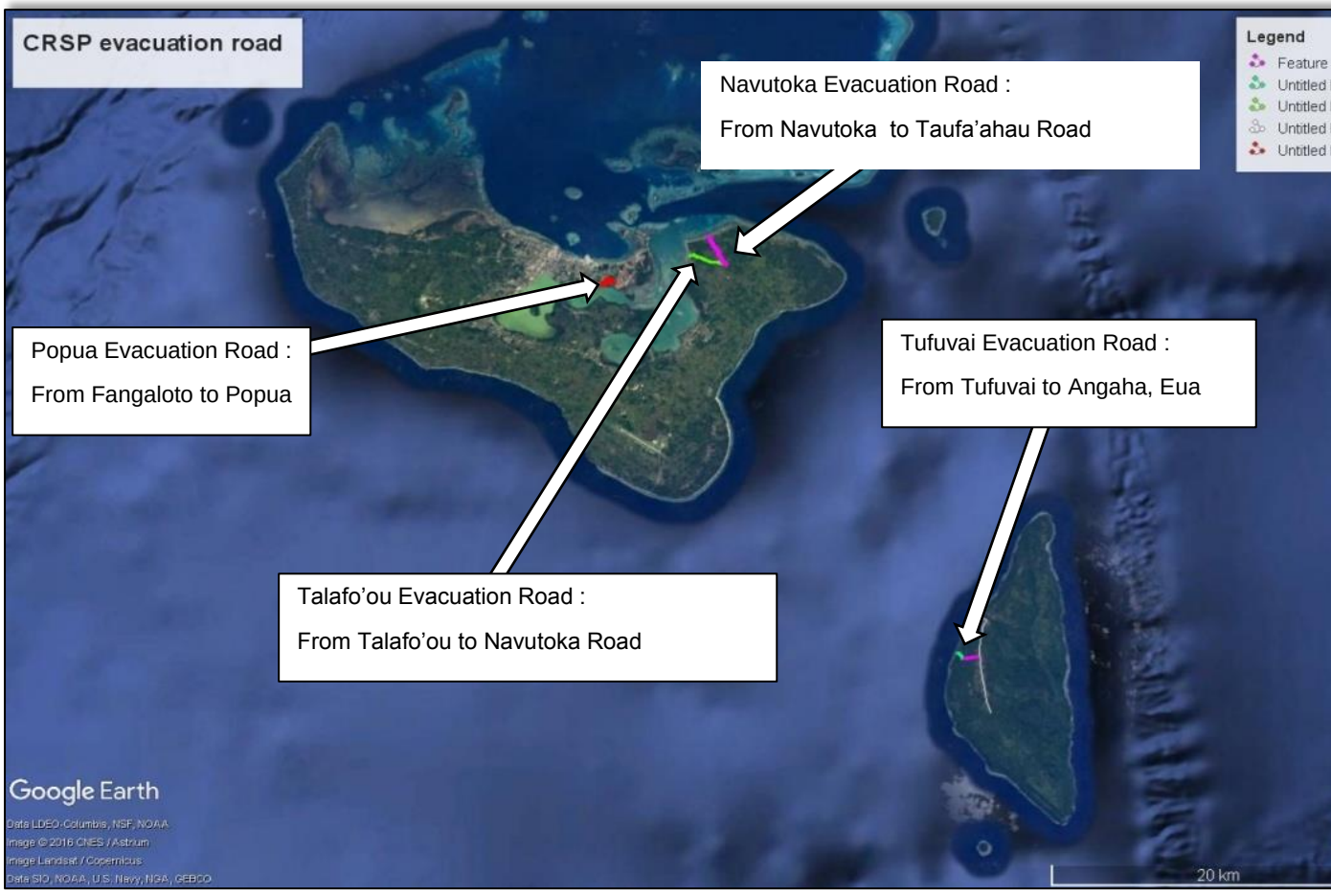

Figure I-I Location of 4 Evacuation Roads

3. The Tonga Climate Resilience Sector Project (CRSP) will mainstream climate resilience into development planning and address national priorities focusing on the most vulnerable sectors and communities. The Project will provide resources to address the

climate change risk priorities of the Government, as well as those of vulnerable communities. The roads are being climate proofed under this program. The proposed works align with Tonga's JNAP 2010-2015 priority Goal 4: "enhance community preparedness and resilience to impact of climate change and disaster."

4. The project will upgrade around 6.8 km of roads to provide evacuation and post-disaster access roads to three villages in Tongatapu and one in the island of 'Eua. The expected benefits are improved security of local population in eastern Tongatapu in the event of a major climate change event by both allowing evacuation and providing for post disaster access by emergency vehicles.

5. The roads will also enhance the livelihoods of the local population through facilitating their access to economic centers such as markets and providing employment and training opportunities for local and national workers. Tongatapu evacuation roads will include two roads on the eastern side, at Navutoka and Talafo'ou, one road at Popua, in Nuku'alofa and one road at Tufuvai, on 'Eua.

B. Proposed Improvement

6. The works will involve :

- Clear vegetation along the route
- Construct new granular flexible pavement road
- Create drainage system along the road way
- Link existing route to major collector road as the main evacuation route
- Double coat sealed pavement to give climate proofing

7. The estimated costs are given below.

Table I-1 Estimated cost for road upgrades

Roads	Estimated Cost USD
Talafo'ou Evacuation Road – From Talafo'ou to Navutoka Road	0.44 million
Navutoka Evacuation Road- From Navutoka to Taufa'ahau Road	0.44 million
Popua Evacuation Road - From Fangaloto to Popua	0.41 million
Tufuvai Evacuation Road- From Tufuvai to Angaha, Eua	0.46 million

8. The works are primarily climate proofing through the repair and upgrading of existing roads within established Rights of Way. Although some widening may be necessary no land acquisition is required.

9. In the project preparatory technical assistance stage, subproject options were screened for technical, environmental, and social feasibility. This IEE updates the earlier PPTA IEE prepared in 2014, and confirms that as the construction works can be classed as minor and temporary impacts.

10. A submission has been made under Tongan EIA Regulations 2010 which has agreed that the works are classed as "Minor" and a full EIA is not required.

11. The works will be carried out by local contractors who will be required to comply with the requirements of an EMP. This will be contractually binding on them.

12. Public consultations have taken place with stakeholders to update earlier findings on their concerns. These concerns have been addressed in the remedial works.

13. The IEE contains an EMP which must be followed by the contractor.

14. The IEE contains a Grievance Redress Mechanism (GRM) which must be followed by all involved parties.

15. There are no Sites of Special Ecological Interest or cultural sensitivity near the proposed works site that will be adversely impacted,

16. The IEE confirms that the works fall under ADB Category “B”.

17. This IEE concludes that there are no outstanding environmental issues remaining and there is no environmental reason for this project not to proceed.

II.POLICY AND LEGAL FRAMEWORK

A. Policy Framework

1. Tonga Strategic Development Framework 2015-2025 (TSDF2)

18. In 2015 the Ministry of Finance and National Planning, with support from the Asian Development Bank, circulated the "Tonga Strategic Development Framework 2015-2025: *A more progressive Tonga:Enhancing Our Inheritance*." This is known as TSDF2.

19. Following the ending of TSDF 1 in December 2014, the formulation of TSDF2 built on lessons learned from TSDF1, feedback received during consultations with key sectors of the economy in October-December 2014 and consultation within Government ministries, departments and agencies.

20. It follows regional and international commitments and serves as a broad 10 year overarching national framework and guide to lower level plans and budgets at sector, district and corporate level where organizations outside of government have involvement in development initiatives.

21. TSDF2 seeks to provide "A progressive Tonga supporting higher quality of life for all." It consists of seven national outcomes and twenty-nine organizational outcomes to guide development over ten years. The national outcomes are :

A. a more inclusive, sustainable and dynamic knowledge-based economy

B. a more inclusive, sustainable and balanced urban and rural development across island groups

C. a more inclusive, sustainable and empowering human development with gender equality

D. a more inclusive, sustainable and responsive good-governance

E. a more inclusive, sustainable and successful provision and maintenance of infrastructure and technology

F. a more inclusive, sustainable and effective land and environment management, with resilience to climate change and risk

G. a more inclusive, sustainable and consistent advancement of our external interests, security and sovereignty

22. Organizational Outcomes have also been identified to support these National Outcomes and are grouped into five pillars.

Three Institutional Pillars:

1. Economic Institutions

2. Social Institutions

3. Political Institutions

Two Input Pillars:

4. Infrastructure and Technology Inputs

5. Natural Resource and Environment Inputs

The overall TSDF2 vision is shown in Figure II-I below.

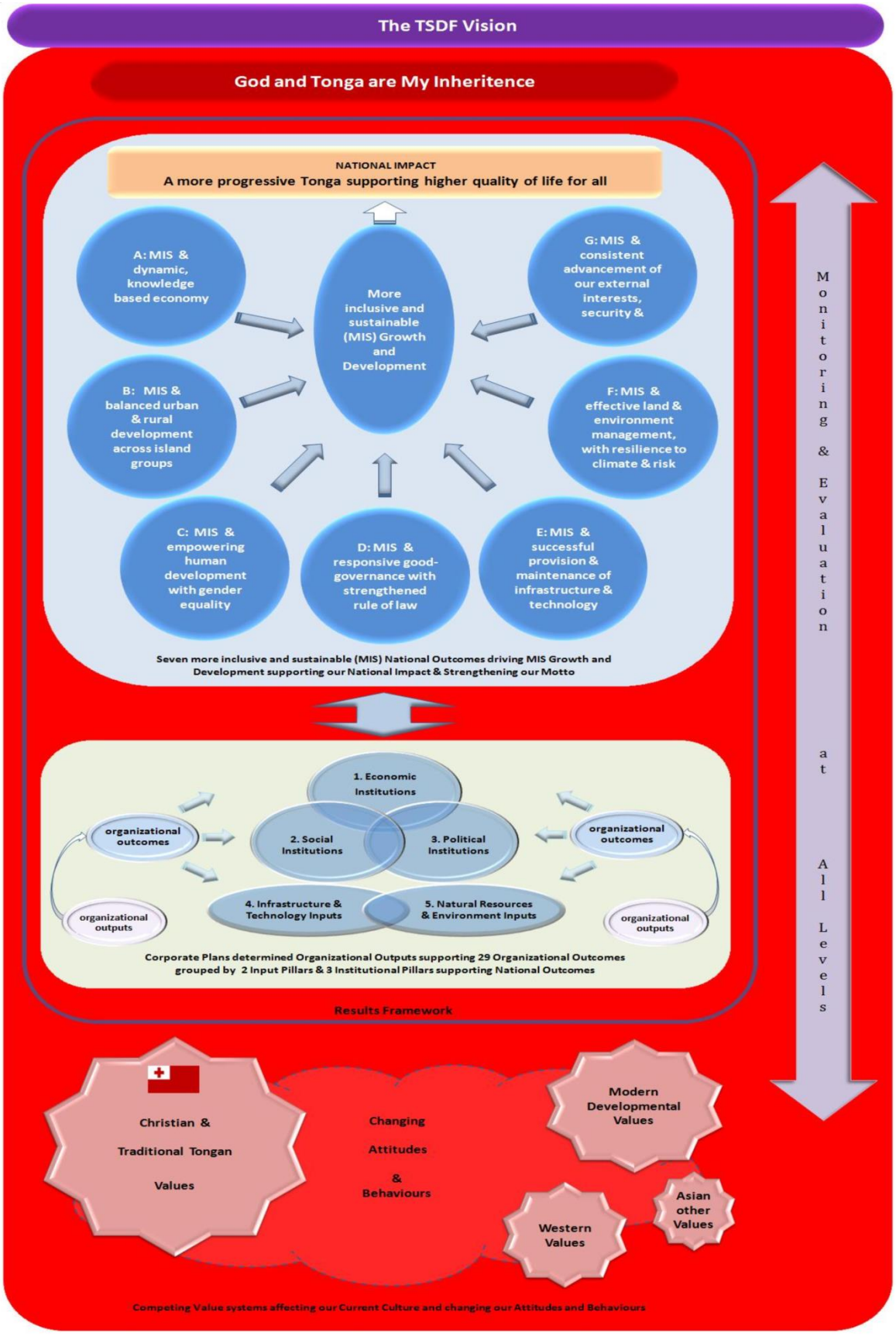

Figure II-I The TSDF Vision

23. Pillar Number 5 relates to environmental matters and Number 5.4 is of direct relevance to this project.

- Pillar 5: Natural Resources & Environment Inputs
- 5.1 Improved land use planning & management for private & public spaces
- 5.2 Improved use of natural resources for long term flow of benefits
- 5.3 Cleaner environment with improved waste recycling
- 5.4 Improved resilience to natural disasters and impact of climate change

24. TSDF2 states that "Tonga is one of the most vulnerable countries to natural disasters in the form of earthquakes, tsunamis, hurricanes and general flooding. Future climate change is only likely to make some of these events more serious. The potential for damage can be lessened by … more appropriate infrastructure as well as limiting building on more disaster prone areas. These services are particular important for more vulnerable and isolated groups."

25. The roads are located in vulnerable sites adjacent to the sea and climate proofing will reduce vulnerability to extreme weather events induced by climate change. The proposed project is in line with TSDF2.

26. TSDF2 has been approved in principle by the Government of Tonga.

2. National Infrastructure Investment Plan 2014-2018 (NIIP2)

27. The National Infrastructure Investment Plan (NIIP) is an integrated program for management of existing assets, new investments, supporting complementary measures, and linked projects. Complementary measures include the development of sector road maps, policy changes, institutional/regulatory/financial reforms, training and capacity building, and technical assistance in support of the Government policy to capitalise on existing infrastructure and obtain best value from new investments.

28. The National Infrastructure Investment Plan (NIIP2) outlines the Government of Tonga's priorities and plans for major infrastructure initiatives over the next 10 years. This is the second Plan and updates and builds on the first NIIP that was prepared in 2010 (NIIP 2010 or NIIP1). Of the 12 priority investment projects proposed in NIIP1 most are now underway as are many reforms and capacity building initiatives.

29. NIIP2 covers major infrastructure initiatives with national, regional, or local significance. It looks at the next five years to 2018 in detail and the five years from 2018 to 2023 in terms of broad directions for infrastructure development. It is the result of extensive consultation with infrastructure managers, users, and funding partners.

