

Initial Environmental Examination

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Samoa: Central Cross Island Road Upgrading Project Preliminary Environmental Assessment Report

Prepared by the Land Transport Authority

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Abbreviations

ADB	Asian Development Bank
BOQ	Bill of Quantities
CEMP	Construction environmental management plan
CSC	Construction supervision consultant
CSS	Country safeguards system
COEP	Code of Environmental Practice (of Samoa, 2007)
DBST	Double Bitumen Surface Treatment
DCA	Development Consent Application
EIA	Environmental impact assessment
EMP	Environmental management plan
ENSO	El Niño-Southern Oscillation
EOO	Extent of occurrence
EPC	Electric Power Corporation
ERAP	Enhanced Road Access Project (World Bank financed project)
ERP	Emergency response plan (part of CEMP)
ESCP	Erosion and sediment control plan (part of CEMP)
ESO	Environment and safety officer (of the contractor)
GRC	Grievance Redress Committee
GRM	Grievance redress mechanism
IBA	Important bird area
IEE	Initial Environmental Examination
IES	International environmental specialist (in the CSC team)
IUCN	International Union for Conservation of Nature
KBA	Key biodiversity area
LTA	Land Transport Authority
MNRE	Ministry of Natural Resources and Environment
MWTI	Ministry of Works Transport and Infrastructure
NES	National environmental specialist (in the CSC team)
PPE	Personal protection equipment
PUMA	Planning and Urban Management Agency
SCU	Sector Coordination Unit
SPS	Safeguard Policy Statement 2009 (of the ADB)
SO	Safeguards Officer (in TISCD)
SWA	Samoa Water Authority
TMP	Traffic Management Plan
TOR	Terms of Reference
TISCD	Transport Infrastructure Sector Coordination Division (within MWTI)
WB	World Bank
WHO	World Health Organisation
WMP	Waste management plan (as part of the CEMP)
WST	Samoa Tala (currency)

Executive Summary

Background. The Government of Samoa (the government) is implementing a program to strengthen the safe access and resilience of its roads and bridges by reconstructing the most critical transportation links to higher standards so that they can better withstand the impact of climate change and extreme weather events. The Enhanced Road Access Project (ERAP) formed part of this program with funding from the World Bank and the Government of Australia. The Cross Central Island Road Upgrading Project (the project) was identified as a critical component and will be financed by the Asian Development Bank (ADB). Project preparation includes consultancy services to survey, design, feasibility study including undertaking and reporting on safeguards due diligence and preparing civil works bidding documents for an enhanced and more sustainable Central Cross Island Road between Apia and Siumu.

Project description. The Central Cross Island Road has not been repaved for many years although some sections have recently received emergency repairs. The upgrade will be completed by: (i) improvement, road widening and upgrading along the existing alignment following international best practices and quality standards; (ii) providing wider traffic lanes, with sealed hard shoulders and / or sidewalks in villages; (iii) clearing and improvement of culverts; (iv) installing a higher capacity drainage system along the corridor; (v) fine tuning alignment by widening curves; and (vi) introducing new road marking, signage, safety barriers and traffic calming measures to improve road safety. The project covers a stretch of approximately 20 km of the Central Cross Island Road.

The project will finance: (i) the upgrade of about 20 kilometers (km) of national road featuring climate proofing considerations, innovative technologies, road safety and gender-inclusive elements, (ii) 3-year routine maintenance commencing immediately after the physical completion of the road upgrade with gender-inclusive elements; and (iii) a gender-sensitive capacity strengthening for the road subsector. The project is estimated to cost \$50 million. The project commences (KM 0+000) on the northern side of the Ififi Street intersection in the outskirts of Apia and progresses southwards across the central highlands of Upolu to the Central Cross Island Road and project upgrading end point at the intersection with the South Coast Road in Siumu (KM 19+686).

Implementation arrangements. The executing agency will be the MOF and the implementing agencies will be the MWTI, LTA and MNRE. The MOF will provide overall oversight, monitoring and reporting role through its Centralized Technical Services Support Unit (CTSSU) and maintain the advance account for the disbursements from the Grant. The LTA will undertake the day-to-day project management in accordance with ADB's relevant guidelines. The overall project coordination will be provided by MWTI's Transport and Infrastructure Sector Coordination Division (TISCD). The LTA will be supported by a construction supervision consultant (CSC).

Policy, legal and administrative framework. The project will comply with requirements of the Planning and Urban Management Act 2004 and Planning and Urban Management (Environmental Impact Assessment) Regulations 2007 which require that for all developments a development consent must be obtained from PUMA. The development consent application shall be in accordance with the EIA Regulations 2007 and for the project will include this preliminary environmental assessment report (PEAR). There are also requirements under the Codes of Environmental Practice (COEP) that apply to the project. The project will also comply with the requirements of ADB Safeguard Policy Statement 2009 (SPS) which amongst other things requires compliance with the World Bank Group's Environmental Health and Safety Guidelines (EHSG). The development consent (and other permits) must be obtained before any works commence.

Safeguards. The project is determined as category B for environment in accordance with the SPS because the potential adverse environmental impacts are site-specific, few if any of them are irreversible, and mitigation measures can be designed readily to ensure potential impacts are avoided or minimised to acceptable levels. An initial environmental examination was carried out in 2017 and has been updated as this PEAR in 2018 and 2019. The project will be designed and implemented in compliance with the country safeguards system and ADB Safeguard Policy Statement 2009 (SPS). This preliminary environmental

assessment report (PEAR), as equivalent to an initial environmental examination as required under SPS, has been prepared.

Critical habitat. Some 7 km of the Central Cross Island Road between km 2+000 and km 9+000 passes through the Apia Catchments key biodiversity area (KBA). The KBA is also an important bird area and the steeper slopes and gullies further inland still vegetated with undisturbed forest are known as habitat for the Tooth-billed Pidgeon and/or the Ma'oma'o; two birds included on the IUCN Red List. Such non-degraded areas of forest may be classified as critical habitat for the Tooth-billed Pidgeon and/or the Ma'oma'o based on their habitat preferences, breeding requirements and habitat quality. The existing road and proposed project upgrading (construction limit-of-works) does not impinge on any areas of non-degraded or undisturbed forest. The degraded vegetative zone between the road corridor and the non-degraded forest may have habitat values but do not satisfy the criteria for critical habitat. A critical habitat assessment was undertaken to determine if the project is situated in critical habitat. The assessment identified that criteria for critical habitat are triggered; criteria 1 and 2 – critically endangered and/or endangered species (five species including two skink, one snail and two birds) and endemic and/or restricted-range species (five bird species), and criterion 6: internationally and/or nationally recognised areas.

The road upgrading will include works within a 16m wide right-of-way rather than the standard 22m right-of-way and this will minimise risks posed by project related activities to any areas flanking the corridor that may hold some residual habitat value for endangered species. Construction activities and works will be entirely confined to the footprint of the existing road right-of-way, within which the habitat values are already severely degraded due to the influence of urban development and the existing road. In addition, due to the influence of the land uses that have been developed around the road, the habitat values in a 50m wide corridor either side of road are also degraded. Provisions have been included in the EMP to ensure that all lesser impacts originating from project related activities are mitigated to achieve at least no net loss of biodiversity (i.e. not actual harm, nor loss or degradation of habitat) relating to either species.

Anticipated impacts. Mitigation measures, compliance and environmental monitoring and reporting, and capacity development are required to ensure that safeguards are properly implemented during design, construction and operational phases. The main issues relate to planning and design of the road surface, roadside drainage and control of construction impacts such as spoil and waste disposal, extraction of construction materials, water quality impacts, health and safety concerns, traffic interruption, re-provisioning of utilities and irrigation, noise and dust during construction. The main environmental and social issue identified by the PEAR and the proposed mitigation measures are summarised in the table below. A full description of the impacts and required mitigation measures are provided in the EMP section of the PEAR.

Table ES1: Summary of impact and mitigation measures for various phases of the project

Project activities	Environmental impact	Mitigation measures (in addition to COEP)
Pre-construction impacts		
Climate change adaptation	Increased erosion and damage to road infrastructure	Climate change adaptation measures incorporated into the design are implemented
contractor CEMP prepared	All foreseeable impacts, based on construction methodology and approach, captured in CEMP	LTA and CSC to review and approve CEMP; as a minimum ensure all issues in EMP Section of the PEAR are addressed
Check on suitability, quantities and legitimacy of material sources	Project complies with national and ADB requirements	LTA and CSC to check the suitability, quantities and legitimacy of material suppliers proposed by contractor. All sources used for the project must have current development consent (and other permits as required)
Construction – impacts on physical environment		

Project activities	Environmental impact	Mitigation measures (in addition to COEP)
Clearing, grubbing, cut/fill	Soil erosion and silt generation and sediment laden run-off	Sediment control measures included in CEMP based on guidance in PEAR. Erosion and sediment control plan (ESCP) to be prepared as part of CEMP.
Sourcing of materials	Sourcing from unauthorized quarries	Only LTA approved and MNRE consented quarries to be used by contractor (either existing or new)
River flow and drainage	Alterations to river flow	Maintenance of structures to ensure river debris does not collect and result in scour
Works adjacent to rivers and streams	Erosion and turbidity of river waters due to site runoff	Discharge and emissions reducing measures included in CEMP based on guidance in PEAR (EMP Section)
	River/stream bank stability and erosion issues	Bank protection and stabilization measures identified in site-specific plan as part of CEMP
Run-off, discharges	Loss of soils and other forms of erosion	Maintenance of erosion control structures, preventing debris build-up and ensuring good vegetation cover
	Impacts on water quality	ESCP to be prepared as part of CEMP
Spoil disposal	Impacts water courses	ESCP to be prepared as part of CEMP. Spoil disposal measures included in CEMP based on guidance in PEAR (EMP section)
Hazardous materials	Chemicals are spilled into the environment	Hazardous materials management plan (HMMP) and emergency response plan (ERP) shall be prepared as part of the CEMP
Operation of construction plant	Emission of exhaust from vehicles and machinery	Emissions-reducing measures included in CEMP based on guidance in PEAR (EMP section). Dust control (including watering schedule) to be elaborated in CEMP
Routine maintenance	Constriction of water flows through structures blocking water flow	Maintenance of structures to ensure debris does not collect and result in damage to culverts and drainage structures, or to the road pavement structure.
Construction – impacts on biological environment		
Site clearance, site establishment, excavations.	Loss of vegetation	Vegetation and tree removal plan to be developed by the contractor and approved by the CSC. Any trees/vegetation to be removed marked with paint or tap, strict adherence to plan
Surveying of centre-line	Minor loss of vegetation during demarcation	As above
Spoil disposal	Impacts habitats	Erosion and sediment control plan (ESCP) to be prepared as part of CEMP. Spoil disposal measures included in CEMP based on guidance in PEAR (EMP section)
Encroachment into KBA	Impacts on terrestrial habitats	Specialist recruited for fauna relocation (as required) and monitoring. Construction workers will be informed about need for environmental protection based on guidance in PEAR (EMP section). The CEMP will include prohibitions, penalties and sanctions for violations by construction workers.
Construction – impacts on socio-economic environment		
Site clearance, site establishment, excavations	Discovery of physical and cultural resources	contractor's CEMP to include a chance finds procedure
Equipment and plant	Worker health and safety risks	contractor to employ a suitably qualified environment and safety officer (ESO). LTA also have a safeguards officer and the CSC will include environmental specialists.
Mobilization of contractor and presence of workers	Social disruption	Village protocols included in CEMP based on guidance in PEAR (EMP section). Labour influx management plan to be included in CEMP. Code of conduct/protocols discussed and agreed. ESO to address to liaise with the LTA and village leaders within the project area
Presence of workers/additional people in the area	Exposure to emergency and/or disaster risk if evacuation procedures are not known	Emergency response plan to be linked with health and safety plan as part of the CEMP
Materials haulage, vehicles and equipment in villages	Traffic and pedestrian safety issues	contractor's CEMP to include a traffic management plan based on guidance in PEAR (EMP section). TMP to also address haulage routes and times etc

Project activities	Environmental impact	Mitigation measures (in addition to COEP)
Accidental damage to services	Interference with existing irrigation, infrastructure	Consult with service providers to minimize physical impacts to public infrastructure
Construction plant creating noise	Noise in community	Noise reducing measures included in CEMP based on guidance in PEAR (EMP section)
Encroachment into cultural sites	Impacts cultural property sites	contractor's CEMP to include a chance finds procedure based on guidance in PEAR (EMP section)
Use of water and electricity supplies	Stress on resources and existing infrastructure	Site office and works yard located in areas well supplied with infrastructure and services
Accidents and safety hazards	Risks to worker and community health and safety	CEMP to include health and safety plan detailing measures to protect workers and community. Approved service provider to be recruited to deliver communicable diseases (including STI and HIV) awareness and prevention
Operation – impacts on environment		
Vehicles creating emissions	Air pollution	Forecasts of traffic indicate that emissions will not have a noticeable change in air quality
Increased traffic	Road safety issues	General safety will be improved through implementation of measures based on guidance in PEAR (EMP section)
	Potential impacts on Red List fauna through KBA section	Speed limits and speed reduction measures (such as speed humps) to reduce risk of fauna road kill
Spread of communicable diseases	Roads act as pathway for spread of communicable diseases including HIV and STI	At expected traffic volumes, risk of spread of such diseases are not expected. Risk further reduced by 'island' and no road connections to international borders
Any other	Unintended or unanticipated impacts	As required to avoid or reduce effects or impacts

Environmental management. To ensure these impacts are readily mitigated and managed, the bid and contract documentation will include the PEAR and its environmental management plan (EMP) updated based on detailed design and require that the contractors are responsible for the implementation of mitigation measures. The methods and measures that each contractor proposes to implement will be documented in a construction EMP (CEMP) which will be reviewed and approved by LTA and CSC. The CEMP will be based on the updated EMP and will detail the construction methodology and approach to the main construction elements, risk assessment and mitigation measures. The CEMP will include detailed site-specific plans and sub-plans as required to describe each contractor's approach to the works and proposed actions to address the following issues and impact channels: (i) waste management and spoil disposal; (ii) vegetation and tree removal and replanting; (iii) utilities, irrigation and telecommunications re-provisioning; (iv) temporary drainage; (v) extraction and haulage of construction materials and management; (vi) runoff control and excavation protection; (vii) noise and dust control; (viii) temporary traffic management; (ix) worker and public health and safety; (x) code of conduct/social protocols; and (xi) training and awareness for staff. The CEMP will clearly set out the organizational arrangements and responsibilities for implementation of the approved CEMP and will establish how the contractor will implement the relevant parts of the grievance redress mechanism (GRM) and project's communication and consultation plan.

Consultation. Public consultation was undertaken during the Enhanced Road Access Project and again during preparation of this PEAR. The public consultation was conducted in line with the findings and recommendations described in the project's rapid gender assessment, to capture gender specific issues that may have been missed during previous rounds of consultation. The stakeholder consultation process disseminated information to all key stakeholders including the general public and the authorities through meetings and surveys along the project corridor.

Information was provided on the scale and scope of the project works and the expected impacts and the proposed mitigation measures through meetings and surveys. The process also gathered information on

relevant concerns of the local community relating to the project implementation stages. The LTA will continue to implement the project's communication and consultation plan.

Grievance redress. A grievance redresses mechanism (GRM) will be established can help resolve issues associated with the project. The GRM will receive, evaluate and facilitate the resolution of affected people's concerns, complaints and grievances about the environmental and social performance of the Project. Resolution of these issues and concerns will be undertaken expeditiously and according to the procedures of the GRM. The complaints/issues registry maintained at the site project office and by the contractor will be subject to monitoring. The GRM will aim to provide an accessible, time-bound and transparent mechanism for the affected persons to voice and resolve social and environmental concerns linked to the Project.

Conclusions. With the development and implementation of the CEMP as described in this PEAR and required as part of the contract the environmental related impacts from the construction phase will be appropriately managed. Of greater concern are the safety aspects of the road during construction, as there are many schools, churches and residences located in the urban part of the road. The development and implementation of the health and safety plan and traffic management plan will serve to minimise the risk to public safety.

The operation of the upgraded Central Cross Island Road should have beneficial effects on the surrounding environment overall. The improvement of the road will allow more efficient travel and improved traffic flow. The improvement of crossing drains will reduce the chances of erosion due to uncontrolled run-off. The smoother asphalt pavement and improved road side gutters and drainage can be expected to reduce noise and the accumulation of road side dust and therefore air pollution from noise and disturbed dust should also be reduced. The installation of traffic calming measures, new signage, safety barriers, dedicated bus stops and pedestrian walkways will improve the safety of the road and help to reduce risk of fauna roadkill.

1 Introduction

1.1 Background

Location. Samoa is a Pacific island country comprising two main islands of Upolu and Savai'i by the Apolima Strait and two minor outer islands (Figure 1.1). Samoa is bordered to the east by American Samoa, Tonga to the south, Tuvalu and Kiribati to the north, and Fiji to the west. The geographic coordinates are 13:35° south, 172:20° west. About 70% of the population live on Upolu, the main island and the location of the capital, Apia, the main commercial and government centre.

Figure 1.1: Location of Samoa, Apia and the project road



Introduction to the Project. The Central Cross Island Road Upgrade Project (the project) was identified as an important element of the Enhanced Road Access Project (ERAP), a program implemented by the Government of Samoa (the government) with support from a grant from the International Development Association of the World Bank Group and co-financed by the Government of Australia in 2015. However, on completion of that program, the design and implementation of the project was not finalized. The Asian Development Bank (ADB) has financed the design of the project and will provide financing to the government for project implementation. The project is estimated to cost \$40.4 million.

Implementation arrangements. The Ministry of Finance (MOF) is the executing agency and the Land Transport Authority (LTA) is the implementing agency. While the LTA will lead and oversee implementation of the project, the Transport Infrastructure Sector Coordination Division (TISCD) of Ministry of Works, Transport and Infrastructure (MWTI) will lead the coordination and monitoring of the overall project. A Project Coordination Committee within the LTA will oversee a Sector Coordination Unit (SCU) to be established in the MWTI to coordinate all project activities. The LTA will be supported by a construction supervision consultant (CSC).

Safeguards. The project will be designed and implemented according the laws and regulations that make up the country safeguard system (CSS) and the requirements of the Safeguard Policy Statement 2009 (SPS) of ADB. The project has been screened and determined as category B for environment as per the SPS because the potential adverse environmental impacts are determined to be site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. This is consistent with the categorization of similar previous road and bridge projects carried out in Samoa, including the ERAP and Second Infrastructure Asset Management Project.

According to the SPS, category B projects require an environmental assessment to the level of initial environmental examination, including an environmental management plan (EMP). This preliminary environmental assessment report (PEAR) prepared in accordance with Samoan environmental law is equivalent to an initial environmental examination and will be considered as such for this project. The ADB has agreed to accept the national equivalent of an initial environmental examination, a PEAR, provided it conforms to both CSS and SPS requirements.

1.2 Rationale and Justification for the Project

1.2.1 National Context

Samoa's road network plays a vital role in the country's social and economic development by linking regional centres and rural areas with the main urban hubs, supporting trade and commercial activity through the movement of goods and services and providing access to social services such as education and health.

The road network faces a range of vulnerability issues, specifically: (i) coastal exposure to sea-level rise, storm surge, wave action during cyclones and tsunamis; (ii) inland flooding and landslips during extreme rainfall events; (iii) damage from earthquakes; and (iv) accelerated pavement deterioration due to extreme weather and rising water tables in some locations.

Samoa's road network has, in the past, been subjected to damage and deterioration from a range of natural and climatic factors including:

- Flooding of inland low-lying areas;
- Increasing instability and the risk of landslips during extreme rainfall events;
- Coastal erosion from sea-level rise, storm surge, and wave action during cyclones and tsunamis;
- Earthquakes; and
- Premature pavement failure due to the above factors, extreme weather and rising water tables.

Tropical Cyclone Evan struck Samoa in December 2012. It caused an estimated Samoan Tala (WST) 235.7 million (approx. US\$103.3 million) in damage to physical assets across all economic and social sectors. It is estimated that Tropical Cyclone Evan inflicted about WST 88.35 million (approx. US\$40.16 million) in damage and losses to the transport sector, as well as most of the country's networks of roads and bridges. The 2012 Post-Disaster Needs Assessment documented the high degree of damage, for example 600 homes damaged and about 4,000 people displaced.

Major roads and bridges were also damaged, which negatively affected the mobility of people and movement of goods around and between the islands of Upolu and Savaii. The cyclone severely damaged the Central Cross Island Road, one of the main economic arteries on Upolu island. In the light of this recent natural disaster, the government as part of its overall transport priorities, is implementing an ambitious program to climate change proof its roads and bridges by upgrading the most critical transportation links to higher standards. The ERAP forms part of this program.

The government considers developing a reliable and climate-resilient transportation infrastructure to be essential to sustaining economic growth and contributing to the overall objective of ending poverty and boosting shared prosperity. This proposal to upgrade/rehabilitate the Central Cross Island Road as part of the ERAP, is aimed at supporting the government's objectives of improved access and reducing poverty levels noted to be concentrated in rural areas as well as improving the climate resilience of the road.

1.2.2 Local Context

The current condition of the road varies with some sections of tar seal experiencing significant deterioration. Various temporary repairs have been undertaken along critical stretches of the road, providing a band aid solution that has enabled functionality of busy sections. The road serves as the main thoroughfare between Apia town and the South Coast of Upolu including:

- A rapidly extending residential and small business area which covers approximately five kilometres of the road out of Apia;
- A shorter more convenient route for residents along the South Coast to access the main service hub of Apia as well as essential services such as the islands only hospital as well as secondary and tertiary schooling;
- It provides a convenient transport route for women to take small amounts of produce from the Southern side of the island to sell in the Apia markets, carried on the Cross Island Road buses;
- Convenient access to and from tourism resorts on the Southern side of the island; and
- Access to a few scattered farms and traditional owner residences along the stretch of the road once past the main urban segments.

The project seeks to improve the climate resilience and safety of the road. The proposed project will also improve commerce along the road, facilitating access to places of work and markets; and improve road safety with the installation of design improvements and traffic calming measures.

1.2.3 Impact and Outcome of the Project

The project is well aligned with government's Transport Sector Plan 2014-2019 which emphasizes improved, sustained, and climate proofed road transport network and improved sector governance. Hence, the project will finance road upgrading activities to improve the Central Cross Island Road that will contribute to a more resilient and safer road network. The rationale and approach to the project and composition of its outputs have been agreed by the government.

The project will finance: (i) upgrading of about 20 km of national road with climate proofing considerations, incorporating innovative technologies, road safety and gender inclusive elements;¹ (ii) 3-year routine maintenance of the upgraded road commencing immediately after the physical completion of the road upgrading with gender inclusive elements; and (iii) capacity strengthening for the road subsector, complementing World Bank's initiatives. In delivering these outputs, key consideration is to ensure that capacity building efforts by the World Bank are utilized and supplemented where necessary. The government requested that, to efficiently manage all sector projects including ADB projects and further support to sector coordination efforts, the project could finance the national personnel to provide additional support to the government. The following four personnel (procurement, safeguards, financial management and monitoring and evaluation) will be provided to the TISCD of the MWTI.

1.3 Analysis of Alternatives

1.3.1 No Action

The without project or no action option means Central Cross Island Road will remain as it is and will only undergo regular maintenance, mainly patching of potholes. Without proper drainage, and with project increased rainfall intensities resulting from climate change, the road pavement will suffer faster deterioration and possible breach and with the poor quality of repair work, riding comfort and safety is compromised. As noted during the road survey, the deterioration of the road is more pronounced in sections where water accumulates due to poor or absence of drainage. Without properly designed drainage, run-off will remain to cause problems to road side residents. Without the upgrade, the road will remain at its present width and without widening and upgrade, motorists' and pedestrian safety is compromised with risk increasing with time as more vehicles get on the road. This situation is more pronounced at the first 3-4 km, the section within the built-up area where traffic volume is higher. Although repair by patching of cracks and potholes is frequently undertaken, the quality of repair is inadequate.

1.3.2 Alternative Routes

A viable alternative route does not exist without construction of a completely new road which would entail a long -lead time for development and approvals and likelihood of significant delays due to the large areas of land acquisition required. Upgrading of the existing route can be undertaken without major land acquisition and is the route considered early in the planning phase; as designated by the government. An alternative route will not contribute to the economic and social development of the communities in the existing road corridor. An alternative route would mean effectively abandoning the existing road linking the villages along it which would then not benefit from economic development related to trade growth along an improved road.

1.3.3 Alternative Modes of Transport

Alternative transport modes are not viable at this stage and the infrastructure for rail, air or sea travel is not sufficiently developed. An alternative transport mode for local and effectively 'short-haul' traffic and transport would not be in line with economic and social development objectives established in the current Transport Sector Plan. Passenger transport already exists (buses and taxis) along the route. The proposed project is preferred based on economic, environmental, financial, and social factors. Considering strategic, environmental, social, economic and financial factors, there are no practical modes to be considered as alternatives to the proposed project.

¹ A section of about 3.7 km upgraded by LTA after Tropical Cyclone Evan in 2012 is excluded from the project scope.

1.3.4 Design Alternatives

The existing road corridor consists of a paved road with swales/open drains either side with no pedestrian footpaths (Figure 1.2). The sections of the Central Cross Island Road upgraded under this project will benefit from a slightly wider right-of-way, improved drainage and utility placement, and the provision of dedicated pedestrian walk ways in populated areas. The road alignment in the upgraded sections will remain mostly as is, adjusted in some sections to improve alignment and sight lines, minimize land acquisition, avoid structures, minimize removal of trees and improve road safety.

Figure 1.2: Existing and proposed profile of right-of-way



Three road corridor widths were considered for the upgrading. The Samoan road standards allow for a right-of-way of up to 22m wide; three designs utilising rights-of-way of 13m, 16m and 20m were considered (Figure 1.3:). The three rights-of-way considered entail different scales of land acquisition requirements (Table 1.1).