30. This Plan focuses on economic infrastructure facilities such as energy supply, telecommunications, water and waste management and transportation. The NIIP includes priorities and plans for major initiatives in the following sectors:

- Energy (electricity, fuel)
- Telecommunications (telephone, internet, broadcasting)
- Water and waste related services (water supply, waste water, drainage, solid waste)
- Transport (airports, roads, sea ports)

Other categories of infrastructure such as education, healthcare, and correctional services, are not included in this Plan and have their own sector plans.

3. Joint National Action Plan Climate Change Adaptation Disaster Risk Management

31. The Tonga Joint Action Plan on Climate Change Adaptation and Disaster Risks Management complies with Tonga's National Strategic Development Framework 2009–2014, the Pacific Islands Framework of Action on Climate Change 2006–2015, the Pacific Disaster Risk Reduction and Disaster Management Framework for Action 2005–2015, the International Decade for Natural Disaster Reduction (IDNDR), the Yokohama Plan for Action and the Hyogo Framework for Action 2005–2015, and the United Nations Framework Convention on Climate Change. The Plan comprises of six priority goals.

- Goal 1: Improved good governance for climate change adaptation and disaster risk management (mainstreaming, decision making, organizational and institutional policy frameworks).
- Goal 2: Enhanced technical knowledge base, information, education and understanding of climate change adaptation and effective disaster risk management
- Goal 3: Analysis and assessments of vulnerability to climate change impacts and disaster risks
- Goal 4: Enhanced community preparedness and resilience to impacts of all disasters
- Goal 5: Technically reliable, economically affordable and environmentally sound energy to support the sustainable development of the Kingdom
- Goal 6: Strong partnerships, cooperation and collaboration within government agencies and with civil societies and NGOs

The coordination of JNAP implementation is centred on the JNAP Secretariat and its Technical Working Group which works in close collaboration with JNAP's relevant stakeholders.

4. Climate Change Policy 2016 and JNAP2

32. The Tonga "Climate Change Policy - *A Resilient Tonga by 2035*" was issued by the Department of Climate Change MEIDECCin February 2016. It aligns with the Tonga Climate Change Policy Objectives and Strategies (2006) and JNAP Goals and Objectives (2010-2015)

33. The policy provides a supporting framework that is aligned with the TSDF 2015-2025 and encourages alignment with all relevant sector policies and plans to ensure that proactive measures are taken to build a resilient Tonga. This emphasises strong engagement with and ownership from the community, with resilience an integral part of all community development plans (CDPs) and Island Strategic Development Plans.

34. The ultimate objective is a "Resilient Tonga" and the Climate Change Policy identifies the extent to which current legislation, policies and plans aligns with this concept. (See Table II-I

Table II-1 Legislation and Policies aligned with a Resilient Tonga

	Legislation	Policy	Plan
Sector/focal area	Fully aligned with a Resilient Tonga		
	Partially aligned with a Resilient Tonga		
	Not aligned with a Resilient Tonga		
	A priority for completion/development; and to be fully aligned with A Resilient Tonga		
	Needs to be reviewed		
Finance and Planning	TSDF		
	Public Financial Management Act		National Infrastructure and Investment Plan
			CFRGA
Climate Change	Climate Change Fund Bill Ozone Layer Protection Act	Climate Change Policy	Revised JNAP
Environment	Environment Management Act and EIA Act		Revised National Biodiversity Strategy and Action Plan
Energy	Renewable Energy Act	Renewable Energy Policy	Tonga Energy Roadmap
	Energy Bill		
Meteorology	National Emergency Management Act		
DRM	National Emergency Management Act		JNAP, National Emergency Management Plan
Internal Affairs	District & Town Officers Act Fono's Act		Community Development Plans and Island Strategic Development Plans
Infrastructure	National Spatial Management Act Building Control and Standards Act		Building Code Urban Infrastructure Development Plan
Lands and Natural Resources	Land Act	Land Use Policy	Land Use Plan
Women	Family Protection Act	National Policy on Gender and Development	Strategic Plan
Culture and Youth	Parks and Reserves Act Polynesian Heritage Trust Act	National Youth Policy	Tonga National Youth Strategy and Action Plan

	Preservation of Objects of Archealogical Interests Act	National Cultural Policy	National Cultural Plan
Health	Public Health Act 2008 Health Services Act 1991 Health Promotion Act 2007		Tonga National Strategy to Prevent and Control Non Communicable Diseases
Agriculture		Agriculture Policy	Agriculture Sector Plan
Fisheries	Fisheries Management Act SMA Act		Fisheries Sector Plan
Forestry	Forests Bill 2015	Forestry Policy	Forestry Plan
Tourism	Tourism Act 1976		Tonga Roadmap
Water	Water Resources Bill	National Water Policy	Water Plan
Education	Education Act 2014	Education Policies	
Chamber of Commerce and Industries			Public Private Sector Plans

35. To ensure that the objective of "A Resilient Tonga by 2035" is met a revised Joint National Action Plan on Climate Change and Disaster Risk Management (JNAP 2) is being developed.

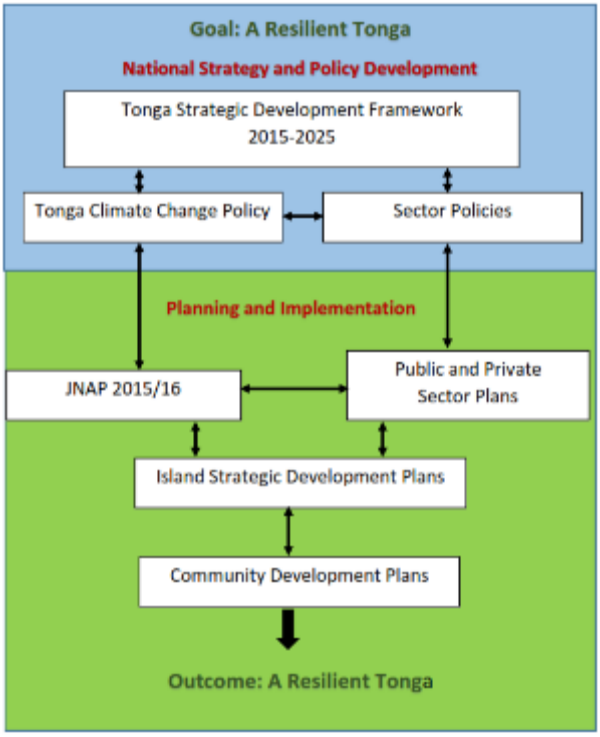

Figure II-II Resilient Tonga Vision

36. All relevant sector policies, community development plans and island strategic development plans will be aligned with this policy and a revised JNAP2.

5. MEIDECC Corporate Plan (2014 – 2016)

37. MEIDECC has a Corporate Plan 2014 – 2016 which is in line with the Tonga Strategic Development Framework (TSDF). The Environment Division of MEIDECC is tasked with achieving Strategic Outcome 7 "*to ensure environmental sustainability, disaster risk management and climate change adaptation is integrated into all planning and implementation of programmes, by establishing and adhering to appropriate procedures and consultation mechanisms*".

B. Legal Framework

1. International Conventions and Protocols

38. Tonga is signatory to the following 15 international agreements.

- United Nations Framework Convention on Climate Change
- Kyoto Protocol to the UNFCCC
- Convention on Protection of Biological Diversity
- Cartagena Protocol on Biosafety
- Paris Agreement
- Vienna Convention for the Protection of the Ozone Layer
- Montreal Protocol on Substance that deplete Ozone Layer
- Nagoya Protocol on Access and Benefit sharing of Genetic Resources
- United Nations Convention to Combat Desertification
- Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Waste and to Control the Tran boundary Movement and Management of Hazardous Waste within the South Pacific Region
- Convention for the Protection of the World Cultural and Natural Heritage
- Stockholm Convention on Persistent Organic Pollutants
- Basel Convention on the Control of Tran boundary Movements of Hazardous Wastes and their Disposal
- Rotterdam Convention on the Prior Informed Consent Procedures for Certain Hazardous Chemicals and Pesticides in International Trade
- United Nations Convention on the Law of the Sea

A full list with details is given in Annex 1.

2. Paris Agreement on Climate Change 2016

39. The Paris Agreement is the United Nations Framework Convention on Climate Change that 195 countries agreed to adopt on 12 December 2015 at the COP 21UN climate summit in Paris.

40. Tonga was among 12 Pacific Islands Forum countries that signed the Paris Agreement in New York on 22 April 2016. Tonga ratified the Paris Agreement in August 2016 and deposited Tonga's instrument of ratification of the agreement with the U.N. on 21 September 2016.

41. Tonga has made a commitment to reduce reliance on fossil fuel for power generation by 50% by 2020, and 70% by 2030. The Government has also made a commitment to

double Tonga's marine protected areas by 2030, and increase efforts in reforestation, as these are a carbon sink.

42. For the agreement to become an international law, it must be signed and ratified by at least 55 countries, representing at least 55% of global greenhouse gas emissions. The Paris Accord became effective on November 7th 2016 when the threshold of signatories was passed.

3. Tongan Laws on Environment

43. The following laws which are relevant to environmental issues have been enacted in Tonga.

Table II-2 Schedule of Major Laws

Constitutional Law	• Constitution of Tonga 1875 • Act of Constitution of Tonga 1988
Law Sources	• Ministry of Civil Aviation • Ministry of Education • Ministry of Finance and National Planning • Ministry of Health • Ministry of Justice • Ministry of Lands, Survey and Natural Resources • Tonga Legal Gazette • Tongan Government
Transport And Maritime Law	• Fisheries Management Act 2002 • Fisheries Regulations 1992 • Harbours Act 1903 / 2010 • Ports Authority Act 1998 • Ports Management Act 2001 • Roads Act 1909 / 1970 • Shipping (STCW Convention) Regulations 1998 • Shipping Act 1972
Environmental Law	• Animal Diseases Act 2010 • Aquaculture Management (Amendment) Act 2009 • Aquaculture Management Act 2003 • Birds and Fish Preservation Act 1989 / 2007 • Environmental Impact Assessment Act 2003 • Environment Management Act 2010 • Environmental Impact Assessment Regulations 2010 • Environment Management (Amendment) Act (Infringements) 2015 • Environment Management (Litter And Waste Control) Regulations 2016 • Fisheries Management (Conservation) Regulations 2008 • Fisheries Management (Amendment) Act 2009 • Forests Act 2010 • Hazardous Wastes And Chemicals Act 2010 • Marine Pollution Prevention (Amendment) Act 2009 • Marine Pollution Prevention Act 2002

	• Ozone Layer Protection Act 2010 • Parks and Reserves Act 1992 / 2007 • Plant Quarantine (Amendment) Act 2009 • Preservation of Objects of Archaeological Interest Act 1969 /2007 • Public Health (Amendment) Act 2009 • Tonga Water Board Act 2000 • Waste Management Act 2005 • Waste Management (Amendment) Act 2009 • Waste Management (Amendment) Act 2014 • Waste Management (Plastic Levy) Regulations 2013
Construction Law	• Building Control and Standards Act 2002 • Building Code Regulations 2007
Agriculture Law	• Agricultural Commodities Export Act 2002 • Biosafety Act 2009 • Noxious Weeds Act 2010 • Pesticides Act 2002

Of direct relevance to this project are the following:

- Environmental Impact Assessment Act 2003
- Environment Management Act 2010
- Environmental Impact Assessment Regulations 2010
- Environment Management (Amendment) Act (Infringements) 2015
- Environment Management (Litter And Waste Control) Regulations 2016

44. The Environment Management Regulation on Litter and Waste Control and that was passed in May 2016 lists a range of waste dumping and burning offenses and their penalties. The fines range from Tongan $500 to $10,000.

45. The regulations will not be enforced until 2017, as the ministry will first launch a public awareness campaign to further clarify the Regulation, and to remind the public of their responsibilities to secure a healthy environment.

4. Environmental Impact Assessment (EIA) Act

46. The Environmental Impact Assessment (EIA) Act was passed in 2003. Regulations to support the Act have been enacted under the Environmental Impact Assessment Regulations 2010. MEIDECC is the coordinating agency.

47. Under this regulatory framework, all development activities must be referred to the Minister of MEIDECC, either directly or through the Determining Authority (designated ministry). With this notification, the proponent must complete a Determination of Category of Assessment form, providing an overview of the proposed development and a number of details in relation to the existing environment, potential environmental impacts and mitigation measures. The schedule outlining major projects as per the EIA Act 2003 is given in Table II-3 below.

Table II-3 Schedule of Major Projects EIA Act 2003

Schedule of Major Projects as given in EIA Act 2003 Annex2

Any of the following activities shall be deemed to be major projects:

(a) abattoirs

(b) brewery works

(c) buildings, works, or land associated with the landing, take-off, parking or servicing of aircraft or helicopters

(d) canning and bottling works in excess of floor space 2000 square metres

(e) cattle feedlots or intensive piggeries with excess of 50 animals

(f) cement works or concrete batching works in which more than 2,000 tonnes per annum are manufactured

(g) ceramic works, being works in which excess of 200 tonnes per annum are produced of bricks, tiles, pipes, glass are manufactured in furnaces or kilns

(h) chemical factories, or chemical storage areas in excess of 1,000 square metres

(i) electricity generating stations

(j) marinas (comprising pontoons, jetties, piers, dry storage, moorings) for more than 20 vessels primarily for pleasure or recreation

(k) mining, being an activity that disturbs the surface of the land in excess of one hectare

(l) sand or gravel extraction from any beach within 50 metres of the high tide mark

(m) liquid, chemical, oil or petroleum refineries, storage or waste processing works

(n) farms for the propagation of marine, estuarine or freshwater organisms

(o) pre-mix bitumen works

(p) rubber or plastics works

(q) the removal of trees (including mangroves) or natural vegetation of any area in excess of half a hectare

(r) construction of roads, wharfs, barrages, embankments or levees which affect the flow of tidal waters

(s) any facility involving the use, storage or dumping of nuclear materials

(t) sawmills where more than 2,000 cubic metres per annum of timber is sawn, milled or machined in any way

(u) tourism or recreational resorts, buildings or facilities, involving a total building floor area of greater than 1,000 square metres or a potential total overnight accommodation level (visitors and staff combined) in excess of 20 persons.

48. The Minister determines whether the proposed development is a minor or major project, and advises the proponent within 30 days. If it is a major project, the proponent then submits a full EIA for review by the Environmental Assessment Committee (EAC). The Minister receives an assessment report and issues an approval (with or without conditions),

a request for further information, or a rejection. However, under the regulations, a development proposal not reflected in this schedule may still be deemed as a major project through the determination of category process.