Table 1.1: Land acquisition requirements of rights-of-way

Right-of way option	Area of land acquisition (m ²)
1 – 13m	2,000
2 – 16m	4,500
3 – 20m	10,400

Figure 1.3: Option 1 – 13 m wide right-of-way

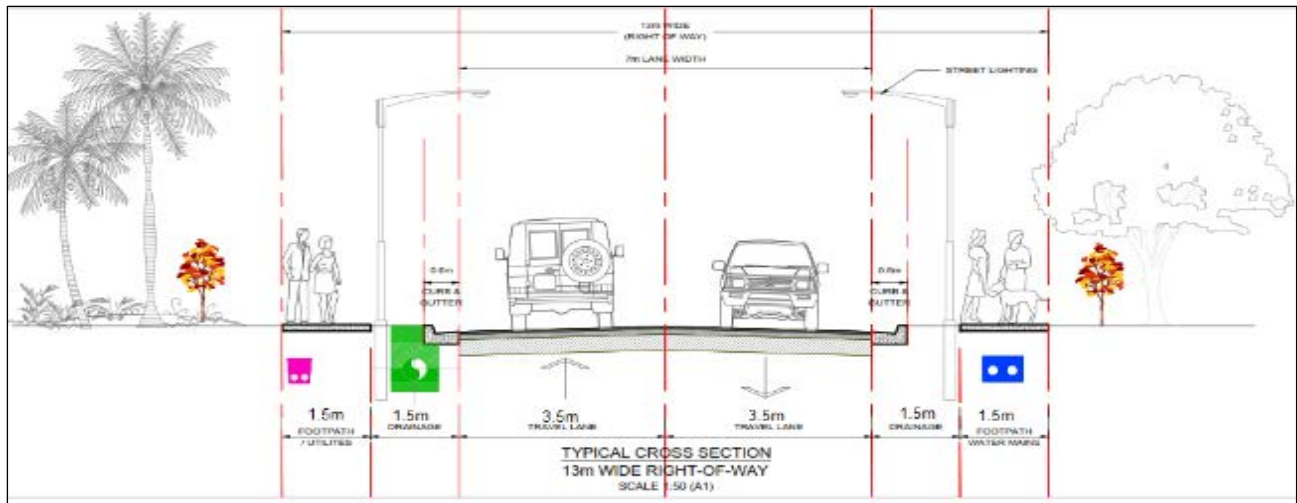


Figure 1.4: Option 2 – 16 m wide right-of-way

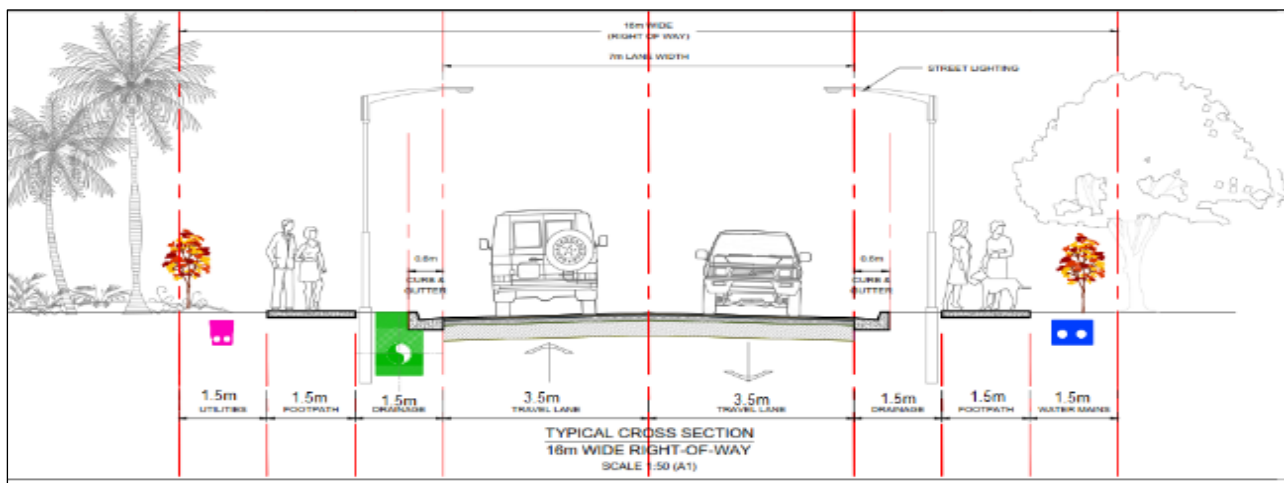
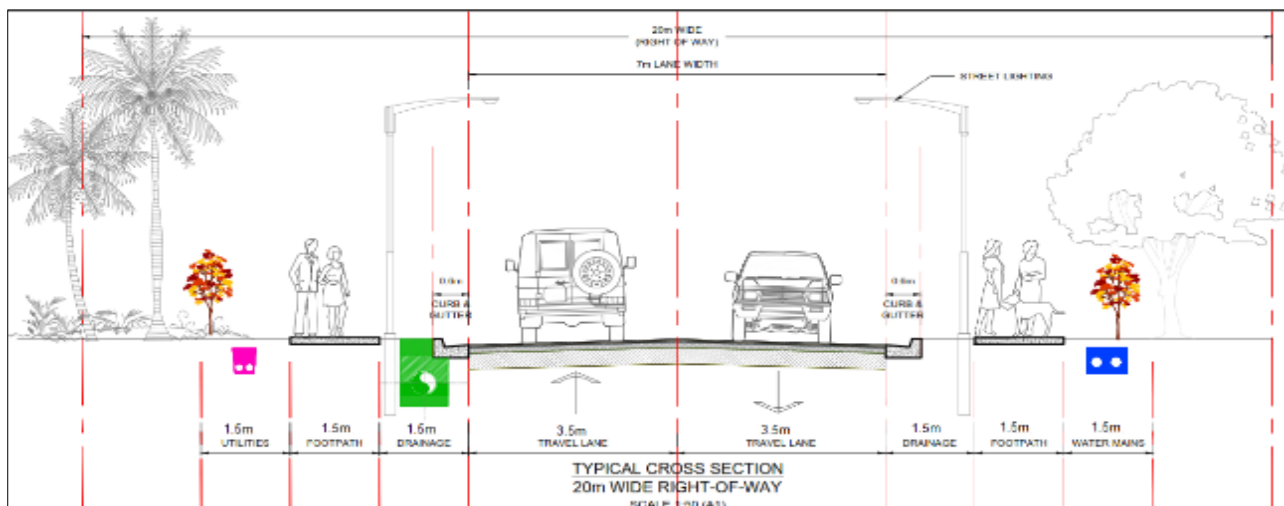


Figure 1.5: Option 3 - 20 m wide right-of-way



The preferred right-of-way width for the sections of the Central Cross Island Road to be upgraded under the project was determined by striking a compromise between minimising land acquisition and vegetation removal whilst optimising road safety, drainage and placement of utilities. The proposed alignment consists of variable widths of right-of-way (between 13m and 16m) depending on the constraints of a specific section (typically the right-of-way is more constrained in the urban sections and less so in the rural sections). The preferred right-of-way is 16 m, as this is deemed to provide the maximum benefits in terms of road safety and placement of utilities, whilst minimising land acquisition and vegetation removal.

1.4 Preliminary Environmental Assessment Report

The preparation of this PEAR entailed the following activities and methods:

- Review of project documents, including: Inception Report; Draft PEAR developed for the World Bank in 2016 under the ERAP; LTA Public Consultation Report; Preliminary Road Design.
- Collection and review of secondary information on the social and environmental setting of the country, Upolu Island and project corridor data. References used include: MNRE's report on status of the environment; reports to the Convention on Conservation of Biological Diversity; the 2016 Socio-Economic Atlas of Samoa; PEARS and IEEs for other proposals funded by World Bank and ADB among others; and the IUCN Red List of Threatened Species.
- Site inspection for mapping, observation and photo documentation with the aid of a tablet-based application for GIS, mapping and navigation; and
- Informal interview of stakeholders was also carried out.

This PEAR is organised in accordance with the guidelines included in the Planning and Urban Management (Environmental Impact Assessment) Regulations (2007) including sections which cover: introduction including justification of the proposed development and analysis of alternatives; policy and legal framework; description of the proposed development; description of the area to be affected; environmental impacts; consultations; mitigation measures, and conclusion and recommendations.

2 Policy and Legal Context

This section provides a brief overview of the specific policies, and administrative and institutional frameworks in relation to environmental and social safeguards applicable to the preparation and implementation of the project.

2.1 Country Safeguards System

The country safeguards system (CSS) includes the Constitution enacted in 1960 and other laws and regulations. The country has a unique system of governance, blending a parliamentary government structure, comprised of the legislature (parliament or 'Fono'), Executive (cabinet and prime minister) and the judiciary, with the fa'amatai customary system in which traditional matai (leaders of extended families with chiefly status) are elected to serve in Parliament.

The country is divided into sixteen divisions and 43 districts and one urban area (Apia) across the islands of Upolu and Savai'i. The Fono o Matai (village councils) attend to civil matters at the village level, a role recognized under the Village Fono Act 1990. The government representative in each village is called the Sui o le Malo. At the household level, matai administers customary land on behalf of the extended family.

The key legislative instruments relevant to project activities and environmental and social safeguards in the CSS include:

- Lands, Surveys and Environment Act 1989;
- Planning and Urban Management Act PUMA 2004;
- Planning and Urban Management (Environment Impact Assessment) Regulations 2007;
- Planning and Urban Management (Development Consent and Fees) Regulation 2008;
- Samoa Codes of Environmental Practice 2007;
- Land Transport Authority Act 2007;
- National Parks and Reserves Act 1974;
- Waste Management Act 2010;
- Samoa Occupational Safety and Health Act 2002;
- Samoa Occupational Safety and Health Regulation 2017;
- Quarantine (Biosecurity) Act 2005
- Pesticides Regulations 2011
- Samoa Antiquities Ordinance 1954;
- Village Fono Act 1990;
- Taking of Land Act 1964; and
- Alienation of Freehold Land Act 1972; and
- Alienation of Customary Land Act 1965.

2.1.1 Environmental Protection and Assessment

The Lands, Surveys and Environment Act 1989 establishes the principal functions of the Ministry of Natural Resources and Environment (MNRE) which include advising the Minister on all aspects of environmental management and conservation. The key functions of MNRE include reviewing and advising on the potential environmental impact of a public or private development proposal and advocate for environmental conservation.

The MNRE is responsible for environmental protection and management in Samoa. MNRE comprises ten divisions including the Land Registry, Planning and Urban Management Agency (PUMA), Meteorology Office and Division of Environment and Conservation (DCE).²

The PUMA is the lead agency for development approvals and environmental management of new developments. It administers the Planning and Urban Management Act 2004 and Planning and Urban Management (Environmental Impact Assessment) Regulations 2007. PUMA has a dual role: (i) defining the requirements of environmental impact assessments (EIA) for proposed developments; and (ii) to review EIAs prepared for development activities, consider the findings and whether development consent (with or without conditions) should be issued. Specific requirements for environmental assessments are provided in the EIA Regulations 2007 and Planning and Urban Management (Development Consent and Fees) Regulations 2008.

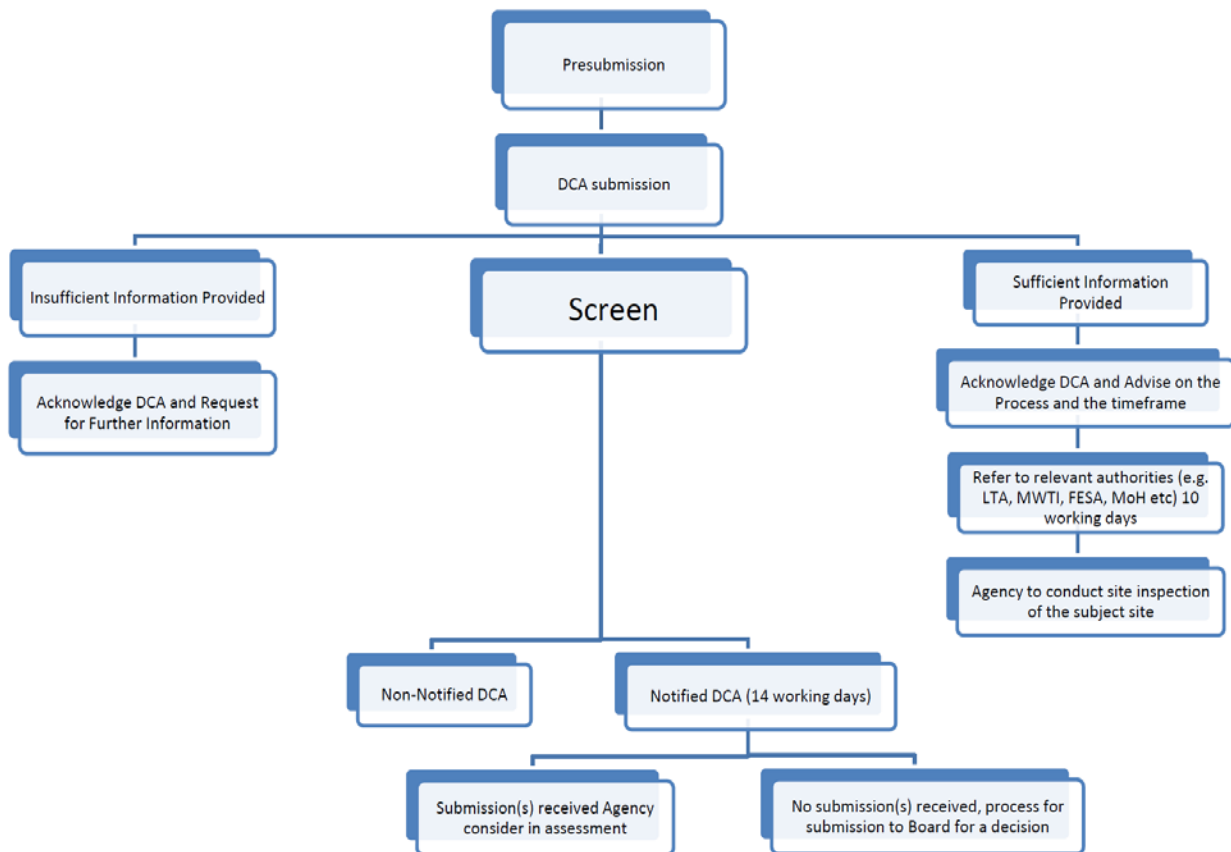
Under the EIA Regulations 2007, environmental assessments are required for any public or private development proposal that triggers qualifying criteria. Section 4 of the EIA Regulations prescribes two forms of EIA: (i) PEAR; and (ii) comprehensive environmental assessment report. A PEAR is required when PUMA considers an activity requiring consent is not likely to have a significant adverse impact on the environment. A comprehensive environmental assessment report is required when a development is likely to have a significant adverse impact on the environment. The regulations establish what level of EIA is required, the aspects that need to be included and the process for review and approval. Depending on the nature and scope of the development, either a PEAR or a comprehensive environmental assessment report is required for a development that meets the qualifying criteria. The qualifying criteria relate to potential negative impacts on people, property, places, habitats and a range of situations detailed in the regulations, including:

- Adverse impacts on people, an existing activity, building or land;
- Adverse impacts on a place, species or habitat of environmental (including social and cultural) importance;
- Adverse impacts in conjunction with natural hazard risks;
- Adverse impacts on or in the coastal zone;
- Adverse impacts on or in any waterway or aquifer;
- Adverse impacts arising from the discharge of any contaminant or environmental pollutant;
- Adverse impacts associated with land instability, coastal inundation or flooding;
- Adverse impacts on the landscape or amenity of an area;
- Adverse impacts on public infrastructure;
- Adverse impacts on traffic or transportation; and
- Any other matter for consideration stated in s46 of the Act.

Once completed, the assessment report is submitted with a development consent application including final design drawings, a site plan, certified survey plans, written consent from property owners, lease agreements, deeds of conveyance and a fee, to PUMA to be reviewed. The environmental assessment report is open for public comment before a final recommendation is made to the Planning and Urban Management Board (the Board). Projects with significant adverse impacts and projects with a value of WST 1 million or more must publish a public notice. A 28-day public notification period applies. The Board has representation of various ministries and public communities and can therefore act independently of MNRE. The Board may approve the application, decline it or approve it with conditions. Once development consent for buildings and infrastructure is granted, a building permit from the MWTI is required. The development consent process is summarized in Figure 2.1:

² DEC comprises five units including terrestrial biodiversity conservation; marine biodiversity conservation; solid waste management; chemical and hazardous substances management; and national parks and reserves management.

Figure 2.1: Development consent process



Source: PUMA

2.1.2 Codes of Environmental Practice

The Codes of Environmental Practice (COEP) present methods and procedures to be followed for the avoidance or mitigation of adverse environmental effects that may arise from infrastructure projects or maintenance work. PUMA personnel monitor the implementation of these COEP and specific development controls through development consent conditions. All other authorities monitor the implementation of the COEP through normal contract administration procedures. The COEP was formally issued by PUMA in April 2007. The intent of the COEP is “...to define methods and/or procedures to be followed by consultants, designers and contractors for the avoidance or mitigation of adverse environmental effects that may arise out of infrastructure development projects or maintenance work.” The following is a summary of COEPs considered relevant to the project; each of the COEPs is to be read in conjunction with COEP 1 – Administrative Procedures.

COEP 2: Road Planning, Design and Construction

In general road rehabilitation or upgrading works for existing roads, and the road alignment planning, design, and associated earthworks for new roads shall:

- Avoid as far as is practicable the disturbance, and or the resettlement of, villages, or individual buildings including houses;
- Avoid areas of land, foreshore, wetlands, waterways or other areas of habitat which have been set aside for the conservation of flora and fauna, and biodiversity;

- Avoid sites of archaeological, heritage, historical, traditional, and cultural importance;
- Avoid wherever possible National Parks, eco-tourism areas, foreshore reserves, forest reserves, nature reserves, riverbank reserves, traditional reserves, water catchment reserves, wetlands, and heritage and archaeological sites;
- If road user safety is not compromised, relax specified design standards in areas of steep and heavily vegetated slopes, sensitive coastal areas, and roads which could be part of a scenic roads programme;
- Incorporate design features for the general improvement of environmental quality;
- Incorporate design features for the protection and enhancement of coastal margins and other areas that require sensitivity; and
- Incorporate measures and design features for the mitigation of adverse environmental effects.

COEP 3: Consultation

The basic principles of consultation, which should be applied to all development projects, are as follows:

- At the earliest opportunity, a community should be advised of potential projects and how the community can receive information about, and become involved with, such projects.
- The intentions/objectives of the consultation should be clearly and openly stated.
- Stakeholders and affected communities should have timely and meaningful inputs to, and participation in, any phases or aspects of projects that directly affect them and all inputs should be treated equitably and with respect.
- Consultation should be a two-way process and there should be an exchange of information where both the proponent and the affected communities should put forward their points of view and to consider other perspectives.
- Consultation is best undertaken at early stages in and throughout the decision-making process or at least on going communication after a decision has been made.
- All parties do not have to agree to a proposal, however as a result of undertaking consultation at least points of difference will become clearer or more specific.
- Project proponents must comply with the requirements of the EIA Regulations 2007 as they pertain to consultation during the environmental impact assessment process.

COEP 4: Land Acquisition and Compensation

Land acquisition shall be minimised. Where unavoidable, land acquisition shall be carried out in such a manner to minimise the adverse impacts on the affected people.

- Avoid, wherever possible, the need to relocate graves and/or burial sites. Where this cannot be avoided, such relocation shall be carried out in a manner that will minimise duress on the relatives of the deceased.
- Land acquisition and compensation issues should be clearly distinguished from labour and industrial related matters in following the procedures established in this COEP.
- Any acquisition of land shall be carried out in consultation with the people to be affected and in accordance with the project consultation strategy (as set out in COEP 3 – Consultation).

COEP 5: Construction Camps

COEP 5 provides guidelines on the selection, development, maintenance and restoration of construction campsites to avoid or mitigate against significant adverse environmental effects, both transient and permanent.

- In accordance with Part V of the Planning and Urban Management Act 2004 and any other relevant legislation, any person who engages in the development of a construction camp shall first obtain a development consent from PUMA for the proposed activity.
- Consent applications shall be on a form approved by PUMA and shall be submitted by the person undertaking the camp construction. In the case of land development, the land developer rather than the contractor or agent shall submit the application. Applications shall be made no later than one month before the proposed camp construction is scheduled to begin. Applications shall be accompanied by such other documents as PUMA may require.
- At any time during the consent process, PUMA may convene a public hearing or hearings for determining the facts on which to base a decision. Adequate notice of the hearing or hearings, adequate opportunity to appear and be heard, and adequate opportunity to provide written comment, shall be given to all interested persons.
- PUMA may, upon issuance of a consent, impose any conditions or special requirements on the camp construction as it sees fit. All such conditions and requirements shall be listed in writing by PUMA and attached to the consent.

Note: COEP 5 is not relevant to the project as specifically built construction camps or worker accommodation is not required due to availability of existing accommodations (guest houses, hotels, dormitories etc in Apia town) are included.

COEP 6: Road Construction Erosion Control

COEP 6 defines measures for the prevention of erosion of exposed earth surfaces because of road construction activities, including post construction period, and to prescribe measures to be taken to avoid erosion of channels and drainage outlets. It also prescribes measures to be taken to mitigate significant adverse effects of the discharge of water containing suspended soil particles into natural watercourses or onto land adjacent to road works.

- The planning and design of the alignment of any road project is to be undertaken to avoid, so far as is possible, the disturbance of existing vegetation and therefore minimise the implementation of erosion control measures defined in this COEP.
- To minimise the risk of water ponding adjacent to the toe of fill batters with the consequent risk of saturating fill materials with resulting batter failures, it is often necessary to construct toe drains.
- Wherever they are installed road side drains shall be designed for their purpose and shall be protected against the effects of scour. The minimum protection shall be the establishment of suitable grasses. Where flow velocities are anticipated to be high, scour protection shall be afforded by rip rap, concreted stone pitching, concrete dished channels or other equally effective protection.
- Throughout the construction period, and if necessary, the maintenance period, it is intended that the discharge of silt-laden water from construction sites to natural water courses is minimised. In ecologically sensitive areas and along any foreshore, untreated discharge must be prevented.
- To protect the surface of road shoulders against erosion from surface water flows it is necessary to surface the shoulder with non-erodible material. Such surfacing has the secondary benefit of minimising the occurrence of edge break of adjacent sealed pavements.

COEP 8: Quarry Development and Operations

COEP 8 prescribes the safety requirements for the development and operation of quarries as well as to define procedures and works that shall be used to mitigate against adverse environmental effects. COEP 8 shall be read in conjunction with COEP 13 - Earthwork.

COEP 9: Gravel Extraction

COEP 9 provides the planning and construction guidelines for the extraction of river gravels for development projects with regard for the need to avoid or mitigate adverse environmental impacts from such work. In each case a proposal to extract river gravel for a development project must be compared in terms of economic cost and environmental cost with the alternative of obtaining gravel aggregates from existing or new quarries. This COEP shall be read in conjunction with COEP 13 - Earthwork.

Note: COEP 9 is not relevant to the project as no river gravel extraction is included.

COEP 11: Drainage

COEP 11 prescribes the procedures for the design, construction and maintenance of drainage structures and drainage channels to minimise short term and long-term adverse environmental effects. This COEP shall be read in conjunction with COEP 1 – Administrative Procedures and COEP 13 - Earthwork.

COEP 12: Traffic Control During Construction

COEP 12 prescribes the methods that are to be used for the safety and control of traffic during the upgrading, reconstruction or maintenance activities on any road. This COEP shall be read in conjunction with COEP 1 - Administrative Procedures.

Note that the contractor is to prepare a traffic management plan (TMP) together with the construction EMP which shall be submitted for approval before the commencement of the works. Different sections of the Central Cross Island Road upgrading works may require special consideration given the different social and land-use environments through which the road passes, and these will need to be accounted for in the TMP.

COEP 13: Earthworks

COEP 13 provides the planning and work guidelines for earthworks activities associated with development projects; with regard for the need to avoid or mitigate adverse environmental impacts from such work.

All earthworks activities shall be conducted in accordance with this COEP and in such a way as to prevent accelerated erosion, accelerated sedimentation and disturbance of potential cultural resources. To accomplish this, all persons engaging in earthwork activities shall design, implement and maintain erosion control, sedimentation control, and cultural preservation measures which effectively prevent accelerated erosion, accelerated sedimentation and adverse impact on cultural resources.

2.1.3 Cultural Preservation

The key legislation protecting relics, antiquities and sites of historical and cultural significance in Samoa is the Samoa Antiquities Ordinance 1954. This ordinance aims to prevent the loss of national heritage treasures by export to overseas buyers but excludes botanical or mineral collections or specimens. A Heritage Policy was also passed by the Cabinet in 2002 for the sustainable management of Samoa's natural and cultural heritage sites.

On 15 January 2019 the government launched the Samoa National Culture Framework 2018-2023 which promotes and safeguards the Samoan culture through traditional and innovative means, to ensure its continuity in the future. The Framework identifies three goals—cultural heritage, cultural industries and culture in education—and for each goal a distinct policy has been developed.

In line with the Regional Culture Strategy: Investing in Pacific Cultures 2010-2020, endorsed by Pacific Ministers of Culture in 2012, the Framework aims to: identify, safeguard and maintain the country's natural and cultural heritage and infrastructure; develop cultural industries and; mainstream culture in education. The Framework also presents an implementation plan with a monitoring and evaluation framework. Importantly, the Framework ensures its linkage to the 2030 Agenda for Sustainable Development and calls for the integration of culture into existing sector plan and national development strategy.

2.1.4 Land Acquisition

There are three types of land ownership in Samoa: (i) freehold land - privately owned land and constitutes approximately 12% of land area in Samoa and it can be transferred, leased, mortgaged or otherwise; (ii) public land - land owned by the government and constitutes approximately 7% of land in Samoa by area. Public land can be leased and, in certain circumstances, transferred; and (iii) customary land - land owned by the community in accordance with traditional custom and usage. Approximately 81% of land area in Samoa is customary land.³ Customary land may be leased but may not be otherwise sold or transferred. Both Upolu and Savai'i islands have predominantly customary land ownership, which extends to the high-water mark.

Key legislation in Samoa relevant to involuntary resettlement and compulsory land acquisition includes the Taking of Land Act 1964, Alienation of Customary Land Act 1965 and the Lands, Surveys and Environment Act 1989, as well as the COEP 4 Land Acquisition and Compensation.