5. Conservation and Protected Areas

49. There are 22 protected areas recorded for Tonga. All are national-level protected areas. Of the 22 protected areas, 19 (86%) include a marine component. These protected areas may be either partially or completely within the marine environment. There are no protected areas designated under international or regional conventions.

6. Historical Sites

50. There are no legally protected historical sites in Tonga.

7. Protection of Birds

51. The following birds are protected by law.

Table II-4 Birds Having Legal Protection in Tonga

1. Pekepeka	Edible Swiftlet	*Collocalia francica (Gmel.)*	
2. Fuleheu	Land Bird	—	
3. Henga	Samoan blue Lory	*Vini Australis (Gmel.)*	
4. Kaka	Parrot (peculiar to 'Eua)	—	1st January to 31st December
5. Kaleva	Small Land Bird	—	
6. Kulukulu	Purple crowned Dove	*Ptilopus porphyraceus (Forster)*	
7. Malau	Megapod	—	
8. Misi	Savage Island Starling	*Aplonis Tabuensis (Gmel.)*	
9. Moho	Tongan Rail	*Porzana Tabuensis*	
10. Tu	Land Bird	-	
11. Lupe	Wild Pigeon	-	1st May to 31st January

52. An Important Bird Area (IBA) is an area recognized as being a globally important habitat for the conservation of bird populations. These sites are small enough to be entirely conserved and differ in their character, habitat or ornithological importance from the surrounding habitat. The program was developed and sites are identified by Bird Life International which is the official IUCN Authority for the Red List for birds. Currently there are over 10,000 IBAs worldwide.

53. Often IBAs form part of a country's existing protected area network, and so are protected under national legislation. There are no reported Important Bird Areas in Tonga.

8. Fisheries Special Management Areas (SMAs)

54. In Tonga there are currently 12 Special Management Areas which have been legally established under the Fisheries (Coastal Communities - Amendment) Regulations 2016 by gazetting and there are another 27under consideration.

Table II-5 SMA list updated October 2016

Island Group	Existing SMAs	Interested community	Year requested by the community	Propose donors / Funding sources
Vava'u	Ovaka (2008)	Hunga	2007	ADB
	Taunga (2013)	'Utungake	2009	
		Falevai	2010	
		Talihau	2011	
		Lape	2011	
		Útulei	2012	
		Ofu	2015	
		Eueiki	2015	MoF
		Kapa	2016	MoF
		Vaipua	2016	MoF
		Makave	2016	MoF
		Koloa	2016	MoF
Sub-Total	2	12		
Ha'apai	'O'ua (2006)	Mo'unga'one	2009	Civil Society
	Felemea (2008)	Uiha	2011	
	Ha'afeva (2007)	Ha'ano	2011	
	Nomuka (Kelefesia&Tonumea) (2011)	Fakakai	2011	
	Kotu (2015)	Pukotala	2012	
		Muitoa	2012	
		Faleloa		MoF
		Tungua	2012	
		Fonoi	2012	Tonga Health
		Mango	2012	
		Matuku	2016	
		Lofanga	2013	MoF
Sub-Total	6	12		
Tongatapu	'Atata (2008)	Navutoka	2010	Tonga Health
	'Eueiki (2008)	Ha'atafu	2016	
		Pangaimotu	2013	MoF
	Fafa Island (2014)	Eua	2014	MoF

	Kolonga (2015)	Holonga	2015	R2R Ridge to Reef
		Lapaha	2015	
		Nukunukumotu	2015	
		Nukuleka	2015	
Sub-Total	4	8		
Total	12	32		

III. Description of the Project

A. Background

55. Tonga is vulnerable to adverse climate change and extreme weather events. Roads have been damaged in recent cyclones through heavy rain, strong winds and flooding. The Tonga Government has requested ADB for financial support under Component 4 of the SPCR which relates to climate proofing infrastructure and ecosystem resilience. Funds will be used to repair, improve and climate proof four roads of which three are on Tongatapu and one on Eua.

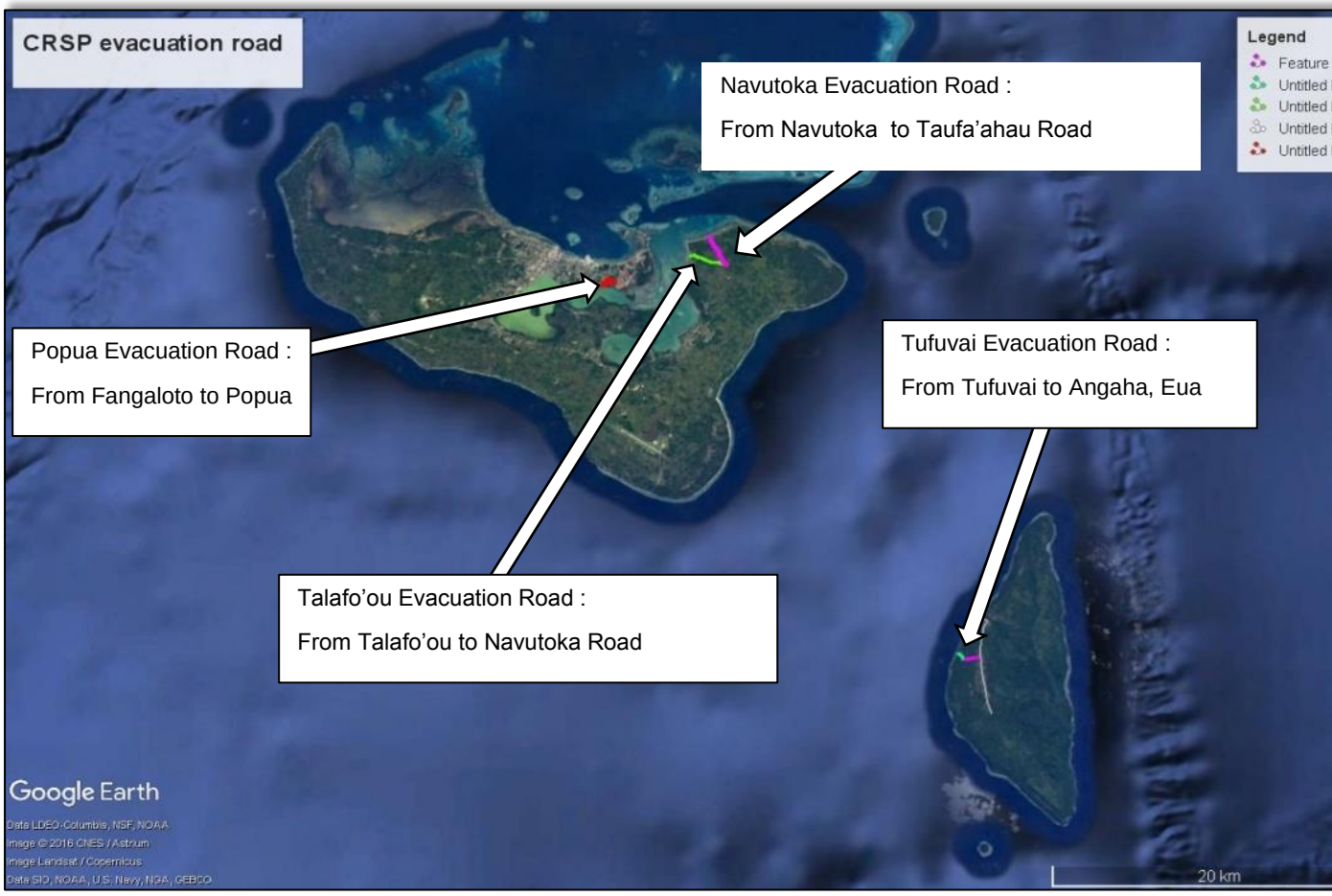

Figure III-I Location of 4 Evacuation Roads

56. The Tonga Climate Resilience Sector Project (CRSP) will mainstream climate resilience into development planning and address national priorities focusing on the most vulnerable sectors and communities. The Project will provide resources to address the climate change risk priorities of the Government, as well as those of vulnerable communities. The roads are being climate proofed under this program. The proposed works align with Tonga's JNAP 2010-2015 priority Goal 4: "enhance community preparedness and resilience to impact of climate change and disaster."

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disaster access by emergency vehicles. The roads will also enhance the livelihoods of the local population through facilitating their access to economic centers such as markets and providing employment and training opportunities for local and national workers. Tongatapu evacuation roads will include two roads on the eastern side, at Navutoka and Talafo'ou, one road at Popua, in Nuku'alofa and one road at Tufuvai, on 'Eua.

B. Proposed Improvement

The works will involve :

- Clear vegetation along the route
- Construct new granular flexible pavement road
- Create drainage system along the road way
- Link existing route to major collector road as the main evacuation route
- Double coat sealed pavement to give climate proofing

The estimated costs are given below.

Table III-1 Estimated cost for road upgrades

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58. The works are primarily climate proofing through the repair and upgrading of existing roads within established Rights of Way. Although some widening may be necessary no land acquisition is required.

C. Talafo'ou Evacuation and Post-Disaster Access Road: From Talafo'ou To Navutoka Road

1. Location

59. The subproject is the construction of a climate proofed road on the existing alignment. It will be constructed for 2.253 km with an average width of 5.0m to provide an evacuation access route from Talafo'ou Village to higher ground, which will provide a safe place in the event of storm surge or tsunami. The existing embankment/ground will be raised by 284mm and pavement will be constructed as double coat chip sealing. The proposed road will connect to Taufa'ahau trunk road which is located on the higher ground.

Figure III-II Talafo'ou-Navutoka road - Hahake Evacuation Roads

2. Condition of Existing Infrastructure

60. The existing road has no clear corridor with trees overhanging the existing road. The pavement is old with no evident drainage system. It is proposed to construct a new corridor within the existing right of way. The existing road conditions are shown below.

Figure III-III Talafo'ou to Navutoka road

Figure III-IV Talafo'ou road - middle of road

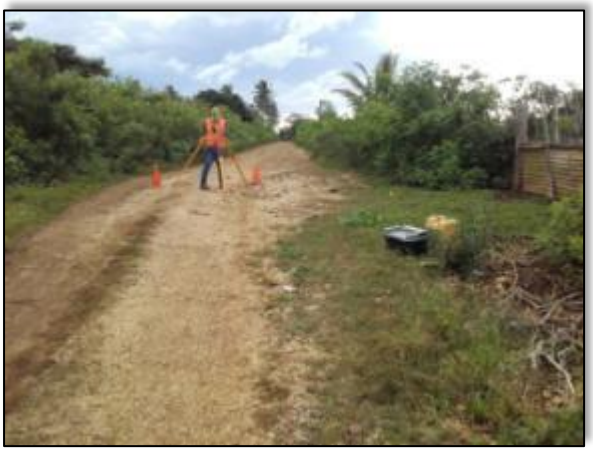

Figure III-V Talafo'ou road from end of village

Figure III-VI Rough existing pavement at mid-point of road

3. Proposed Scope of Works

61. The proposed works are as follows :

- On Talafo'ou Road it is proposed to upgrade the existing surface by resealing and cover with 7mm ʻAhononou aggregate. Also part of this road will be widened by boxing the road edge (350 x 1.4m) x 300mm thickness and compacting.
- Earthworks include excavation, clearing and grubbing.
- Subgrade preparation - this will scarify the existing road pavement and compact to stabilize and strengthen the subgrade
- Pavement Construction - Sub-base and base construction including batter, grading and rolling, filling with specified materials, and compacting to comply with MOI specification
- Chipseal - application of Double Coat Seal: 1) with single coat bitumen seal covered with 14mm chip aggregate 2) as double coat with 7mm chip aggregate.
- Drainage system – side ditch on both edges of pavement to carry water to the constructed soak pit to align with the drawing slope.
- Road Marking and Road Furniture is of utmost importance in terms of safety of both pedestrians and road users and is proposed to be used

D. Navutoka Evacuation and Post-Disaster Access Road: from Navutoka to Taufa'ahau Road

1. Location

62. The subproject is the construction of a climate resilient road on an existing alignment. It is to be constructed for 2.273 km with an average width of 5.0m to provide an evacuation route from the village of Navutoka to higher ground in Eastern Tongatapu. The existing embankment / ground will be raised by 270mm and pavement will be constructed as double coat chip sealing. The proposed road links the existing road to the major collector Taufa'ahau road on higher ground. In a post disaster scenario, access to the coast is likely be disrupted along the coastal road and therefore this proposed road will provide emergency response access into the villages in addition to the initial evacuation.

Figure III-VII Navutoka-Taufa'ahau road (Hahake Evacuation Roads)

2. Condition of Existing Infrastructure

63. The existing road has no clear corridor with trees overhanging the road, an old pavement with no signs of a drainage system. A new corridor is proposed to link to the major

trunk roads as part of the Taufa'ahau roads network. The existing road conditions are shown in the figures below.

Figure III-VIII Navutoka Road at the top of the slope

Figure III-IX Navutoka road to the end to Taufa'ahau road

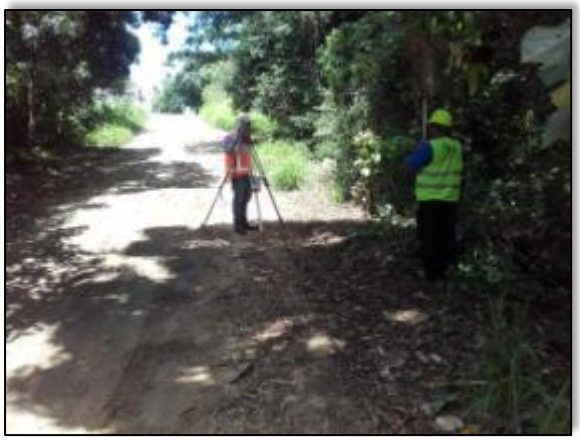

Figure III-X Road through swampy area

Figure III-XI Navutoka just graded by MOI

3. Proposed Scope of Works

64. The proposed works are as follows

- Earthworks includes excavation general clear and grubbing
- Subgrade preparation – Removal and stockpiling, scarify, grading and rolling to stabilize and strengthen the subgrade
- Pavement construction – sub base, base construction including batter, grading and rolling, fill with specified materials and compact
- Application of Double coat Seal; 1) single coat bitumen seal covered with 14mm chip ‘Ahononou aggregate, 2) double coat covered with 7mm ‘Ahononou aggregate.
- Drainage system to be established: 1) Culvert – construct reinforced concrete 150mm thick x 500 x 500mm internal diameter box culvert across the roads. 2) Side ditch – construct on both edges of pavement to transfer water to the constructed soak pit to align with the drawing slope. 3) Rollover kerb
- Road Marking and Road Furniture is proposed for the safety of all road users

E. Popua Evacuation and Post-Disaster Access Road: from Popua to Fangaloto

1. Location

65. The subproject is the construction of a climate resilient road mainly on the existing alignment. However, part of this road is new construction. It is to be constructed for 1.263km with an average with of 5.0m to provide an evacuation route from Popua village to higher ground inland. The existing embankment / ground will be raised by 356mm and pavement will be constructed as double coat chip sealing. The proposed new road will link Popua village, Fangaloto new settlement to 'Umusii collector road and Houmakelikao village. This project will benefit them in terms of transportation and communications.