The Lands, Surveys and Environment Act provides for the alienation of government land, land administration and other matters such as environmental protection, wildlife conservation and coastal zones. The Minister may approve purchase of any land for public purpose (s23) or lease of government land for up to 20 years (s37). The Act also covers land allocation and the environmental management of land. Under the Act, regulations can be made to address specific issues including forest protection, regulation of various forms of land use, and biodiversity conservation.

The Taking of Land Act 1964 establishes the taking of lands for "public purposes" (i.e. alienation of freehold or customary land). Once land is identified for acquisition reasonable notice is required to be given to the owner or occupier of freehold land or the matai who has the rule over customary land. Public notice of 28 days is allowed for any objections. If no written objection is received, the Minister may then proceed to take the land by Proclamation.

Customary land cannot be alienated except by the Minister of Lands in accordance with s4 of the Alienation of Customary Lands Act 1965. The Minister is appointed by the Alienation of Customary Land Act 1965 to act for and on behalf of all beneficial owners in signing a lease for registration. The Minister may grant a lease or licence of customary land for authorized purposes (which are defined). The maximum lease in aggregate for a public, commercial, business or religious purpose is 40 years. Leases of public land and customary land are administered by MNRE and are based on standard terms.

2.1.5 Consents and Permits

In addition to a development consent under the Planning and Urban Management Act, other consents and permits could be required for the project.

Building permit. A building permit from the MWTI will be required to ensure compliance with the Building Code for Safety and Structural Integrity and verification of compliance with various utilities' requirements

Quarry permit. A quarry permit from PUMA will be required to ensure compliance with the Code of Environmental Practice (COEP) 8 – Quarry Development and Operations.

Biosecurity. Samoa Quarantine Services implements the Quarantine (Biosecurity) Act 2005 and the Pesticides Regulations 2011. Any equipment, plant and materials imported for the project will need to receive all phyto-sanitary certificates and be cleared by Samoa Quarantine Services.

³ <http://www.joneslanglasallesites.com/investmentguide>

2.1.6 International Agreements

Samoa is signatory to several international conventions and treaties of relevance to the project. Annex 1 lists the international agreements and conventions.

2.2 Safeguard Policy Statement

Objectives. In addition to complying with the requirements of the CSS, the project will also need to comply with the SPS which sets out the policies and principles for protecting the environment and people wherever possible by avoiding impacts and mitigating and/or compensating for impacts that cannot be avoided. The SPS covers environment, involuntary resettlement and indigenous peoples.

The SPS is the ADB policy in respect of the three safeguards and avoiding, minimizing or mitigating adverse impacts on people and the environment. The SPS requires the safeguard instruments prepared for investments and activities to:

- Reflect the policy objectives and relevant policy principles and safeguard requirements governing preparation and implementation of projects and/or components;
- Explain the general anticipated impacts of the project and/or components;
- Specify the requirements that will be followed for Project screening and categorization, assessment, and planning, information disclosure, meaningful consultation, and grievance redress mechanism;
- Describe implementation procedures, including budgets, institutional arrangements, and capacity development requirements;
- Specify monitoring and reporting requirements; and
- Specify the responsibilities and authorities of the borrower/client, ADB, and relevant government agencies in relation to the preparation, submission, review, and clearance of safeguard documents, and monitoring and supervision.

Screening and categorization. The SPS categorizes potential projects or activities into categories of impact (A, B, C or FI) to determine the level of environmental assessment required to address the potential impacts. The project has been classified as category B for environment because the potential adverse environmental impacts are site-specific, few if any of them are irreversible, and mitigation measures can be designed readily. The appropriate level of environmental assessment for environment category B projects is an initial environmental examination or equivalent. This PEAR has been prepared as the appropriate instrument for the project.

Health and safety. The SPS applies pollution prevention and control technologies and practices consistent with good practices as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines (EHSG). The EHSG provide the context of international best practice and contribute to establishing targets for environmental performance. Standards incorporated into the EHSG will be used in parallel with Samoan environmental standards (where they exist) throughout this document with the principals of due diligence and a precautionary approach adopted. Application of occupational and community health and safety measures, as laid out in the EHSG is required under the SPS.

3 Description of the Proposed Development

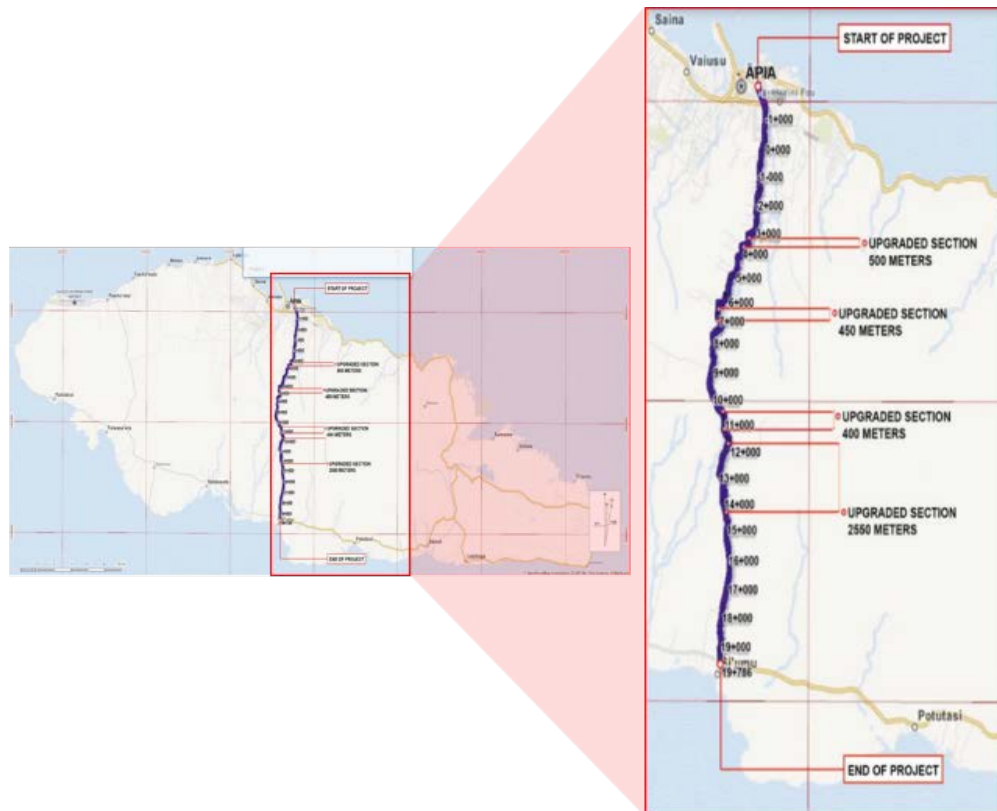
The project will upgrade the Central Cross Island Road which was among the roads damaged in December 2012 by Tropical Cyclone Evan. The project was identified as a critical component of the ERAP which had the objectives of improving access and reducing poverty levels observed to be prevalent in rural areas. The project also seeks to improve the climate resilience and safety of the road.

3.1 Project Location

The first five kilometres (km) on the Apia-end of the road is classified as semi-urban, densely populated continuous settlement that is characterized by houses, churches, schools and businesses. This segment of the road traverses several villages (such as Vailima and Vaoala) and provides access for others (Avele). While this semi-urban area with panoramic views has a large freehold land component with pockets of customary land scattered throughout, it is becoming an increasingly desirable yet costly area to reside. Approximately 15km of the road to Siumu is rural with few households and settlements. This segment is also a mix of customary, freehold, church and pockets of government land, with some areas owned by key employers or businesses such Mynas Supermarket and Petrol station and Le Manumea Hotel.

The proposed upgrading/rehabilitation works encompasses the full length of 19.7 km (Figure 3.1) of the existing bitumen surfaced road starting at Leufisa in Apia town at intersection to Ifiifi Street running southwards across the central highlands ending at the South Coast Road intersection at Siumu. The project will upgrade the road to two-lanes with traffic calming measures, shoulders, drainage improvement works, safety and traffic management and ancillary works.

Figure 3.1: Location of the Central Cross Island Road



3.2 Proposed Activities

Detailed design has been completed for the proposed Central Cross Island Road upgrade. The project will widen the existing narrow carriageway (4–5m) to 7m with 1.5m hard shoulders in urban areas and 2m meter unsealed shoulders in rural areas, reconstruct the subbase and base courses, and upgrade pavements to 20-years design life with 50mm thick asphalt surface. The road alignment design is governed by topography rather than geometry to minimize land acquisition, earthworks, and other costly construction requirements. To ensure climate resilience, the roadside drainage will be improved and has been informed by hydrology and hydraulic analysis considering extreme climatic events. The design also includes slope protection and grading based on geotechnical analysis, retaining structures, and bioengineering measures. Road safety measures will be implemented, including guardrails, separate pedestrian walkways in areas where pedestrian traffic is high, thermoplastic line markings, traffic calming near schools and public markets, and appropriate road signage. The community consultation process has helped to identify appropriate locations for bus shelters and lighting. Separate community and driver road safety campaigns will also be implemented.

3.2.1 Widening

Road widening will be required for both urban and rural sections of the road. The interface of urban and rural sections is at km 4+420. For the urban section the road will be widened to provide for a 7m wide sealed carriageway (3.5m wide traffic lanes in both directions) with a nominal 4.5 m wide verge area both sides consisting of kerb and channel, grass lined berm and concrete footpaths. For the rural section this will also include a 7m wide sealed carriageway (3.5m wide traffic lanes in both directions) but will additionally include 2m wide unsealed gravel shoulders and a nominal 4.5 m wide verge area consisting of trapezoidal shaped side drains and grass lined berms. The total road right-of-way width will be increased to a maximum of 16m in either section.

3.2.2 Pavement Design

The proposed road pavement design is to include road surfacing of 50mm thick asphaltic cement for the urban section and a two-coat chip seal for the rural section. These will overlay granular basecourse and subbase layers. The basecourse layer will be a uniform 200mm thick throughout. The subbase layer will be 200mm in the higher trafficked area (up to about km 7+000) and 160mm in the lower trafficked area (beyond KM 7+000). The rural section will additionally include 2m wide and 200mm thick gravel shoulders. No stabilisation additives (lime, cement or bitumen) will be required for the granular pavement layers.

For reuse of existing road pavement material, it was determined that the existing road surfacing could be reused in bulk earthworks as a fill material component. Existing road base and subbase layers could both be reutilised as new subbase if a construction ‘scalping’ process (to remove excessive coarse and fine materials) takes place following removal and prior to placement in the new works. Removed subgrade material can be reused either in the subgrade zone or in bulk earthworks as a component of select fill. The same applies for other reusable material (e.g. earthworks bulk fill, crushed and screened existing road surfacing, and topsoil) as they are conventional reusable materials.

3.2.3 Drainage Improvements

For the urban section, full length kerb and channels will be installed on both sides of the road to collect runoff which will then be conveyed to underground drainage pipelines designed on the east side of the road to align with suitable natural drainage pathways.

Several outfalls to collect and convey the water to natural drainage pathways have been designed. Three have been included in the design to ensure that rainfall runoff is effectively managed, and flooding of streets and yards is prevented.

For the rural section, drainage will generally be improved through installation of improved transverse drains (piped culverts), wider and deeper lined side drains, headwalls and wingwalls, drop structures, weirs, and outfalls.

For the entire project, climate change adaptation has been accounted for in the drainage design. The project design followed the recommendations of the Vulnerability Assessment of the Samoa Road Network (SMEC, May 2016). The project design team's conclusion was to adopt the following climate change adaptation measures:

- 1:5 to 1:10 ARI for longitudinal pipes (incl. connected cross-drains) and open drains;
- 1:10 to 1:20 ARI for piped culverts (crossing the road, but independent of the road drainage system); and
- 1:25 to 1:50 ARI for box culverts cross-drains (crossing the road, but independent of the road drainage system).

The outfall structures planned for construction within the Apia catchments key biodiversity area (KBA) are shown in Figure 3.2 and Figure 3.3. These have been designed to drain the road in to existing waterways and include engineered dissipaters to minimise the erosive impacts of runoff. Further details can be found in the separate Drainage Design Report (SMEC, 2017).