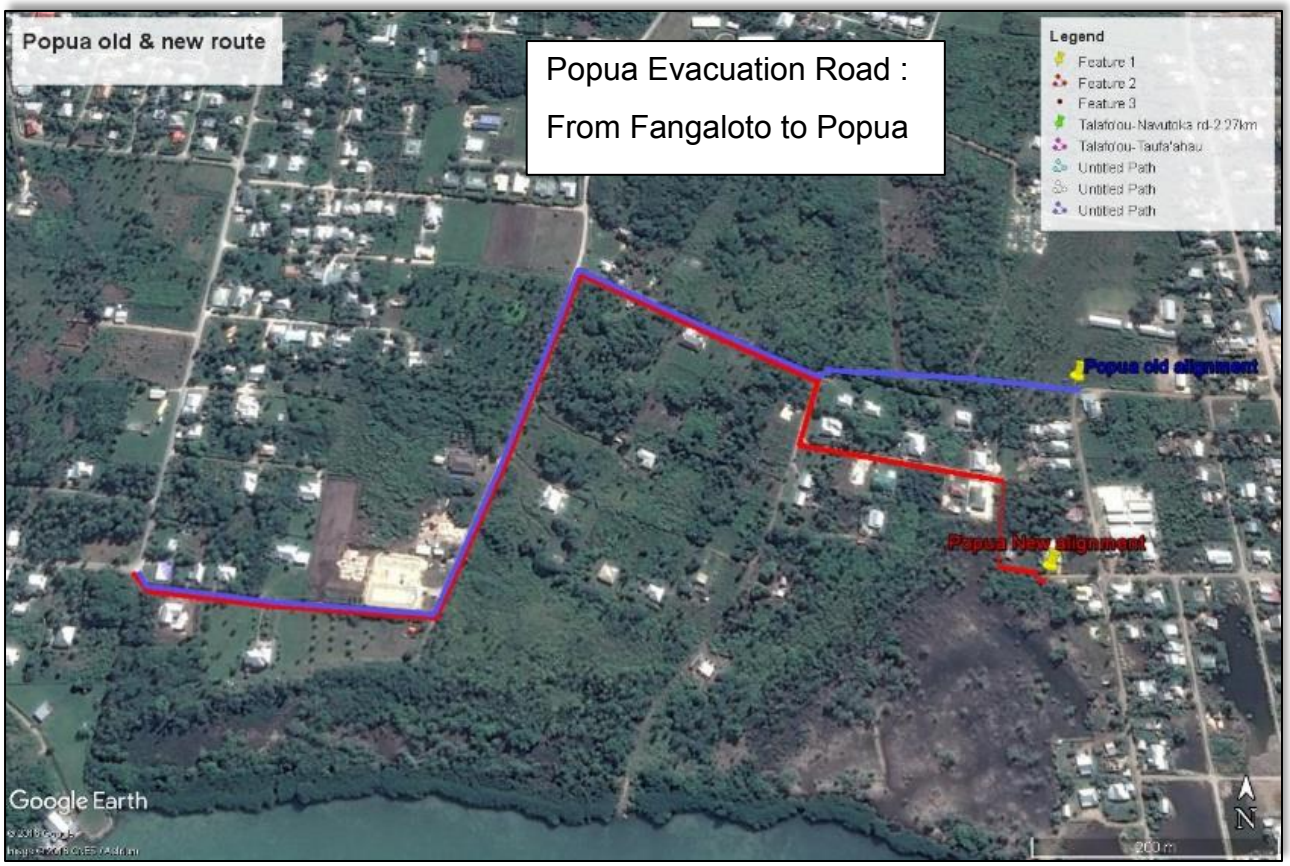

Figure III-XII Location of Popua evacuation road old (blue) and new (red)

2. Condition of Existing Infrastructure

66. This is a new settlement in a rural area known to be swampy and currently there is no direct connection from Popua to Houmakelikao village. The area is vulnerable to climate changes especially in heavy rain and floods, tidal waves and tsunamis. The existing road has no drainage system and becomes flooded in time of rain. A new corridor is proposed to link the villages to the major collector 'Umusii road which leads towards higher ground. The existing conditions are shown below.

Figure III-XIII Popua road at start from Fangaloto

Figure III-XIV Popua road at end, west of Popua village

Figure III-XV Water trap at Popua road (Fangaloto)

Figure III-XVI Swamp at Popua road

3. Proposed Scope of Works

67. The proposed works are as follows :

- Earthworks includes excavation general clear and grubbing
- Subgrade preparation – scarify, grading and rolling to stabilize and strengthen the subgrade. In swampy places there is a need to place filling material to stabilize the subgrade straight away
- Pavement construction – sub base and base construction including batter (150mm thickness), grading and rolling, fill with specified materials and compact
- Chipseal - Application of Double coat Seal; 1) single coat bitumen seal covered with 14mm chip 'Ahononou aggregate, 2) double coat covered with 7mm 'Ahononou aggregate.
- Drainage system to be established; 1) Culvert on main route - construct reinforced concrete 150mm thick x 500x500mm internal diameter box culvert across the roads. 2)

Side ditch - on both edges of pavement to transfer water to the constructed soak pit to align with the drawing slope

- Road Marking and Road Furniture is proposed to be established for the safety of all road users

F. Tufuvai Evacuation and Post-Disaster Access Road:Tufuvai - Angaha on 'Eua

1. Location

68. The subproject is the construction of a climate resilient road on an existing alignment. It is 1.047km lenght with an average width of 5.0m to provide an evacuation route from the village of Tufuvai 'Eua to the higher ground towards Angaha village. The existing embankment / ground will be raised by 235mm and pavement will be constructed as double coat chip sealing. The proposed new road is the closest route from Tufuvai village to 'Eua Hospital.

Figure III-XVII Location of Tufuvai – Angaha 'Eua evacuation road

2. Condition of Existing Infrastructure

69. During the site visit it is observed that the erosion of the coral pavements due to the effect of surface water runoff from the road surface and surrounding bush allotments is one of the major problems of the existing alignment.

70. It was reported that after heavy rainfall, coral patching, grading and compaction are required to be done to maintain the road to its good standard. One time it was closed to the public due to the danger of big potholes and gullies on the roads for vehicle. It was clear from the site visit that the biggest problem facing Tufuvai road was the surface water runoff because there is no formal road drainage system.

Figure III-XVIII Tufuvai road (downward view from highest point)

Figure III-XIX Tufuvai road (upward view from bottom of slope)

71. Without the drainage, water will continue to erode and flow in whatever directions and paths it can follow making the Tufuvai road unsuitable for use after heavy rain. These are shown in the figures below.

Figure III-XX Road erosion in Tufuvai town

Figure III-XXI More road erosion in Tufuvai town

3. Proposed Scope of Works

72. The proposed works are as follows:

- Earthworks includes excavation general clear and grubbing

- Subgrade preparation – removal and stockpiling, scarify, grading and rolling to stabilize and strengthen the subgrade
- Pavement construction – sub base, base construction including batter, grading and rolling, fill with specified materials and compact
- Application of Double coat Seal; 1) single coat bitumen seal covered with 14mm chip ‘Ahononou aggregate, 2) double coat covered with 7mm ‘Ahononou aggregate.
- Drainage system to be established; 1) Side ditch – on both edges of pavement to transfer water to the constructed soak pit to align with the drawing slope. 2) Rollover kerb. 3) Stone Pitching – construct concrete stone pitching on one side ditch. 4) Culvert – construct reinforced concrete 150mm thick x 500x500mm internal diameter box culvert across the roads
- Road Marking and Road Furniture is proposed to be established for the safety of all road users

G. Road Design

73. Chip seal or Surface Dressing is a simple and inexpensive road surface treatment which is highly effective if adequate care is taken in the planning and execution of the work. Double Coat Seal is being used for the purposes of roads being able to withstand any climate change hazardous. TRL Overseas Road Note 3 (ORN3) "A guide to surface dressing in tropical and sub-tropical countries", states double surface dressings should be used when :

- A new road is being surfaced which is expected to carry a substantial amount of traffic (say 100 vehicles per day) from the outset,
- Extra ‘cover’ is required on an existing bituminous road surface because of its condition e.g. when the surface is badly cracked or patched
- The chippings available are particularly weak, and will tend to crush or abrade quickly.

The estimated number of vehicles travelled per day is less than 500 vehicles per day (vpd) therefore based on ORN 3 this is considered an appropriate design.

74. Road markings and road furniture are important factors in road design for directing road users that are not familiar with road safety practices.

H. Approval under Tongan Government EIA Regulations

75. A submission was made in accordance with Tongan Government EIA Regulations 2010. Confirmation was received on February 14th 2017 that these works are classed as Minor and an EIA is not required (See Annex 2). As such, the production of this IEE represents ADB safeguards equivalency in complementing Tongan environmental regulations to ensure project safeguard compliance with the ADB SPS.

IV. Description of the Environment

A. Physical Environment

1. Seismic Activity

76. Tonga is located near the world's longest deep oceanic trench, the Tonga Trench. The area is an extremely active seismic zone due to friction caused by the occasional movement of the Pacific Plate, diving (subduction) under the Australian plate (Tonga-Kermadec Subduction Zone) along the Tonga Trench.[1]

77. An underwater volcanic eruption took place 10 km northeast Nukualofa on 18th March 2009. This was followed by a tremor of magnitude 7.9 on 20th March 2009 originating 200 km northeast of Nukualofa. An accompanying tsunami with a height of 0.8 meter resulted from this earthquake prompting seismologist in the Pacific Tsunami Warning Centre to issue tsunami warnings for Tonga, Samoa and Fiji. No damage was recorded. [2]

78. On 24 May 2013, three earthquakes were felt between 0500 and 1100. A 7.4-magnitude earthquake, followed by another tremor with a 6.3- magnitude shook Tonga. A 5.0-magnitude earthquake occurred at about1100. There were no immediate tsunami alerts or reports of damage. [3]

79. The 7.4-magnitude earthquake occurred at a depth of 170km approximately 285km southwest of Nukualofa. The 6.3-magnitude earthquake occurred at a depth of 152km, 85km southwest of Nukualofa. No damage was reported and no tsunami warning was issued following the three earthquakes. [4]

2. Severe Tropical Storms

80. The cyclone season in Tonga occurs during the months of January to April. Damaging cyclones normally have an eight to ten year cycle. From 1960 to 2006, there were 58 severe weather events within Tonga. Of the 58 cyclones 28 have impacted the central region of Tonga which includes Ha'apai. In December 2012, Tropical Cyclone Evan missed the northern region of Tonga as a Category 3 cyclone and killed two people in Samoa. In January 2012, Cyclone Jasmine caused damage to Tonga which resulted in minor damages such as fallen trees and power lines, uprooted root crops and vegetables.[5]

3. Topography

81. Tongatapu's topography is flat with a few small hills rising to about 30 meters with the highest elevation at approximately 65 meter ASL. The island rises gradually to the south east and dips to sea level in the northeast where two of the three projects are located although there is very little difference in the heights between the projects. The project

[1] The World Fact Book, 2016. https://www.cia.gov/library/publications/resources/the-world-factbook/geos/tn.html

[2] The World Fact Book, 2016. https://www.cia.gov/library/publications/resources/the-world-factbook/geos/tn.html

[3] Pacific Catastrophe Risk Assessment and Financing Initiative, Secretariat of the Pacific Community http://pacrisk.sopac.org

[4] The World Fact Book, 2016. https://www.cia.gov/library/publications/resources/the-world-factbook/geos/tn.html

[5] Pacific Catastrophe Risk Assessment and Financing Initiative, Secretariat of the Pacific Community http://pacrisk.sopac.org

areas are predominantly below 1 meter ASL and are mostly flat with no rivers or streams.[6]

4. Geology

82. Tongatapu sits on volcanic and sedimentary rocks which are overlain by raised reef limestone. The younger rock is valuable and is a source of quarry material. The island's morphology and surface geology are mainly the result of sub aerial and marine erosion.[7] A marine dissolution process, termed solution cliffing, is thought to be responsible for excavating depressions and channel-ways below present sea level in the interiors of the islands. Factors that promote solution cliffing include tilting of the atoll surface which provided connections between the lagoons and coastal environment at virtually all eustatic sea levels; tidal dispersal of the dissolved limestone products from the interior of the atoll; and a rate of biogenic sedimentation in the interior waterways that is slower than the rate of erosion.[8]

5. Soils

83. Soils on the islands of Tonga are coral base covered with around 3 meter of volcanic ash deposited from the chain of volcanoes to the west.[9]

6. Temperature

84. The climate of Tonga is tropical, with warm summers and temperate winters. The mean temperature during the entire year 2000-2012 was 24.9^{o} C with a minimum mean of 21.7^{o}C and a maximum mean of 28.2^{o}C. The warmest temperatures are in December through March; the warmest temperature observed from 2000 to 2012 was 31.2^{o}C in February with the coldest minimum during these months being 21.5^{o} C. The coolest months are June through August with the minimum during these months being 17^{o}C. [10]

7. Rainfall

85. While Fua'amotu Airport has the most comprehensive atmospheric data, rainfall data is collected in Nuku'alofa. Between 2000 and 2012 the mean annual rainfall recorded at Nuku'alofa weather station was 1,838mm which is about 300mm less than Fua'amotu Airport for the same period. The highest rainfall is observed in the summer months of December through March. The highest mean rainfall observed was in April 2010 at 691mm. The lowest rainfall was June 2010 at 10.2mm. The monthly minimum, mean and maximum rainfall for Nuku'alofa is given below.[11]

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[6] Administrative Report. Statistics Department Tonga, Nuku'alofa, 2013

[7] Thompson, C. S. 1986. "The climate and weather of Tonga"; Miscellaneous Publication, New Zealand Meteorological Service, Wellington, New Zealand.