Figure 3.2: Outfall structure at km 3+020

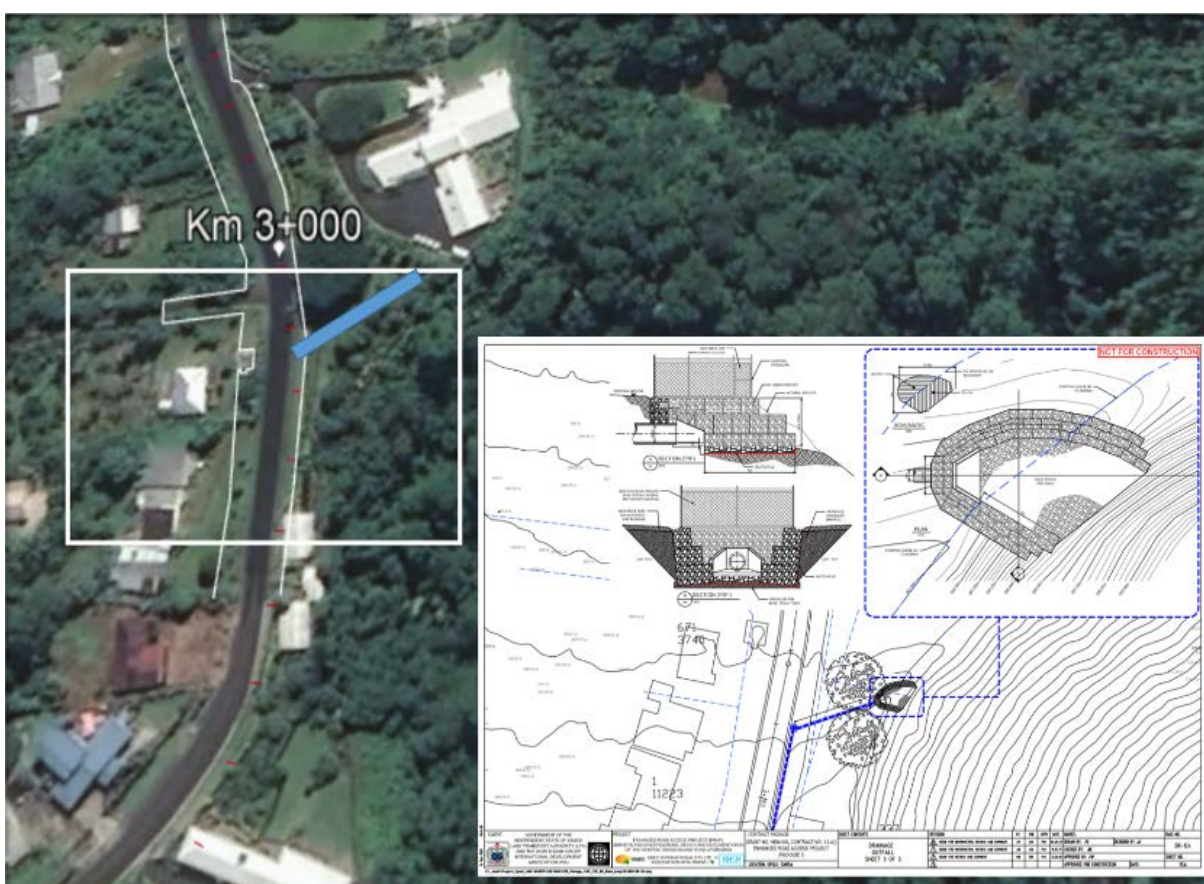
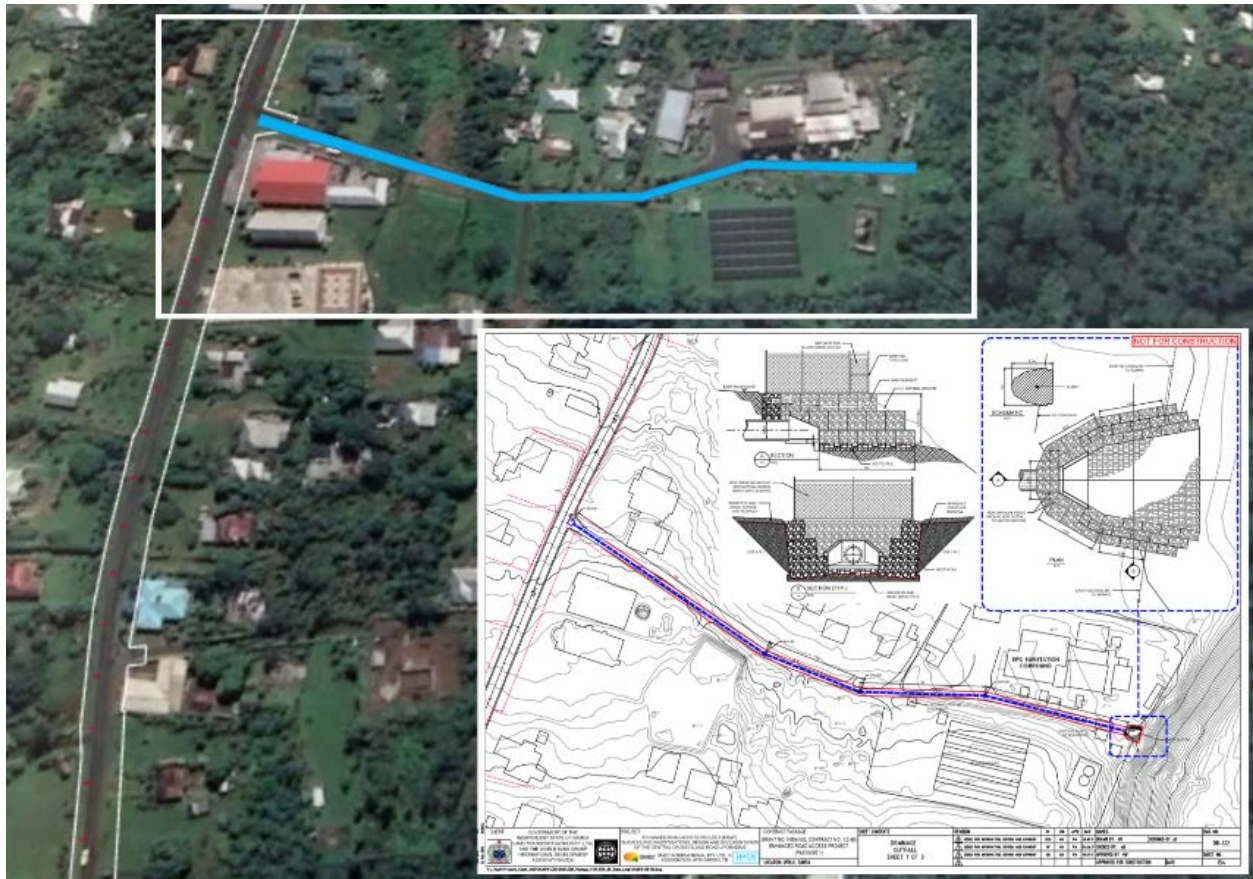


Figure 3.3: Outfall structure at km 0+060



3.2.4 Pedestrian Facilities and Bus Stops

Pedestrian facilities. These facilities include 1.5 m wide concrete footpaths and pedestrian crossings. These have been designed to complement a network of bus bays for the first 3.1km. All footpaths will include sloped transitions across vehicle crossings and kerb ramps (pram crossings) at all side roads and in other select key locations.

Bus stops. A network of 14 bus stops is included in the urban section. They will be in the form of bus bays, indented into the kerb line, so that the buses may pull clear of the live traffic lanes to load and unload passengers.

- Km 0+000 – km 3+127 - 1.5m wide footpath both sides, including the network of bus bays;
- Km 3+127 – km 3+604 - the existing footpath on the left (east) side and one existing bus bay that will remain;
- Km 3+604 – km 4+420 - new 1.5m wide footpath alternating from side to side, there is insufficient room for bus bays through this section; and
- Km 18+100 – km 19+686 - new footpath on the right (west) side. This is the only one in the rural area (for and as requested by the Siumu community); and will include bus bays in the sealed road shoulder so that buses may safely collect and drop-off school children. The bus bays will be at each end of this section and on both sides of the road (i.e. four in total).

3.2.5 Side Roads and Vehicle Crossings

Numerous existing side roads and driveways, including appropriate drainage provisions, will need to be incorporated in to the upgraded road design. For the urban section, many of these side roads will require a recessed kerb line across the Central Cross Island Road, and all driveways will need to be connected to the kerb line by means of a concrete vehicle crossing. Side roads requiring a kerb line will additionally have concrete ramps similar to concrete vehicle crossings, although their design will be more robust due to the heavier and more frequent traffic requirements.

Otherwise, existing side roads will tied-in like for like (with kerb returns in the urban environment), and all other vehicle crossings will be of a standard 3.0m wide gravel surfaced design.

Some side entrance exceptions exist, such as crossings to commercial developments. These designs will be specified on a case-by-case basis.

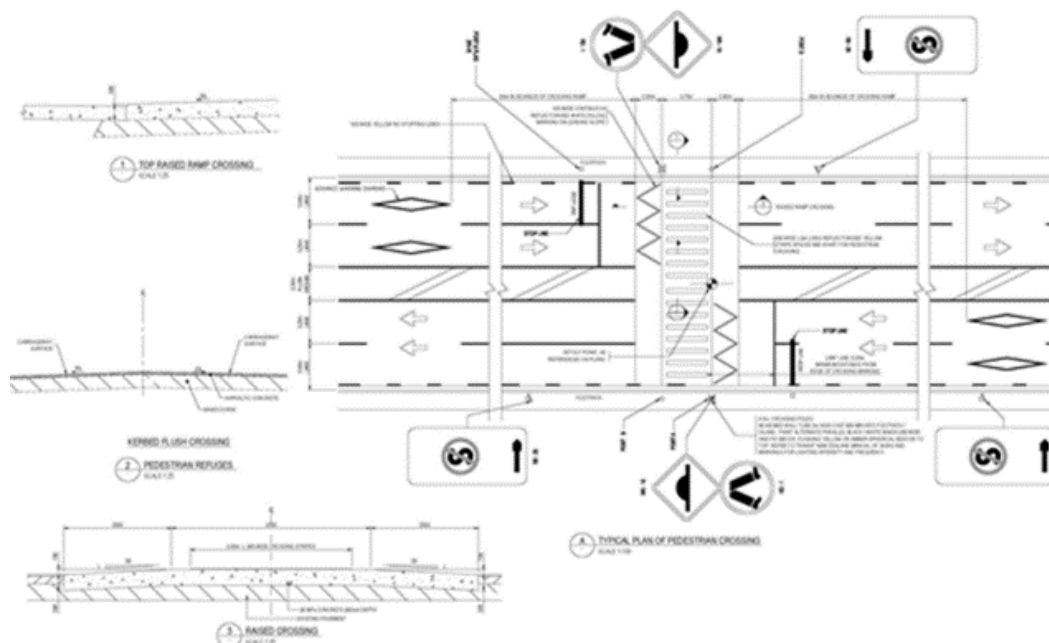
3.2.6 Road Safety Improvements

In addition to improving shoulders, providing pedestrian walkways and bus facilities; road safety improvements will also include:

- Road markings (e.g. centre-line, edge-line, continuity lines, stop lines);
- Traffic signs (e.g. posted speed limit, stop, give way, chevron boards, and warning signs with advisory speed limits such as for steep grades and sharp / winding corners);
- Guard rails;
- Edge marker posts; and
- Street lighting (for km 0+00 – km 4+420 i.e. the urban section).

In one instance, as an additional safety measure, one of the proposed pedestrian crossings will be raised. This crossing is located near Vailima Primary School at approximately km 1+785. Example pavement markings for the raised pedestrian crossing are provided in Figure 3.4.

Figure 3.4: Example of raised pedestrian crossing signs and road markings



3.2.7 Material Sources

The Geotechnical Investigations Report (SMEC, 2017) documents inspections and tests undertaken to understand the existing road pavement properties of the Central Cross Island Road. Included in this report are discussions, findings and recommendations from site inspections (including a road condition inventory survey), field dynamic cone penetrometer tests for determination of existing pavement strength, sampling and laboratory testing by means of test pits and auger holes to determine various existing pavement soil characteristics including strength (California bearing ratio), and findings of investigations into available construction materials, most notably for aggregate materials from quarries.

Locations of quarries. Road base materials will need to be sourced from one or more quarry sites located on the island of Upolu. As far as can be determined there are 12 candidate quarry sites across Upolu Island. Their locations and relative distance to the start and end points of the Central Cross Island Road upgrading project are shown in Figure 3.5. Alafua and Vaitele quarries are within 10 km of the starting point of the project (km 0+000). Alesia (Ott) and Alesia (Ulia), Leauvaa and Salimooa and within 20 km. Saanapu Quarry is approximately 12 km from the end point of the Central Cross Island Road project (km 19+686) with Alafua and Vaitele being the next closest by road (by travel along the Central Cross Island Road).

Figure 3.5: Recommended quarries and haulage routes



Source: SMEC - 2018

The advice provided by PUMA (14/11/18) is that only two quarries are currently licenced to three operators on the island of Upolu, namely: Saleimooa (Ott Construction), Saleimooa (ACP construction) and Faleolo (Downer).

The lack of an existing licence does not automatically exclude a quarry from consideration, but it does mean that a contractor will have to obtain a development consent from PUMA⁴ and other permits as required prior to the commencement of any extraction activities.

Recommended quarries. Of the 12 candidate quarry sites considered the following 3 are recommended, with rationale:

- Saleimoa Quarry (2) – close to the Central Cross Island Road project starting point and currently operational with good previous reporting feedback. Visual inspection by the Consultant's Material Engineer confirmed suitability.
- Vaitele Crushing Site (4) – close to the Central Cross Island Road project starting point and currently operational but little further is currently known about it to the Consultant. A site visit and interview with the operator Zan Westerland is recommended.
- Saanapu Quarry (9) – the only quarry close to the Central Cross Island Road project end point. Although it is currently closed by PUMA it is anticipated that would be reopened by the time construction is to commence. A site visit and further interview with the operator Silva Construction is recommended.

The locations of these quarries are shown in Figure 3.5. The only viable haulage routes from the Saleimoa (2) and Vaitele (4) quarries are to travel east along the Main West Coast Road and to turn south on to the Central Cross Island Road in Apia. From the Saanau Quarry (9) the only viable route is to travel east along the Main South Coast Road and to turn north on to the Central Cross Island Road (as also shown on Figure 3.5).