[8] The World Fact Book, 2016. https://www.cia.gov/library/publications/resources/the-world-factbook/geos/tn.html

[9] Ministry of Environment and Climate Change, Vulnerability and Adaptation Assessment on Tonga's Initial National Communication on Climate Change, 2005.

[10] Tonga National Population and Housing Census, Tonga Statistics Department, 2011

[11] Tonga National Population and Housing Census, Tonga Statistics Department, 2011

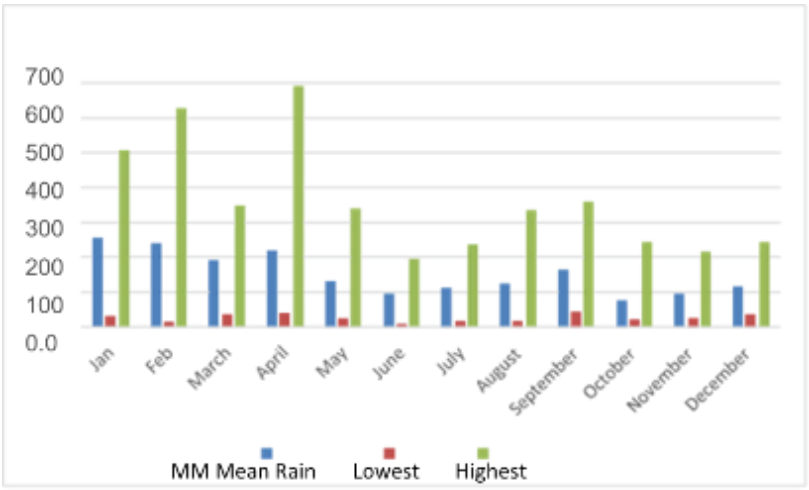

Figure IV-I Rainfall recorded at Nuku'alofa 2000 to 2012

8. Winds

86. Wind data is recorded at Fua'amotu Airport. Tonga is not impacted by significant ocean breezes. Stronger winds are predominantly recorded between November and April and come from the east and south east directions. Figure IV-II gives the wind rose for Fua'amotu airport. [12]

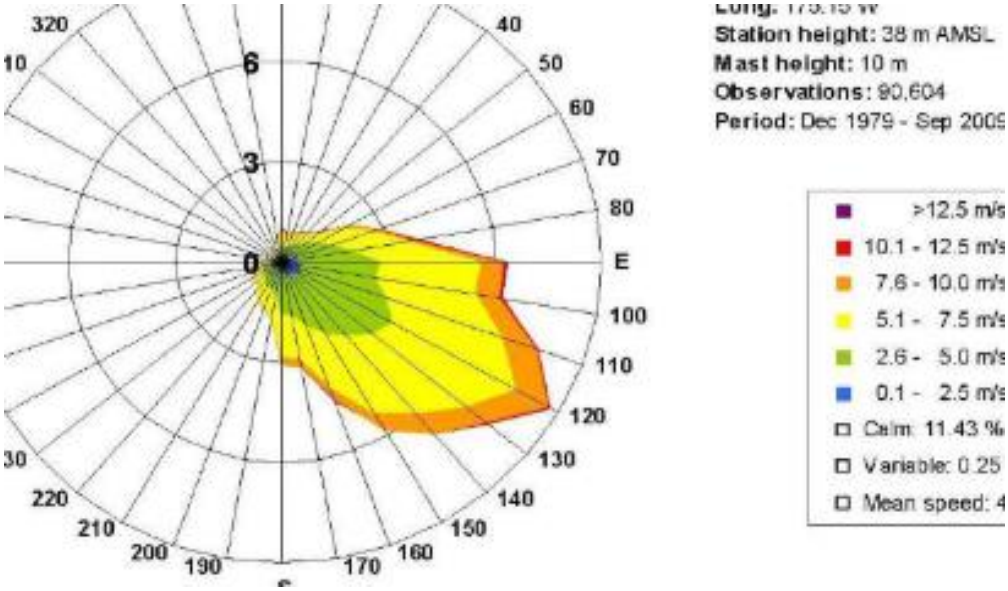

Figure IV-II Wind speed and direction at Tongatapu

9. Air Quality

87. There is no known air quality data available for Tongatapu. The known impacts to air quality are from the generation of dust from the unpaved or unmaintained roads and fugitive emissions of vehicle traffic which may occur in Nuku'alofa.

[12] Ministry of Environment and Climate Change, Vulnerability and Adaptation Assessment on Tonga's Initial National Communication on Climate Change, 2005.

10. Surface and Groundwater

88. Tongatapu obtains its water supply from the island's groundwater lens located at the Mataki'eua well field. The water is abstracted and pumped to reservoirs for treatment with calcium hypochlorite before it is delivered through a reticulation system of pipelines to the residents. The other form of potable water supply is through rainwater roof top harvesting that is stored in individual household rainwater tanks. There is no available surface water on the island. There are no streams or rivers in proximity to the roads projects. [13]

11. Land Use and Industries

89. The primary land use is either commercial activities, residential properties or agriculture. The roads are all located in agricultural areas linking to major roads.[14]

B. Biological Environment

1. Terrestrial Biodiversity

90. Tongatapu no longer has the old pristine environment seen in the past particularly in Nuku'alofa which is a small city. The environment has been changed over years into secondary habitats as a result of both natural and anthropogenic impacts. The original vegetation in Tongatapu was lowland primary rain forests which were cleared for agriculture hundreds of years ago for the promotion of modern agricultural practice. In places, this has subsequently been replaced by secondary vegetation and in Nuku'alofa, commercial and residential premises.[15]

91. About 770 species of vascular plants have been recorded across the Island, 70ferns(three endemic), three gymnosperms (one endemic) and 698 angiosperms (nine endemic) have been recorded across the island. Terrestrial fauna includes 16 species of reptiles (one endemic species), 51 breeding bird species with two being endemic and the only native mammals on the island are two bat species. Exotic terrestrial fauna includes mynahs, pigeons, cattle, pigs, poultry, cats and dogs. Pigs are extremely prevalent and highly destructive to the environment through their feeding behaviors.[16]

92. Close to the coastal areas, a littoral forest grows and is typically dominated by *Barringtonia asiatica, Hernandianymphaeifolia, Hibiscustiliaceus, Neisosperma oppositifolia, Terminalia catappa* and *Thespesia populnea.* Further inland, the areas are dominated by *Barringtonia asiatica, Calophylluminophyllum, Casuarina equisetifolia ,Guettarda speciosa, Tournefortia argentea* and other widespread littoral trees and shrubs. [17]

93. The dominant fores type in Tonga as a result of clearing and edge effects is a mixture of many native and introduced plant species. The dominant over story tree species are

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[13] Tonga National Population and Housing Census, Tonga Statistics Department, 2011

[14] Tonga National Population and Housing Census, Tonga Statistics Department, 2011

[15] MAF/ Statistics Dept/ FAO (2002). Agricultural Census 2001. Kingdom of Tonga.

[16] Ministry of Environment and Climate Change, Vulnerability and Adaptation Assessment on Tonga's Initial National Communication on Climate Change, 2005.

[17] Ministry of Environment and Climate Change, Vulnerability and Adaptation Assessment on Tonga's Initial National Communication on Climate Change, 2005.

Alphitoniazizyphoides, Elattostachysfalcata and *Rhustaitensis* although these species are rare in the understory suggesting that they will eventually be replaced by other secondary and primary forests pecies. Other common secondary forest species include *Adenantherapavonina, Bischofiajavanica, Canangaodorata, Dendrocnideharveyi, Dysoxylum*spp., *Hibiscus tiliaceus, Kleinhovia hospita* and *Neonauclea forsteri.*[18]

94. On the northern coast of Tongatapu an open to semi-closed forest type is found in coastal areas occasionally inundated by fresh or brackish water from heavy rains or hightides. The tree layer includes species of mangrove, along with *Ficusprolixa, Hibiscustiliaceus, Inocarpusfagifer, Pandanustectorius* and *Thespesiapopulnea.* In semi-open areas, the ground layer includes the grasses *Ischaemummurinum* and *Paspalum conjugatum,* the sedges *Eleocharisdulcis* and *Cyperusjavanicus,* the fern *Acrostichumaureum,* low shrubs and vines and weedy exotics including *Indigo fera suffruticosa, Lantana camara, Psidium guajava* and *Stachytarphetaurticifolia.*[19]

2. Coastal Biodiversity

95. There are mangroves swamps in a number of locations. There are large areas of mangrove on the northern side of the island and to the east and west. There are 1,450 hectares of mangroves representing approximately 6% of the total area of the island. However, across the whole of Tonga, mangrove communities have reduced from 4.3% of land area in 2006 to 2.6% in 2009.[20]

96. Sheltered on shore mud flats support a depauperate mangrove swamp community dominated by *Bruguiera gymnorrhiza, Rhizophora samoensis* and/or *R.stylosa.* In the lagoon areas, where the water changes from saline to brackish or fresh, buttressed trees such as *Excoecariaagallocha, Inocarpusfagifer* and *Xylocarpusgranatum*are observed. *Paspalum vaginatum* often forms a dominant grass cover on the inland margin of the swamp.[21]

3. Estuarine Biodiversity

97. The Fanga'uta Lagoon has been declared a National Marine Reserve. The lagoons are lined by mangrove communities. Both lagoons have been affected by diffuse and point source land pollution, overfishing and mangrove deforestation which in turn has reduced its healthy status and resources. Both lagoon areas are linked to the sea via a 1.5km wide opening with associated sandbar.[22]

98. Previous studies have concentrated on Fanga'uta Lagoon although it would appear it was considered to include Fanga Kakua Lagoon. Fakatava (2000) study indicated that the Lagoon was worse during summer months and there was a general trend for decreasing in water clarity over time. Levels of nitrate, phosphate and faecal coliforms measured

[18] Ministry of Environment and Climate Change, Vulnerability and Adaptation Assessment on Tonga's Initial National Communication on Climate Change, 2005.
[19] Ministry of Environment and Climate Change, Vulnerability and Adaptation Assessment on Tonga's Initial National Communication on Climate Change, 2005.
[20] Lovell, E.R. and Palaki, A, 2001. Tonga Coral Reefs: National Status Report. In "Status of Coral Reefs in Southeast and Central Pacific- Polynesian Mana Network," B. SALVAT ed, Foundation Naturalia Polynesia: pp101–124
[21] Ministry of Environment and Climate Change, Vulnerability and Adaptation Assessment on Tonga's Initial National Communication on Climate Change, 2005.
[22] Salinger. J. 2000. "The effects of the inter-decadal Pacific oscillation on the South Pacific Convergence zone"; National Institute of Water and Atmospheric Research, Auckland, New Zealand.

exceeded Australian standards for sea food, recreational use and risk of algal blooms. Fakatava's (2000) study indicated that Fanga Kakua Lagoon is generally in better condition than Fanga'uta Lagoon.[23]

99. The volume of water exchange between the two branches over a tidal cycle is estimated to be 15.4 million cubic metres. During each tidal cycle, 3.3% of Fa nga Kakua Lagoon's waterbody comes from Fanga'uta Lagoon, while 2.8% of Fanga'uta Lagoon comes from Fanga Kakua Lagoon. The renewal time for the entire two lagoons was estimated to be around 30days, which leads to significant stagnating water.[24]

C. Social and Cultural Environment

1. Population

100. In 2011, Tonga held a census. The total population count was 103,036 (52,001 males, 51,035 females). The majority of the population is located on Tongatapu (75,158). With respect to Nuku'alofa, the 2011 Census data indicates that a total of 36,045 individuals were living in Nuku'alofa within an area of 34.82km^2. The population is split fairly equally between females (17,495) and males (18,100). This results in an overall population density of 1,035people/km^2. [25]

2. Household Conditions

101. Materials for house construction vary across Nuku'alofa. As at the 2011 Census, there were 6,191 households in Nuku'alofa. The majority of houses were built from wood (3,772); followed by concrete blocks (1,922), poured concrete (312), metal (160) and only nine thatched houses. Sixteen houses were made from other material.[26]

102. The primary roofing material is metal sheeting (5,841).Wood (206) and concrete (115) made the primary remainder of roofing material, with 18 thatched roofs and 11 others. As to floor construction, the majority of properties have concrete flooring (4,988 concrete floors) with 1,127 having wooded floors and 76 houses have some other type of flooring.[27]

103. The sources of drinking water are fairly consistent with other areas of Tonga. The majority of drinking water is sourced from cement tanks (62%) while water is also sourced from neighbors (25%). Approximately 8% relied on bottle water; 3.5% on piped water supply while just over 1% boiled their drinking water. As for non-drinking water, 91% of households relied on piped water, 7% used water from their own tank while 77 households had their own well that they sourced their non-drinking water from the groundwater aquifer. [28]

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[23] Salinger. J. 2000. "The effects of the inter-decadal Pacific oscillation on the South Pacific Convergence zone"; National Institute of Water and Atmospheric Research, Auckland, New Zealand.

[24] Ministry of Environment and Climate Change, Climate Change Thematic Assessment Report under National Capacity Self Assessment Project, 2007.

[25] *Tonga National Population and Housing Census,* Tonga Statistics Department, 2011

[26] *Tonga National Population and Housing Census,* Tonga Statistics Department, 2011

[27] *Tonga National Population and Housing Census,* Tonga Statistics Department, 2011

[28] *Tonga National Population and Housing Census,* Tonga Statistics Department, 2011

104. For hot water, 87% of households did not have a solar or electric hot water system. Only eight houses did not have a shower or bath, while only five homes did not have a toilet. Of the homes with a toilet, 5,489 had flush systems, 574 had a manual flush and 122 households utilized a pit of some sort. While the numbers not having hot water is high, the numbers having standard hygiene is higher than across the remainder of Tonga on percentage terms.[29]

105. The majority of households were connected to mains electricity for their lighting. Within Greater Nuku'alofa, 95% of households were connect to main supply for their lighting, 3% relied on kerosene or benzene to provide them light, 65 households used an alternate source and 49 households had their own generators. [30]

3. Employment

106. For Greater Nuku'alofa, a total of 10,638 individuals indicated that they were within the labor market. Of these, 2,154 were employed by Government (4,564 indicated they were employed by Government across all Islands), 734 were Quasi Government (1320 in total);4,464 were a private employee (8,714 in total), 187 were an employer (343 in total), 1,909 were self-employed (8,740 in total) and 1,190 were an unpaid family worker (9,741 in total).[31]

4. Literacy

107. Literacy is measured by a person's ability to read and write a simple sentence. The literacy rate for those aged five years and older in the resident population was 98.2% in 2011. Of those who are literate, 86% were literate in both Tongan and English or other languages, while 11% were literate in Tongan only. Literacy in the Tongan language is over 98% for all age groups; however, literacy in both Tongan and English languages decline with age. Approximately 94% of those aged 10-19 years are literate in both Tongan and English, compared to only 56% of those aged 75 years and over.[32]

5. Cultural Heritage

108. The Siaheulupe Historical Site is of cultural significance to Tonga. Va'epopua Sia Heulupe was a playground of Tonga's first king, 'Aho'eitu. According to legend "This is a treasure that once lost will be lost forever. It is linked to the origins of Tongan civilisation. According to legend one of the Tangaloa's, Tangaloa 'Eitumatupu'a came down from the sky, met a Tongan lady, Va'epopua on the reef and later they had a son, 'Aho'eitu; his father was a sky-god, and his mother an earthly woman. That was the beginning of Tonga's kingship system." [33]

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[29] *Tonga National Population and Housing Census,* Tonga Statistics Department, 2011

[30] *Tonga National Population and Housing Census,* Tonga Statistics Department, 2011

[31] Statistics Department (2006). Kingdom of Tonga Population Census 2006: Administrative Report and Basic Tables, Government of Tonga, Nukulofa.

[32] *Tonga National Population and Housing Census,* Tonga Statistics Department, 2011

[33] Tonga Ministry of Tourism Corporate Plan 2017/18

Figure IV-III Locality map of SiaHeu Lupe Reserve at Popua

109. The Va'epopua Sia Heulupe was used for a royal favourite sport of catching pigeons. There are Sia Heulupe in other places in Tonga, but the Va'epopua is significant because Tangaloa was supposed to come down from the sky and meet Va'epopua in the area.

110. The project will have no impact on this culturally important site.

6. Indigenous People

111. There are no indigenous peoples in the Kingdom of Tonga.

V.Anticipated Environmental Impacts and Mitigation Measures

D. Impacts and Mitigation due to Location

112. The environmental impacts envisaged for the projects are temporary in nature and are associated with construction activities only. The proper handling of materials may have impacts on the environment. Where earth moving will be undertaken, the scale of actual work is not significant as it is limited to the section of road that is being worked on at any one time.

113. The roads are located on low level terrain. However, any movement or ground breaking can result in sediment movement once disturbed. During construction any stockpiles must be covered to minimize sediment runoff during rainfall. Stockpiles should also be sited in areas where they will not drain directly to the coastal and/or lagoon environments. The most effective measure in relation to this would be that no construction occurs during the wet season, thereby mitigating the potential impacts of runoff totally unless there is a rain event during this period. Reference should be made to the Tongan Meteorological Office with respect to forecasting.

114. None of the projects will create temporary and/or permanent habitats for mosquito breeding. Attention will be given to avoiding the creation on site of ponds and inundations which encourage such breeding.

E. Impacts and Mitigation during Pre-construction Phase

1. Environmental Management Plan (EMP)

a) Impact

115. An EMP is included in the tender documents. This is general in nature and must be converted into a CEMP (Contractors Environmental Management Plan) before commencement of building works. This must be done within 30 days of contract signing.

b) Mitigation

116. The CEMP will give specific details on pollution control measures to be undertaken by the selected contractor. This must be approved by MoI before construction works start.

2. Site Formation

a) Impact

117. For flood control the road alignments will be elevated. This will require infill material from a quarry.

b) Mitigation

118. The contractor will need to obtain all legal permits to show he is using an approved quarry.

F. Impacts and Mitigation during Construction Stage

1. Construction Camp

a) Impact

119. It may be necessary to set up a construction camp on the sites. It is preferable that workers do not live on the site. Residential quarters can be rented for them in the town. If workers must occupy the site then living and sleeping quarters must be provided in a sanitary manner.

120. Impacts are from toilets, bathrooms and solid waste from kitchens.

121. Threats to health and safety of workers may include malaria and dengue, unsanitary camp conditions, lack of clean water and sanitary facilities.

b) Mitigation

122. Health and safety of workers in the camp is part of the Contractors obligation. For health and safety of workers, the contractor should provide: safe, suitable and comfortable accommodations, kitchen, dining and sanitary facilities (toilet and bath); ample supply of bottled drinking water; and first aid supplies and equipment. Camp surroundings should be kept clean to prevent breeding of insects, vermin and vectors.

123. Solid waste management should be implemented. Waste bins for segregating waste should be provided within the camp with a regular collection schedule. Waste should be segregated with recyclables recovered and non-recyclable wastes disposed at the landfill.

124. Contractor should conduct a training and orientation on environmental protection, hygiene, health, safety and security. The training program should be presented in the CEMP.

125. The CEMP to be prepared by the Contractor should present a detailed plan of the construction camp showing the layout, the sanitary facilities, septic tank, drainage, access road, fuel storage, equipment yard, among others if appropriate. All domestic quarters and vehicle maintenance is to be encouraged to be off site.

2. Water Quality

a) Impact

126. Heavy rain may cause run off of silt from the site. Rainwater contaminated by waste oil or fuel spillages may contaminate adjacent land.

b) Mitigation

127. Silt traps should be installed at perimeter drains which lead run off water away from the site.

128. Any fuel stores should be located on a hard base with weather shielding to prevent rain water contamination.

3. Air Quality

a) Impact

129. Stock piling of materials on site may lead to dust blowing towards nearby residences.

b) Mitigation

130. Any materials stockpiled on site should be covered with tarpaulins. In dry weather if dust is entrained by site vehicles water sprays should be used. Any vehicles carrying materials onto the roads should have their loads covered to prevent spillage on the road.

131. No open burning of any waste materials is allowed on site.

4. Noise

a) Impact

132. Noise levels may be generated by site vehicles and construction equipment.

b) Mitigation

133. All site vehicles and construction equipment should be maintained in good condition with silencers. Work is only allowed between 0700 to 1900 and no work on Sundays or public holidays unless with prior permission.

5. Solid Waste

a) Impact

134. Some site clearance of vegetation may be necessary. This will need removal to the landfill.

135. Site vehicles or equipment may need oil filters changing. Wooden formwork may be needed for construction.

b) Mitigation

136. Any vehicles carrying materials on the roads should have their loads covered to prevent spillage on the road. All maintenance of vehicles and equipment should be done off site. All waste wooden formwork must be removed to the landfill. Recycling of building materials should be encouraged. No burning of waste wood is allowed on site.

137. No solid wastes or litter should be dumped in the land adjoining the sites. All biodegradable wastes will be transferred to Tapuhia Landfill.

6. Complaints

a) Impact

138. The road projects are unlikely to have any impact on the community especially if works are undertaken during normal working days. However some complaints must be expected, even if unjustified.

b) Mitigation

139. The project managers and contractor will establish a complaints and grievances register as detailed below (see Response to Complaints).

G. Impacts and Mitigation during Operation

1. Site Clearance

140. Upon completion of the construction works the contractor will have no involvement in the operation of the road.

c) Impact

141. All debris and unused materials must be remove from any sites and any damages made good.

d) Mitigation

142. Remove all debris from the site and make good. The ESU will inspect and file a Project Completion Report. Failure to make good may result in payments being delayed.

2. Air pollution

e) Impact

143. All roadside residents have complained about dust entrainment from the gravel road in dry weather.

f) Mitigation

144. Surfacing of the road with a chip seal bitumen aggregate mix will seal in any dust and reduce air pollution. This will be a benefit.

3. Noise

g) Impact

145. The road has very low residential ribbon development and no complaints have been made about noise. Higher numbers of vehicles per day will increase noise but not significantly.

h) Mitigation

146. Surfacing of the road with a smooth wearing course will reduce tyre road interaction noise. This will be a benefit.

4. Road Safety

i) Impact

147. Currently the roads are unsurfaced and have no lane centre markings or edge markings. This compromises road safety during overtaking and at night.

j) Mitigation

After resealing a road centre line, carriageway edge markers and warning signs will be installed. This will improve road safety during overtaking and at night. This will be a benefit.

5. Potential Beneficial Impacts

148. The project will upgrade around 6.8 km of roads to provide evacuation and post-disaster access roads to three villages in Tongatapu and one in the island of ‘Eua. The expected benefits are improved security of local population in eastern Tongatapu in the event of a major climate change event by both allowing evacuation and providing for post disaster access by emergency vehicles.

149. The roads will also enhance the livelihoods of the local population through facilitating their access to economic centers such as markets and providing employment and training opportunities for local and national workers.

VI. Environmental Management Plans

A. Environmental Management Plan (EMP)

150. The Environmental Management Plan (EMP) gives guidance on how to mitigate the environmental concerns identified in connection with this project. The EMP deals with mitigation and management measures to be taken during implementation to avoid, reduce, and mitigate adverse environmental impacts.

151. MoI will ensure that the EMP is included in the tender documents for civil works. It will form part of the contract between MoI and the selected contractor and the requirements of the EMP will be contractually binding on the contractor. The conformity of contractors with environmental contract procedures and specifications shall be regularly monitored by the project management unit (PMU) through the Environmental and Social Unit (ESU) during implementation. PMU/ESU will be assisted by the detailed design and implementation supervision consultant (DDIS) to undertake EMP monitoring and to prepare corresponding semi-annual reports for submission to ADB.

B. Contractors Environmental Management Plan (CEMP)

152. After appointment and mobilization the contractor must prepare his own version of the EMP known as the Contractors EMP (CEMP). This must give specific details of locations of borrow areas; borrow roads, workers camps and other facilities. This must be submitted to the DDIS Consultant for their approval before works commence.

1. CEMP Review

153. Successful implementation of the CEMP will require combined efforts from contractors, consultants, and MoI. The CEMP is a dynamic document and may be subject to change by the contractor as the work progresses. Periodic reviews of the CEMP may be necessary and these should in fact be encouraged.

2. Response to Complaints

154. The construction phase is expected to last 12 months. Residents and any Affected Persons (Aps) are encouraged to voice complaints and these are to be duly investigated and reported through the contractor to SEO and so to MoI.

155. The contractor will be required to display on a notice board a 24 hour phone number to which any complaints can be made. All complaints must be responded to in an efficient and polite manner.

156. Response to complaints must be checked by the construction supervision inspectors. Any urgent issues must be drawn to the contractors' attention immediately. Failure by the contractor to respond in a timely or adequate manner must be raised with them at the monthly progress meetings.

157. The EMP is given below.

Table VI-1 Environmental Management Plan

EMP GIVING POTENTIAL NEGATIVE IMPACTS, MITIGATION MEASURES AND RESPONSIBILITIES

Activities	**Potential Negative Impacts**	**Mitigation Measures**	**Implementing Organisation**	**Supervising Organisation**
Impacts and Mitigation – Location				
(a) Raising road elevation grounds to avoid flooding.	Use of rock and soil from informal quarry	▪ Contractor to use only licensed quarry	Consultant	MOI
(b) Working in rainy season	Sediment laden rain water runoff	▪ Contractor to try and avoid earthworks in rainy weather	Consultant	MOI
(c) Noisy activities	Noise nuisance at residential properties	▪ Contractor to do work only during week day and day time if near houses or churches	Consultant	MOI
(d) Removing damaged building materials	Wastage of good materials	▪ Recycle wastes if possible	Consultant	MOI
Impacts and Mitigation – Pre-Construction				
(a) EMP to be reviewed	Without approved CEMP contractor cannot occupy site	▪ Contractor to submit CEMP within 30 days of contract signing.	Contractor	MOI
Impacts and Mitigation – Construction				
(a) Construction camp	Workers living in unsanitary conditions	▪ If possible workers should live off site ▪ If on site provide adequate sleeping quarters ▪ Provide sanitary arrangements for toilets, showers, laundry. ▪ Provide clean cooking facilities ▪ Provide sufficient drinking water ▪ Provide garbage bins for workers. Waste in the bins should be cleared periodically. ▪ Special attention should be paid to the sanitary condition of camps to avoid disease.	Contractor	MOI
(b) Protecting workers safety	Accident risk from equipment	The following safety precautions should be provided to workers: ▪ Introductory briefing on health and safety.	Contractor	MOI

		▪ Warning and/or Precaution Signs on safety. ▪ Provide full PPE; Helmets, boots, high vis jackets etc ▪ Hold Tool Box meetings every morning to reinforce message on safety		
(c) Drainage	Water pollution	▪ Install temporary perimeter drains to carry away rain ▪ Install silt traps in drains ▪ All stored fuel, oils and paints to be undercover on hard bases with kerbs to stop spills being washed away in heavy rain.	Contractor	MOI
(d) Stockpile materials	Dust and poor air quality	▪ All stockpiled materials to be covered ▪ Water sprays to be used for dust suppression in dry weather ▪ All vehicle movement of materials to have the loads covered	Contractor	MOI
(e) Solid wastes	Littering and garbage	▪ All construction waste to be removed from site and sent to landfill ▪ No dumping of waste in neighboring fields ▪ No open burning of waste	Contractor	MOI
(f) Stagnant water areas	Breeding habitats for mosquito vector	▪ Removal and draining of stagnant water areas.	Contractor	MOI
(g) Security of site	Trespassing	▪ No persons other than workers to be allowed on site	Contractor	MOI
(h) Traffic	Traffic congestion	▪ Enforce traffic management scheme. Use traffic control staff when work requires partial road closure.	Contractor	MOI
(i) Noise	Disturbance with sleep	▪ Vehicle noise control ▪ Timing of work 0700-1900 and no Sunday working	Contractor	MOI
(j) Construction Camps Operation	Health and safety	▪ Practice “Good Housekeeping” at all times ▪ Report "Near Misses" as "Lessons Learned"	Contractor	MOI
(k) Employment policy	Gender Action plan / Localisation preference	▪ Encourage women to be employed e.g. as traffic controllers and offer local employment to unskilled workers	Contractor	MOI
Impacts and Mitigation –Operation				
(a) Resident’s complaints	No response to complaints	▪ Establish complaints response mechanism ▪ Respond promptly	Contractor	MOI

C. Environmental Management and Monitoring Program (EMMP)

158. The Environmental Management and Monitoring Program (EMMP) will ensure that the EMP is being followed.

1. Environmental Monitoring

159. The essence of monitoring is to ensure Compliance with the EMP. The contractors have a duty to comply with this and the relevant legislation. The supervising consultant must check their activities and report to MoI. In the event of noncompliance MoI can exert pressure on the contractor to comply.