3.3 Contract Packaging and Schedule

Contract packaging. There will be a total of two contract packages; civil works (CW) package CW-1 and CW-2. CW-1 will be tendered and constructed by an international contractor over two construction sections. These include:

- Construction Section 1 – Urban from KM0+000 to KM4+420
- Construction Section 2 – Rural from KM4+420 to 15+500.

CW-2 will be nationally tendered as two lots. Bidders will be able to bid for both lots separately, with the possibility that one contracting entity may implement both lots. These lots include:

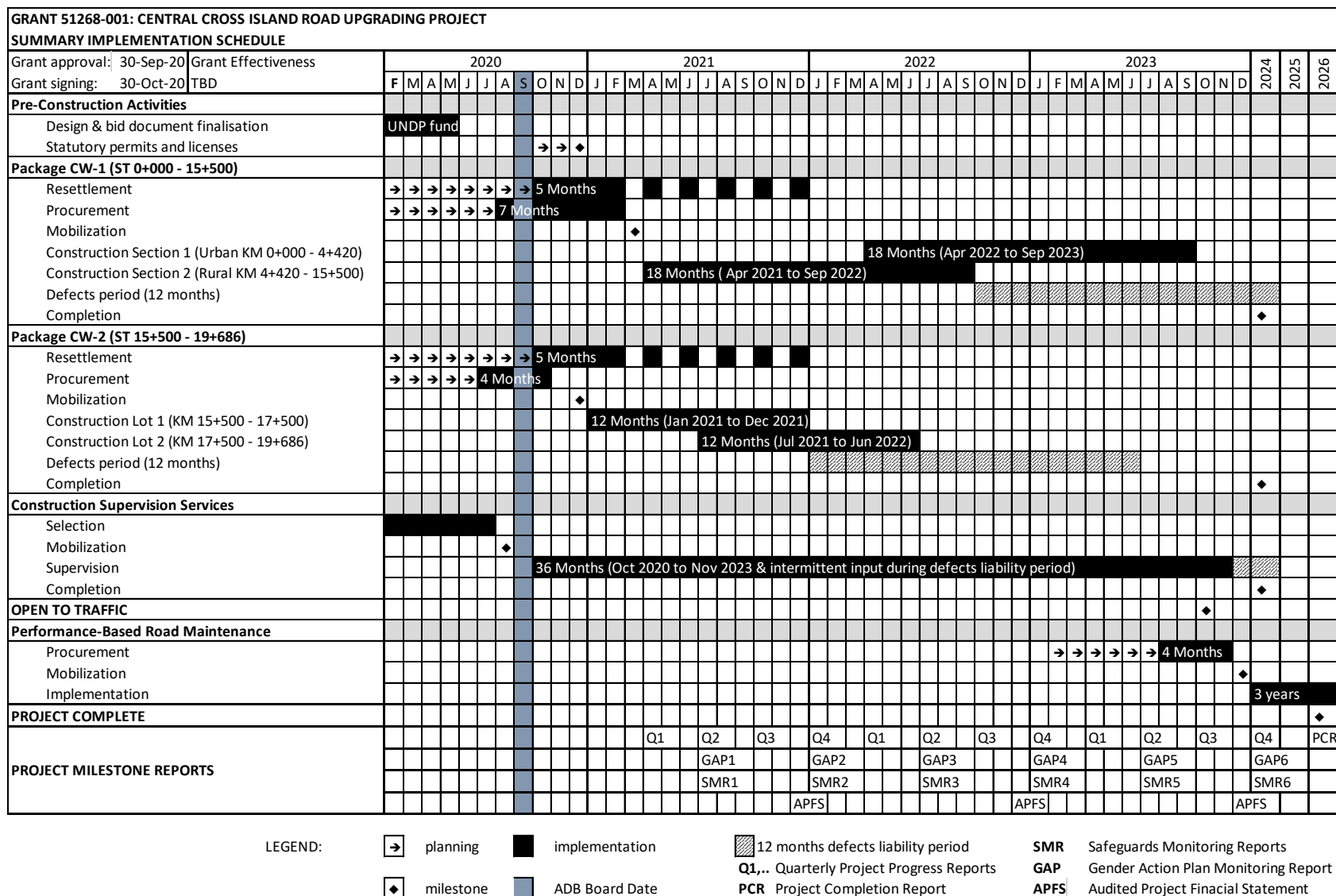
- Construction Lot 1 – Rural from KM15+500 to KM17+500
- Construction Lot 2 – Rural from KM17+500 to KM19+686

The proposed phasing of the sections of road is reflected in the implementation schedule (Figure 3.6).

Implementation schedule. Based on approval of the grant in September 2020, Figure 3.6 provides the proposed implementation schedule. The CSC will support the LTA in supervising the CW packages, and a three year performance-based road maintenance component will follow completion of works. The sequencing proposed here assumes that the rural section of CW-2 will commence first and run from Jan 2021 to Jun 2022 and the urban section will commence in Apr 2021 and be completed in Sep 2023. The first lot of CW-2 is proposed to commence in Jan 2021 and be completed by Dec 2021 and Lot 2 will be undertaken between Jul 2021 and Jun 2022.

⁴ This could likely include undertaking an environmental assessment including consultations and preparing a quarry management plan.

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4 Description of the Existing Environment (Baseline Conditions)

4.1 Physical Environment

4.1.1 Climate and Climate Change

Climate. The climate in Samoa is described as tropical, that is, hot, humid and rainy throughout the year. There are two distinct seasons, the ‘wet’ season from December to March, and the dry season from June to September.

Temperatures are stable and vary little between the hottest period (December to April), when highs are about 30°C (86°F), and the coolest period (June to September) when they are around 29°C (84°F). Temperatures at night are almost always above 20°C (68°F). The average monthly temperature in Apia is shown in Table 4.1.

Table 4.1: Average monthly temperature in Apia

Scale	Temperature by month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Min (°C)	24	24	24	24	24	24	23	23	23	24	24	24
Max (°C)	30	30	30	30	30	29	29	29	29	30	30	30
Min (°F)	75	75	75	75	75	75	73	73	73	75	75	75
Max (°F)	86	86	86	86	86	84	84	84	84	86	86	86

Source: Climate Section – Meteorology Division – MNRE

The rainfall is usually in the form of intense but short-lived downpours or thunderstorms, except in the period from December to March, when they can sometimes last for several hours. In Apia, 2,800mm (110 inches) of rain per year fall, with a maximum of 450mm (17.5 in) in January, and a minimum of 80mm (3.2 in) in July and August. The average monthly precipitation is shown in Table 4.2.

Table 4.2: Average monthly rainfall in Apia

Unit	Rainfall by month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
mm	450	380	350	250	160	120	80	80	130	170	260	370	2800
inches	17.7	15	13.8	9.8	6.3	4.7	3.1	3.1	5.1	6.7	10.2	14.6	110.2
No. of days	19	18	17	15	13	11	8	9	12	14	16	17	169

Source: Climate Section – Meteorology Division – MNRE

Given the variation in rainfall due to topography, the section of Central Cross Island Road located in the higher elevations would be expected to receive relatively higher rainfall than the sections in the lower elevations, as shown in Figures 4.1a and 4.1b. Figure 4.2 shows that for the 30-year between 1971 and 2000 the project area received either average or above average rainfall.

Figure 4-1a: Mean January rainfall (mm) pattern – Samoa

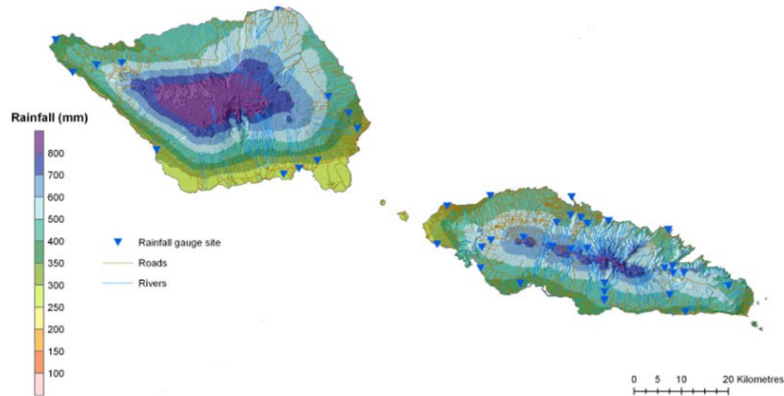
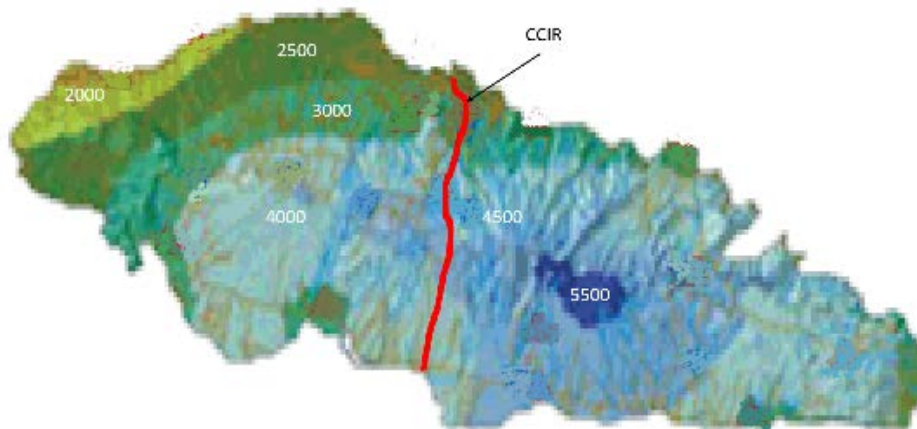


Figure 4.1b: Annual mean rainfall (mm) pattern - Upolu



Source: Climate Section – Meteorology Division – MNRE (2010)

Figure 4.2: Annual rainfall over 1971-2000



Source: Climate Section – Meteorology Division – MNRE (2018)

Extreme weather events. Samoa is highly vulnerable to tropical storms and cyclones. Extreme conditions created by cyclones are damaging winds, extremely high rainfall, flooding, swells, storm surges, and even tornadoes.⁵ Samoa has been affected by devastating cyclones multiple times in the last few decades. Cyclones that have affected Samoa from 1987 to 2012 are listed in Table 4.3.

Table 4.3: Tropical cyclones to hit Samoa from 1987 to 2012

Cyclone	Year
Cyclone Tusi	1987
Cyclone Ofa	1990
Cyclone Val	1991
Cyclone Heta	2003
Cyclone Olaf	2005
Cyclone Evan	2012

Source: Climate Section – Meteorology Division – MNRE (2018)

Climate change. The climate change projections for Samoa, based on the low, medium and high emissions scenarios have been calculated by the Pacific Climate Change Program Partners.⁶ All emissions scenarios indicate the rise of annual average air and sea temperature. The projections are presented in Table 4.4.

Table 4.4: Projected change in temperature under different emission scenarios

Emissions scenario	Projection year		
	2030 °C	2055 °C	2090 °C
Low	0.2-1.0	0.6-1.4	0.8-2.0
Medium	0.4-1.2	0.9-1.9	1.5-2.9
High	0.4-1.0	1.0-1.8	1.9-3.3

Source: Pacific Climate Change Program Partners (2011)

Average temperatures will continue to rise with an increase in number of hot days and warm nights and decline in cooler weather. There is uncertainty with rainfall projections as model results for Samoa are inconsistent, but the projections indicate decrease in dry season rainfall and increase in wet season rainfall over the 21st century. This is related to the projected intensification of the Pacific Convergence Zone; drought projections are likewise inconsistent for Samoa. General decline in number of cyclones on a global scale by end of 21st century, but likely increase of average maximum wind speed of cyclones between 2% and 11% and increase in rainfall intensity of about 20% within 100km of a cyclone center. For Samoa, projections show decrease in frequency of tropical cyclones by the late 21st century but an increase in the proportion of more intense storms.

4.1.2 Air Quality

The population-weighted exposure to ambient particulate matter (PM) 2.5 pollution is defined as the average level of exposure of a nation's population to concentrations of suspended particles measuring less than 2.5 microns in aerodynamic diameter, which are capable of penetrating deep into the respiratory tract and causing severe health damage.

⁵ <http://www.mnre.gov.ws/index.php/riskreductiondmo/samoariskprofile>

⁶ Pacific Climate Change Program Partners (PCCPP) 2011. Current and future climate of Samoa. Pacific Climate Change Science Program, International Climate Change Adaptation Initiative. www.pacificclimatechangescience.org

Exposure is calculated by weighting mean annual concentrations of PM 2.5 by population in both urban and rural areas.

The value for PM 2.5 air pollution, mean annual exposure (micrograms per cubic meter) in Samoa was 3.81 as of 2015. Over the past 25 years this indicator reached a maximum value of 4.40 in 2005 and a minimum value of 3.33 in 2011 (Brauer, M. *et al.* 2016).