2. Inspections

160. It will be necessary to carry out regular inspections to ensure the CEMP is being followed. In fact, simple compliance with the CEMP is not necessarily the final objective. There is no harm in the contractor "going beyond compliance" and running an operation better than that required by the contract.

161. Initially, contractors should check daily that all operations are being conducted correctly. In general "good housekeeping" must be employed and checked by visual inspection. Dust must be controlled by covering of stockpiles and water sprays. Solid waste, engine oil and grease, must be taken away by waste removal contractors and records kept.

162. Construction supervision inspectors must make regular checks and formal reports on site operations. They must also investigate any pollution incidents or complaints. They must use checklists for record purposes and make sure that the complaint or incident is brought to the notice of the contractor immediately, verbally and with a follow up written notice.

163. In addition SEU staff should make monthly visits to site to check the veracity of reporting. They should also review the reports submitted by the consultants to the MoI and report to the PMU project manager.

164. The site inspectors should make regular reports which are compiled into a monthly report. This should be submitted to the Supervising Engineer and discussed with the contractors as necessary but at a minimum on a monthly basis. Monthly reports should be compiled into quarterly and annual reports to be submitted to ADB.

The EMMP is given below.

Table VI-2 Environmental Management and Monitoring Plan (EMMP)

Environmental Features	Aspect to be Monitored	Time and Frequency of Monitoring	Location	Monitoring Cost	Responsible party (Implementation / Supervision)
Construction stage					
Dust and air quality	Dust emissions	Contractor – daily visual checks during civil works Construction Supervision Consultant (CSC) - monthly ESU - as required	Project site and access roads from main roads, quarries and stockpiles.	Project cost	Contractor / CSC / ESU
Waste management	Waste collection, storage and disposal.	Contractor – daily Construction Supervision Consultant (CSC) - monthly ESU - as required	Project site	Project cost	Contractor / CSC / ESU
Noise	Noise levels in dB(A) at boundary of site	At times of predicted high noise intrusion e.g. working weekends.	Project site boundary closest to nearest occupied residence	Project cost	Contractor / CSC / ESU

Hazardous materials	Storage and disposal of hazards materials	Contractor – daily Construction Supervision Consultant (CSC) - monthly ESU - as required	Project site	Project cost	Contractor / CSC / ESU
Erosion control	Silt traps and erosion control measures.	Visual checks of erosion control measures when raining	Project site exit drains from site to road	Project cost	Contractor / CSC / ESU
Stakeholder Consultation / Public Consultation / GRM	Records of consultation	Construction Supervision Consultant (CSC) - monthly	Project site	Project cost	CSC
Occupational Health and Safety	As specified in project health and safety plan prepared by Contractor	On - going but checked once every two weeks. "Tool box" meetings every morning.	Project Site	Project cost	Contractor / CSC
Post Construction					
Site clearance	Scope of clearing	CSC representative to be present during site clearing ESU to issue Project Completion Report.	Project site	Project cost	Contractor / CSC / ESU

VII. Project Justification and Alternatives

A. Do-Nothing Alternative

165. The no-construction alternative is to maintain the present condition of the roads. This “do nothing” alternative would place at risk persons trying to escape from unsafe conditions on the coast. The works proposed will increase safety and therefore the “do nothing” alternative is not appropriate.

B. Alternative Location

166. As the projects are improvement of existing roads there are no alternative locations.

C. Land Availability

167. The four roads currently exist on land owned by the Crown and the improvement works will be within the existing Right of Way.

D. Disaster Risk Reduction

168. The project will upgrade four roads to provide evacuation and post-disaster access to three villages in Tongatapu and one in the island of ‘Eua. This will improve security of the local population in the event of a major climate change induced extreme weather event by both allowing for evacuation and allowing post disaster access by emergency vehicles

VIII.Public Consultation

A. Background

169. The ADB's Environment Policy mandates the procedural requirements for effective public consultation and information disclosure in the IEE process. The degree of consultation depends on the project and local situation.

170. The Asian Development Bank through the Climate Resilience Sector Project (CRSP) duly supports eco-system resilience and climate infrastructure investments to upgrade evacuation road in high vulnerable area at Tongatapu and Outer Island of 'Eua. Four designated road are to be upgraded including Popua, Navutoka and Talafo'ou at Tongatapu and Tufuvai at 'Eua. This will facilitate a swift response in terms of climatic events such as hurricanes, storm surges and post natural disaster such as Tsunami.

171. Community consultation is considered to be an integral component of informed decision-making. It aims to ensure that as many people as possible who are likely to benefit from the evacuation road upgrade have the opportunity to voice their concerns and suggestions prior to the project implementation.

B. Engagement Methods

172. Consultations with the community included 40 people interviewed in qualitative one-on–one interview of men and women from each community group. There were consulted over the 12th, 13th, 16th, and 25-27th January 2017. A list of interviewees is given in Annex 3. Photos of the public consultations are given in Annex 4.

C. Findings

The findings were as given in the table below.

Table VIII-1 Key issues and priority (Note 1)

Key Issues & Priority	% of people mention the issue (Navutoka)	% of people mention the issue (Talafo'ou)	% of people mention the issue (Popua)	% of people mention the issue (Tufuvai)
Coastal				
Old foreshore damage	80	80		
Coastal erosion and severe inundation	80	70		
Flood affect agriculture	70		70	
Drainage blockages			60	
Street Light for evacuation road	80	80	70	80
Road maintenance is poor			20	
Septic overflow			70	60
Capacity Development				
Women lack of skills on business diversity	30	30	30	40
Train of trainer (town officer)	20	40	30	60
Water Resources Management				

Poor quality of drinking water				80
Water scarcity (drought)	60			
Low water pressure supply	30	50		
Social & Cultural				
Community beautification program	20	30	50	50
Unemployment	30	20	50	40
Community value traditional knowledge and practices				50
Disability Carer	50	40	50	80
Ecological				
Deforestation (mangroves)			60	60
illegal sand mining			70	70

1. Note: One interviewee mentioned more than 1 issue.

D. Key Issues and Priority

The following key issues were identified.

1. Navutoka

- Foreshore; Severe climatic event uplifts rocks and rubble onto the main road for 2-3 days before removed by bulldozer.
- Water Security Community water supply low pressure during drought
- Road Road become narrowed on seaward side due erosion
- Drainage Flood due lack of drainage to manage and control water flow
- Street light Children feel unsafe to walk in darkness at night time
- Gender Empower women on small business and employment diversity.
- Training Train of trainer for elderly care
- Sand mining Illegal sand mining along the coast

2. Talafo'ou

- Water Security Community water supply stop when pump is broken
- Drainage Heavy rain damage road, fences and rock pile on main road, accelerate erosion into the ocean
- Road Deeper slope accelerate erosion into ocean
- Street light women feel unsafe to walk at night time
- Gender Train of trainer (Town Officer) integrate climate change activities into men and women roles to successfully manage the impact of CC
- Training Train of carer
- Sand Mining Illegal sand mining for house construction

3. Popua

- Septic overflow Unsafe septic for sewage disposal.
- Flood Last 3-5 days resident area.
- Cut Mangroves Illegal cut of mangroves for development

- Drainage Drain blockages.
- Gender Empower women on small businesses and job diversity
- Unemployment School leavers unable to find jobs
- Street light Women feel unsafe to walk at night time
- Disability Train of trainer for elderly care
- Water security Unsafe drinking water

4. Tufuvai

- Disability Train of carer.
- CC Knowledge Integrate of CC activities into men and women traditional knowledge to successfully manage the impact of CC.
- Roads Steep slope (‘Ohonua) accelerate erosion downstream, block road.
- Training Train of trainer for elderly care.
- Handicraft Influence of foreign investment on women business development.
- Drainage; Accelerate erosion and flood downstream due lack of drainage
- Tap water Unsafe drinking water
- Septic overflow less than 30 household used pit latrine toilet

Ranking were given to the issues by the interviewees as given below.

Table VIII-2 Ranking priority high, medium and low

Rank	Score	Impact Type
High	60-100	Old foreshore, water quality, septic overthrow, training, flood, erosion, sand mining, street light, drought
Medium	40-60	Waste, traditional practices, gender, unemployment,
Low	20-40	Beautification, road maintenance, tree planting

E. Results

173. The key issues and priority were broken down into five categories; coastal, capacity development, water resources management, social and culture and ecological importance. Each category is ranked high, medium and low based on the number of people's responses and type of impact.

174. The majority of high score impact at Tonagatapu and ‘Eua were similar in principle, for instance, training of carer before and after Tsunami events was raised at Navutoka and disability at Tufuvai.

175. Lack of drainage was rank high at Tufuvai above poor road conditions and steep roads which accelerate erosion downstream. The evacuation centre for community safety was the church building and community hall however there are no appropriate facilities in the building to accommodate the needs of children and family, such as food, water and medicine.

176. The evacuation road was critical for women because they cannot walk at night time without street lights. This was raised in Tufuvai and Talafo’ou. Water security was a concern

with poor quality of drinking water at ‘Eua and a low pressure community water system at Hahake during drought.

177. Women find employment very difficult with a score of 50% at Popua compared to a score of 20% at Talafo’ou. Women complained over a lack of skill for small business development and job diversity.

178. In Talafo’ou coastal protection rated a high score of 60% with illegal sand mining for house construction reported. Septic overflow scored 60% at Tufuvai and 70% at Popua. Tufuvai was able to reduce use of Pit Latrine Toilets from 60 to 30 households according to District Officer.

179. Generally speaking members of the Tonga community are highly vulnerable to climate change impacts and Disaster Risk Management is a high priority as documented in Join National Action Plan (JNAP) action plan 2010-2015.

F. Further Ongoing Consultations

180. The public consultations took place during the update of the IEEs. Consultations will continue after detailed design, before civil works and during implementation.

IX.Grievance Redress Mechanism

A. General Principles

181. ADB requires that a grievance redress mechanism (GRM) be established and maintained. It should be designed to efficiently receive and facilitate the resolution of affected peoples' concerns and grievances about project-level social and environmental issues within a reasonable timeframe. The GRM should be scaled to the risks and impacts of the project. It will address affected people's concerns and complaints promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to all segments of the community. The GRM may be revised once the project commences to ensure that its provisions are relevant and practical. It should also be updated as required during the construction process, to optimize the redress process.

182. During project implementation, it is possible that people may have concerns about the project's environmental performance. People may perceive negative impacts during the construction or operational phase, and they have the right to have their complaint fairly heard and acted on. Many issues can be resolved effectively through timely communication, inquiry, and mitigation measures.

183. The grievance redress process will be widely disseminated to all affected people during project consultations. The GRM is in place for all safeguard issues, providing a streamlined process for any concerns or issues in relation to resettlement, social safeguards, and environmental impacts.

184. Consideration of the grievance process should be given to both the construction and operational phases. Environmental impacts from operations are considered within an IEE and EMP, and as such breaches to the EMP in operations need to also provide a GRM.

B. Grievance Coordination

185. A grievance focal point (GFP) will be established by the district/town Officer to coordinate and address all complaints and concerns arising from the project. The contact details will be provided to all affected persons.

186. The GFP will be assisted and supported by the PMU ESU who will maintain a register of complaints, keep track of their status, and report to the PSC. They will regularly track complaints received, actions taken and the status of resolution. All communications with the affected person(s) will be documented, and whether management action has been taken to avoid community concerns in the future. Complaint forms will be distributed to the GFP to facilitate recording of complaints.

C. Grievance Redress Procedures

187. Affected persons will be informed that they should ask any questions or discuss grievances with their community leader or the district/town GFP by phone or in person; or to project staff visiting the area. The GFP is encouraged to discuss the issue with the contractor or ESU, as often minor environmental impacts can be remedied with immediate action.

188. If these questions/grievances are not answered within 1 week, they should be prepared in writing (using the assistance of the local community leader, church, or school if necessary). The complainant will also be informed that national and international project staff could assist them with writing a grievance if necessary. Written complaints can be sent or

delivered to the MEIDECC PMU/ESU, where they will be registered as being received, and will be treated confidentially. The PMU/ESU will have 1 week to deliver a resolution to the affected person.

189. In the event that a satisfactory answer cannot be provided, the affected person may lodge the complaint with the Minister of MEIDECC and receive a reply within 7 days.

190. In the event that the situation is not resolvable, or the complainant does not accept the decision, the affected person(s) may have recourse to the land court (or other relevant court). All court costs (preparation and representation) will be paid for by the project, regardless of the outcome.

191. Project Management Unit (PMU) of MEIDECC shall undertake the following prior to start of site works:

- Establish a grievance redress mechanism (GRM) prior to site works
- Make public the existence of the GRM through public awareness campaigns
- Ensure that names and contact numbers of representatives of the PMU as well as SEO and contractors are placed on the notice boards outside the construction site and at sub national level of local government offices.

192. The Grievance Redress Committee (GRC) shall be established before commencement of site works and shall be chaired by Project Management Unit (PMU) to be assisted by the Social and Environmental Office (SEO). The GRC shall have members from the PMU/ MEIDECC, local NGO and women's organization. Grievances can be filed in writing or verbally with any member of the GRC. The committee will have 15 days to respond with a resolution. If unsatisfied with the decision, the existence of the GRC shall not impede the complainant's access to the Government's judicial or administrative remedies.

X.Conclusions

193. The IEE has been conducted in accordance with ADB SPS 2009. This is an update of an earlier (2014) PPTA IEE.

194. The remedial works will incorporate climate proofing into four roads on Tongatpu and Eua.

195. The works will be carried out by local contractors who will be required to comply with the requirements of an EMP. This will be contractually binding on them.

196. A submission has been made under Tongan EIA Regulations 2010 which has confirmed that the works are classed as “Minor” and a full EIA is not required.

197. Public consultations have taken place with stakeholders to update earlier findings on their concerns. These concerns have been addressed in the remedial works.

198. The IEE contains an EMP which must be followed by the contractor.

199. The IEE contains a Grievance Redress Mechanism (GRM) which must be followed by all involved parties.

200. There are no Sites of Special Ecological Interest or cultural sensitivity near the proposed works site that will be adversely impacted,

201. The IEE confirms that the works fall under ADB Category “B”.

202. This IEE concludes that there are no outstanding environmental issues remaining and there is no environmental reason for this project not to proceed.

XI. Annexes

A. Annex 1 International Conventions

STOCKTAKE OF MULTILATERAL ENVIRONMENTAL AGREEMENT AS OF AUGUST 2016						
NAME OF AGREEMENT	**DATE,PLACE of SIGNATURE**	**ENTRY INTO FORCE**	**TONGA'S STATUS**	**NUMBER OF PARTIES**	**PURPOSE**	**Focus Area**
United Nations Framework Convention on Climate Change	9 May 1992, New York, USA	21 March 1994	Accession (20 July 1998)	197	Stabilize and mitigate atmospheric pollution, the effect of greenhouse gas concentrations in the atmosphere.	Climate Change Environment Biodiversity
Kyoto Protocol to the UNFCCC	11 December 1997, Kyoto, Japan	16 February 2005	Accession (January 2008)	192 (191 states & 1 organization)	To ensure that aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases listed in Annex I to the Protocol do not exceed the assigned amounts, with a view to reducing overall emissions of such gases by at least 5% below 1990 levels the commitment period 2008-2012.	Atmospheric Pollution Ozone Layer Protection Environment Biodiversity
Convention on Protection of Biological Diversity	5 June 1992, Rio de Janeiro, Brazil	29 December 1993	Accession (19 May 1998)	196	Conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.	Environment Biodiversity
Cartagena Protocol on Biosafety	15 May 2000 (Montreal, Canada)	11 September 2003	Accession (18 September	170	Regulate the trans boundary movement, transit, handling and use of Living Modified Organisms [LMOs] which	Generic Resources (Living Modified

			2003)		may have adverse impacts on the conservation of biodiversity from one country to another.	Organism)
Paris Agreement	April 2016 (New York, USA)	-	Signed (April 2016)	21	Combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low carbon future.	Atmospheric Pollution Environment Biodiversity Climate Change Resilience
Vienna Convention for the Protection of the Ozone Layer	22 March 1985 (Vienna, Austria)	22 September 1988	Accession (29 July 1998)	197	Framework Convention to promote research, legislate and international cooperation in the protection of the ozone layer.	Atmospheric Pollution Ozone Layer Protection
Montreal Protocol on Substance that deplete Ozone Layer	16 Sept 1987 (Montreal, Canada)	1 January 1989	Accession (29 July 1998)	197	Regulate the issue of production and consumption of ozone depleting substances in abundance	Atmospheric Pollution Ozone Layer Protection
Nagoya Protocol on Access and Benefit sharing of Genetic Resources	29 October 2010 Nagoya, Japan)	12 October 2014	-	170 (92 signatories) (78 ratification)	Access and Benefit Sharing of Genetic Resources.	Generic Resources Biotechnology
United Nations Convention to Combat Desertification	17 June 1994 (Paris, France)		Accession (25 September		Addressing the Adverse impacts of Desertification and Droughts	Forest Deserts

			1998)			Environment
Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Waste and to Control the Tran boundary Movement and Management of Hazardous Waste within the South Pacific Region	29 January 2000 (Waigani, PNG)	21 October 2001	Ratification (22 May 2002)	13 (Palau signed yet to ratify)	Regulate banning and managing of importation into Forum Island Countries of Hazardous and Radioactive Waste	Hazardous Wastes Chemical Wastes Biodiversity Environment
Convention for the Protection of the World Cultural and Natural Heritage	23 November 1972) (Paris, France)	17 December 1975	Accession (30 April 2004)	192	Promote cooperation at all level in identifying, protection, conservation and presentation and transmission to future generations of cultural and natural heritage.	Natural Heritage Environment Cultural Heritage
Stockholm Convention on Persistent Organic Pollutants	23 May 2001 (Stockholm,	17 May 2004	Ratification (23 October 2009)	180	Protect human health and the environment form persistent pollutants	Pollution Chemical Wastes
Basel Convention on the Control of Tran boundary Movements of Hazardous Wastes and their Disposal	March 1989 (Basel,	5 May 1992	Accession (26 March 2010)	184	Regulate the trans boundary movement of Hazardous Waste and their disposal	Hazardous Wastes
Rotterdam Convention on the Prior Informed Consent Procedures for Certain Hazardous Chemicals and Pesticides in International Trade	September 1998 (Rotterdam,	24 February 2004	Accession (31 March 2010)	155	Promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm and to contribute to their environmentally sound use, by	Prior Informed Consent Process Hazardous & Chemical Waste

					facilitating information exchange about their characteristics, by providing for a national decision-making process on their import and export and by disseminating these decisions to Parties.	Biodiversity Environment
United Nations Convention on the Law of the Sea	10 December 1982	16 November 1994	Accession (2 August 1995)	168	Regulate the rights and responsibilities of nations with respect to their use of the world's oceans, establishing guidelines for businesses, the environment, and the management of marine natural resources.	Maritime Boundaries

B. Annex 2 Waiver on Need for EIA under Tongan EIA Regulations 2010

EIA: ASSESSMENT LEVEL ADVICE MINOR PROJECT

EIA Project ID Number. *205/2016-17*

Proponent Name: Climate Resilience Sector Project (CRSP)

Project Address: Village Name: Navutoka, Tongatapu
Talafo'ou, Tongatapu
Popua, Tongatapu
Tufuvai, 'Eua

Plan Number:

Other Project Reference: *N/A*

BACKGROUND

As required under the *Environmental Impact Assessment Act 2003* (the EIA Act) and the *Environmental Impact Assessment Regulations 2010* (the EIA Regulations), on 10th February 2017 the EIA Unit of the Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change & Communication (MEIDECC) received notification of a development activity from MEIDECC's CRSP.

It is proposed to:

- Repair and upgrade 4 roads for evacuation purposes and post-disaster access roads to 3 villages in Tongatapu (Navutoka, Talafo'ou and Popua) and one village in 'Eua (Tufuvai).

The development activity aims to upgrade and improve 4 roads (three in Tongatapu and one in 'Eua) to provide evacuation and post-disaster access roads for security of local population in the event of major and severe climate change disasters. This can increase the safety and security of the locals and enhance the community preparedness and resilience to impact of climate change and disaster.

EIA ASSESSMENT

The development activity is not listed as a major project in the schedule to the EIA Act. However, this does not automatically mean that it is a minor project. Sections 8 and 9 of the EIA Act require the Minister to determine whether the development activity should be deemed to be a major project. This function has been delegated to the Director (the Chief Executive Officer (CEO of MEIDECC) under section 5 of the EIA Act. Therefore, it may be exercised by either the Minister or the CEO.

The matters that must be taken into account when making this determination are specified in section 8 of the EIA Act and section 12 of the EIA Regulations.

An assessment of the proposed development activity against these matters is detailed below.

Matter to be taken into account	Yes/No/ Likely	Details/Comments
Is the project likely to affect any ecosystems	No	The project aims to repair and improve

Matter to be taken into account	Yes/No/ Likely	Details/Comments
of importance, especially those supporting habitats or rare, threatened, or endangered species of flora or fauna?		4 existing road in Talafo'ou, Navutoka, Popua and Tufuvai ('Eua). No ecosystems of importance will be affected.
Is the project likely to affect areas, landscapes, localities, places, buildings or structures of aesthetic, archaeological, architectural, cultural, historical, social, recreational, scenic, scientific or other special value for present or future generations?	No	No adverse effect will generate from this project that might affect such features.
Is the project likely to affect any land, water, sites, fishing grounds, or physical or cultural resources, or interests associated with such areas, which are part of the heritage of the people of Tonga and which contribute to their well-being?	Yes	The 'Sia Heu Lupe' Reserve in Popua is close to the road that will be upgrade. It is recommended that the project will avoid any adverse activities that might affect the site.
Will the project reduce the aesthetic, recreational scientific or other environmental quality of value of a locality?	No	
Will the project affect the social and economic well-being of communities?	Yes	The project will increase the safeness and enhance the communities' preparedness and resilience to impact of climate change and disaster. It will provide employment opportunities for communities during construction phase including labourer, driver, watchmen and office assistant.
Will the project have an environmental impact upon the community, including the ecosystems associated with the community?	No	
Does the project involve the transformation of a locality?	No	
Will the project endanger any species of flora or fauna?	No	
Will the project have any long-term effects upon the environment?	No	
Will the project degrade the quality of the environment?	No	The project will repair and upgrade the existing roads in the 4 villages to provide emergency response access into higher grounds in times of

Matter to be taken into account	Yes/No/ Likely	Details/Comments
		catastrophic events.
Does the project pose a risk to the safety of the environment?	No	
Will the project curtail any beneficial use of the environment?	No	
Are there any environmental problems associated with the disposal of waste?	No	The waste generated from the project is mostly from construction phase. The remaining bitumen seal and concrete will be reused for another purposes. Leftover wooden materials will be store for recycling or dispose of at Tapuhia and/or 'Eua landfill. Drainage, side ditch, soak pit will be constructed to contain wastewater and runoff.
Does the project place an increased demand on resources that are/may be in short supply?	No	Aggregate and other materials for Tongatapu road upgrade will source from 'Ahononou Quarry, Malapo Quarry and Five Star Quarry. The Quarries in 'Eua will provide the aggregates for Tufuvai however, should the resources may be in short supply; it will be delivered from Tongatapu to 'Eua.
Will the construction or end use of the project increase the amount or duration of traffic generated?	Likely	During construction there might be increase in traffic especially for 'Eua. It is recommended that traffic control inspector must be present on-site to control traffic congestion.
Does the project have any cumulative effects with other existing/likely future activities?	No	

While the above factors must be taken into account in making a determination, the EIA Act also provides that where some matters are likely to occur to a significant degree a project must be deemed to be a major project. An assessment of the proposed development activity against these matters is detailed below.

Matter to be taken into account	Yes/No	Details/Comments
Is the project likely to result in or increase pollution of the environment?	No	Drainage and soak pit will be constructed for all 4 roads. Side ditch

Matter to be taken into account	Yes/No	Details/Comments
		will be constructed to transfer wastewater to soak pit. Waste generated during construction should be recycled or disposed of at Tapuhia and/or 'Eua landfill.
Is the project likely to result in or increase the chance of natural hazards such as soil erosion, flooding, tidal inundation, or hazardous substances?	No	
Is the project likely to result in the introduction of species of types not previously present that might adversely affect the environment and biodiversity?	No	
Does the project have features, the environmental effects of which are not certain, and the potential impact of which is such as to warrant further investigation?	No	
Is the project likely to result in the allocation or depletion of any natural and physical resources in a way or at a rate that will prevent the renewal by natural processes of the resources or will not enable an orderly transition to other materials?	No	The project requires aggregate, corals and cement for the road upgrade; however, there is abundant in Tongatapu. There seems to be abundant in 'Eua as well but if the resources are in short supply, it will be delivered from Tongatapu to 'Eua. Therefore, quarrying over this area is not likely to significantly deplete Tonga's natural resources.
Are their adequate utility services available for the activity? Consider the effect of the project on the supply of electricity, water, waste collection services, telephone or other services.	Yes	The project will connect to Tonga Power poles when electricity is required. Water will be sourced from Tonga Water Board, community water pipe line.

This project aims to increase the community preparedness and resilience to climate change impacts and disaster. The works are primarily climate proofing through repair and upgrading of existing road in Tongatapu and 'Eua. This project aligns with Tonga Strategic Development Framework II 2015-2025 Pillar 5 Outcome 5.4 *'Improved national and community resilience to the potential disruption and damage to wellbeing, growth and development from extreme natural events and climate change, including extreme weather, climate and ocean events with a particular focus on the likely increase in such events with climate change'*.

Taking into consideration the factors outlined above, it is the EIA Unit's opinion that the development activity is a **minor** project.

FORM 2: MINOR ENVIRONMENTAL IMPACT ASSESSMENT

Project ID No.: 205/2016-17, Building Permit Application No.: N/A
Name of Project: CRSP (MEIDECC) Upgrade of existing road for evacuation purposes for Tongatapu and 'Eua.
Contact Person: Tukia Lepa
Contact Number: 8857958

Conditions of Approval:

- Ensure that the waste generated during construction phase especially the cement and bitumen seal are recycled. Other wastes including wooden materials must be disposed of at Tapuhia landfill and/or 'Eua landfill.
- Drainage, side ditch and culvert must be designed according to Ministry of Infrastructure national standards.
- Ensure the 'Sia Heu Lupe' will not be affected by any activities associated with this project especially the road upgrade in Popua.

EIA MINOR
APPROVED
Date: 14/2/17
Date:

This is to confirm that all required information has been lodged in accordance to the requirements of the Act.

Signature:

MEIDECC TONGA

Print Name: Paula Ma'u
Determining Authority: Chief Executive Officer for Meteorology, Energy, Information, Disaster Management Environment Climate Change & Communication (MEIDECC).

C. Annex 3 List of Interviewees

POPUA	**TUFUVAI & ANGAHA**
Tu'ipulotu 'Ulupano	Makaleohiva Feleti
Pulonga Iki	Siope Lonitenisi
Sione Savieti	Navuso Fifita
Lopeti Vaiangina	Paula Toli
Mele 'Otunuku	Kaili Ma'ake
Daphney Vea	Malia Vetekina
Siua Funaki	Lolini Toki
Sione Longani	Finau Siua
Kulukona Taufia	Vesesio tatafu
Salote Kava	Esinio masila
TALAFO'OU	**NAVUTOKA**
Tevita Potesio	Simi Siliva
Tavite Tangifua	'Ana Tufui
Siafa Fungavai	Lofia Nau
Siosiua Tui	Keneti Toluta'u
Loleini Teisina	Pesi Taukolonga
Lavoni Tuavao	Lesieli Teputepu
Sikauti Puafisi	Petilosa Faleta
Lea'aetafe Fekau	Tukuafu Lepa
Laiti Pita	Uatesoni Filikitonga
Losa Poteki	Sione Tu'ikolovatu

D. Annex 4 Photos of Public Consultation

1. POPUA










2. NAVUTOKA

SIMI SILIVA

ANA TUFUI KILOAMATANGI

LOFIA NAU

PESI TAUKOLONGA

PETILOSA FALETA

TUKUAFU LEPA

UATESONI FILIKITONNGA

SINISIA LUI

Lesieli Teputepu

3. TALAFO'OU

SIOSIUA TUI

SIAFA FUNGAVAI

LOLEINI TEISINA

LAVONI TUAVAO

LAITI PITA

SIKAUTI PUAFISI

TEVITA TAFENGATOTO

LOSA POTEKI

LEA'AETAFEA FEKAU

TEVITA POTESI

4. TUFUVAI

District Officer, Sisifa Fili

Tukia lead men group

Ese lead women group

Paula Toli

Kaili Ma'ake

Malia Vetekina

Lolini Toki

Finau Sini

Esinio Masila

Siosifa Keuli Latu

Eneti Mafi

Fakalelu Ma'ake