4.1.3 Topography and Geology

General topography. Samoa consists of two major islands, Savai'i and Upolu. Upolu Island, where project is located, is elongated along the west-northwest to east southeast direction. It is about a 72 km long and 22 km at its widest point; the island is wider at its western end and tapers towards the eastern part. The island is dominated by a central volcanic ridge running along the length of the island forming a major divide. Surrounding the Island is a narrow coastal plain which rises gradually into gently rolling slopes and finally assuming steeper slopes towards the central part. The highest peak in Upolu Island is Mount Mauga Fito with peak elevation of 1,116 m.

The land surface is uneven due to the boundaries between different lava flows which have caused steep pitches in slopes, and due to large pits and rifts caused by obstructions to lava flows and collapsed steam tunnels (Wright, 1963 cited in Lee, 2009). Erosion has also done its share in the evolution of the landscape of Upolu and Samoa in general. Deeply incised valleys are notably present in central part of Upolu. One such valley is the site of the Papapapatai Waterfalls close to Central Cross Island Road at about km 15+300.

Topography of the road corridor. The section of Central Cross Island Road which will be upgraded starts at the northern end at about elevation 60 m and rises steeply towards the central ridges (Figure 4.3:). At its highest elevation, the Central Cross Island Road is about 780 m above sea level at about Km 10+000 where it crosses the central island divide. The southern slope is generally steeper with road slope gradient of 18% in some sections. The cross section in Figure 4.3 shows the general profile of the topography which the Central Cross Island Road will traverse from north to south.

Figure 4.3: North-south profile of topography of Central Cross Island Road corridor



Source: SMEC - 2018

The road corridor is bounded to the west by Mount Vaea and the volcanic peaks and to east by the tributary of Vaisigano River until about Km 11+000. Beyond this point, the road crosses the central island divide and traverses the southern watersheds. The Central Cross Island Road crosses several intermittent headwater tributaries of Tafitoala catchment and the Vajee catchment (as shown on Figure 4.7:). It crosses the headwater tributary of Vaisigano River and at Km 11+700 to Km 13+000, Central Cross Island Road runs close to the edge of the ravine of the western branch of the Vaisigano River (Figure 4.4). It is closest to the ravine at the view deck of Papapapaitai Falls (Plate 4.1).

Figure 4.4: Km 11+700 to Km13+000 Section of Central Cross Island Road close to the ravine

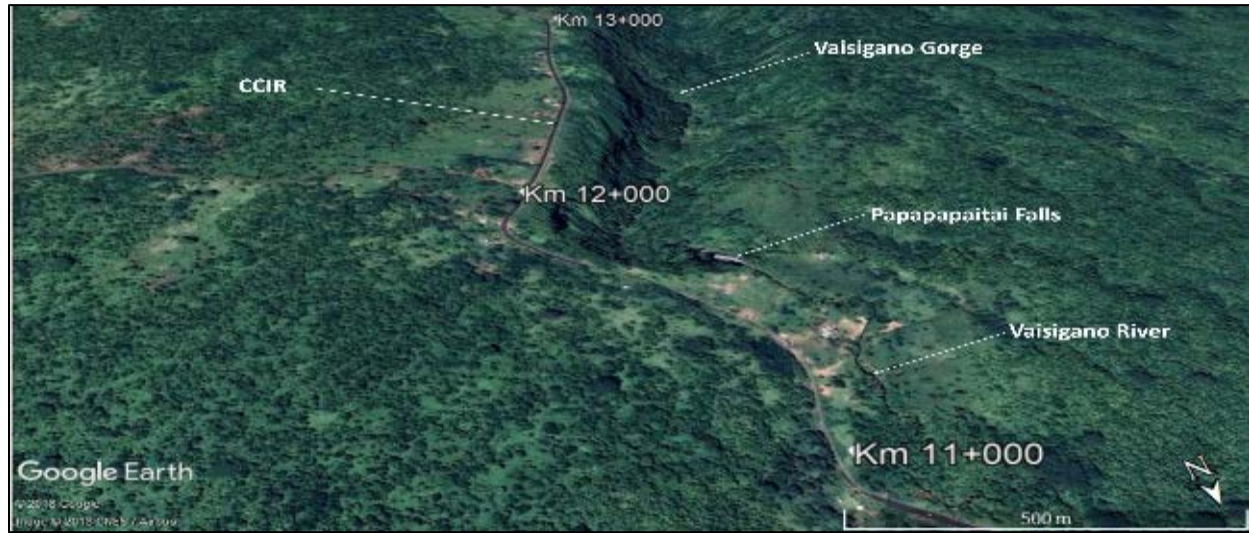
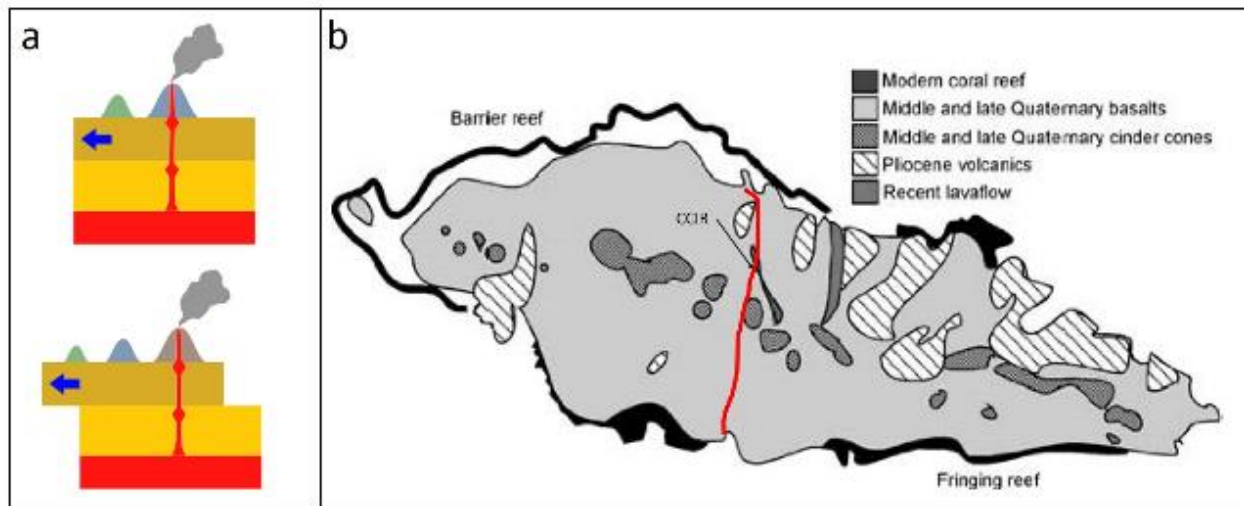


Plate 4.1: Papapapaítai Falls



Regional geology. The Samoan islands are of volcanic origin that evolved through a phenomenon known as hot-spotting. A hotspot is a rising plume of deep seated mantle creating seamounts as it reaches the crust (Figure 4.5 a). Hotspots are stationary and as the tectonic plate moves, the volcanic structures / eruption centers migrate along the path of the plate motion resulting to chain of seamounts / volcanic centers like the case of the Hawaiian Islands and the Society Islands in the Pacific.⁷ This is the reason why the age of volcanic eruptions in Upolu diminishes from west to east. It is also the reason for the presence of the line of old volcanic craters in the central highland. This process of hot-spotting has resulted in the present-day geology on the island which is primarily composed of middle and late Quaternary basalts and cinder cones as well as Pliocene volcanic. The Central Cross Island Road is primarily located on middle to late Quaternary basalts (Figure 4.5 b).

Figure 4.5: (a) Process of hot-spotting (a) and (b) resultant geology of Upolu



Source: Birkeland et.al (2007)

Geologic hazards. Due to its tectonic setting and volcanic origins, Samoa is prone to geologic hazards. Located near the Tonga Trench, at the edge of the subducting Pacific Plate, it is susceptible to volcanic eruptions, earthquakes and associated tsunami. An assessment of levels of risk in Samoa by natural hazards done by MNRE rates volcanic eruption and tsunami as extreme, with earthquake and landslide rated as high level of risk. Due to the inland location of the Central Cross Island Road its risk from volcanic eruption and tsunami is low; but there is risk that seismic activity could cause slope instability and landslides. A study conducted by Beca (2006) characterized the instability of the different volcanic formations that make up the country. The study found that the volcanic rock that underlies the project road corridor is prone to shallow sliding in soils and weathered sections; failure by sliding along volcanic flow boundaries (bedding plane); and rock and debris flow. Using a set of criteria such as rock and soil type, slope angle and height and occurrence of past movement, to assess hazards of slope instability, the study identified several areas in Upolu that are prone to slope instability hazards. These includes the inland areas of Apia, presumably including certain sections of Central Cross Island Road.

An anecdotal account by an interviewed resident mentioned that one section of Central Cross Island Road suffered severe damage from debris flow and rock fall during Tropical Cyclone Evan. There is potential that the sections of Central Cross Island Road closest to the Papapapa River could experience slope instability, as the Beca 2006 study pointed out the Salani Formation in this area is prone to shallow sliding and failure between volcanic flows, which is part of the process of the evolution of the deep erosional escarpments found in central Upolu.

⁷ <https://www.sciencedaily.com/releases/2008/06/080616161631.htm>

4.1.4 Water Resources

Context. The surface water bodies include rivers and lakes, while groundwater is present in aquifers in volcanic flows and as shallow water lens in the coastal areas. Both ground and surface water are utilized for water supply needs. Surface water equates to 65 percent of the total water supply while ground water is only 35 percent (Borgen, 2016). Water supply in northern, eastern and southern Upolu is from surface water intakes, whereas that for western Upolu is from groundwater. Water shortages are reported during the dry season, especially during extended dry periods associated with the El Niño-Southern Oscillation (ENSO).

A lack of natural water storage in the catchments results in water supply levels becoming low within several weeks of flow rainfall. The lack of storage also results in rapid flooding events, with times to peak estimated at less than three hours for cyclone and tropical storm associated rainfall events. Flooding in Apia is a recurrent problem.

Surface water. The main rivers on Upolu are the Fuluasou, Vaisigano, Namo, Mulivai, Tafitoala, Nuusuatia and Leafe (Figure 4.6). In Upolu, of the surface waters, Vaisigano is the most important source of water supply. It is reported that the surface water intakes on Upolu produce an average of 42.5 million m³ of water per year with substantial contribution from the Vaisigano catchment. Aside from water supply, Vaisigano River is also an important as a source of renewable energy for Upolu. Hydropower contributes about 40 to 60 percent of the national power requirement depending on the season (WMO 2012).

Figure 4.6: Main rivers on Upolu



In the absence of data specific to the watersheds which the Central Cross Island Road passes through (Figure 4.7), this information from the Fuluasou River is considered indicative of the water quality expected in neighbouring watersheds.

An observation at a headwater tributary of Vaisigano River close to Central Cross Island Road (below the Forest Café) during a moderate rain in March 2016 revealed high siltation load as evidenced by highly turbid water (Plate 4.2).

Plate 4.2: Heavily silted headwater tributary of Vaisigano River observed 26 March 2016

Water quality. Limited information is available on the quality of surface and groundwater resources in Samoa. The most relevant data available comes from the Fuluasou River (Faiiagi, 2015). This study sampled water quality every two weeks at 10 sites distributed between the head waters and the ocean outfall of the Fuluasou River. Sampling was conducted over three months of the dry season between August and October 2013. The measured parameters were analysed and compared with WHO, SNDWS, and DWSNZ/ANZECC drinking and aesthetic standards. All parameters were found to have total mean concentrations within the permissible standards, with the exception of Total Coli and E.coli.⁸ Out of 53 water quality samples that were tested, all were significantly higher than the specified standards for Total coli and E. coli, and failed to comply with drinking water standards (SNDWS: 0/100 mL; WHO & DWSNZ/ANZECC: < 1/100 ml) and aesthetic regulatory standards (DWSNZ/ANZECC: <260/100 ml) (Faiiagi, 2015).

Project and water resources. Central Cross Island Road traverses two important watersheds, the Vaisigano and the Tafitoala watersheds and two minor watersheds (Figure 4.7). The Central Cross Island Road cuts through the Vaisigano Watershed at its western section and across the headwater of Tafitoala River. The two minor watersheds are arbitrarily named Vaiee and Lupe Sina. While much of the Vaisigano watershed remains widely vegetated, Apia's expanding urban sprawl occupies the lower reaches and spreading along the western fringe of the Vaisigano watershed.

The Vaisigano River is the largest river on Upolu, has a catchment area of a 34 km² and rises on the northern slopes of the island. The length of the main river is approximately 14.1 km and the catchment is roughly wedge shaped with the upper catchment approximately seven kilometres across. The Mulivai and Vaivase catchments are situated to the west and east respectively. The river rises on the main divide of Upolu at 1,158 m above sea level at Mt. Fito and comprises three main tributaries, the western, middle and eastern branches which merge to a single channel at Alaoa, about five kilometres above its estuary in Apia Bay.

⁸ Parameters measured included temperature, pH, turbidity, dissolved oxygen, total dissolved solids, nitrate (NO³), coliform.

The lower 0.5 km of the river is tidal. The upper 2.0 km portion of the catchment descends rapidly at a slope of about 33%, which then changes to 7% for the next 5.6 km (Cedo and Toimoana, 2008).

Understanding of the need to protect these watersheds is evident by the signage located on the Central Cross Island Road, as shown in Plate 4.3.

Figure 4.7: Watersheds traversed by Central Cross Island Road

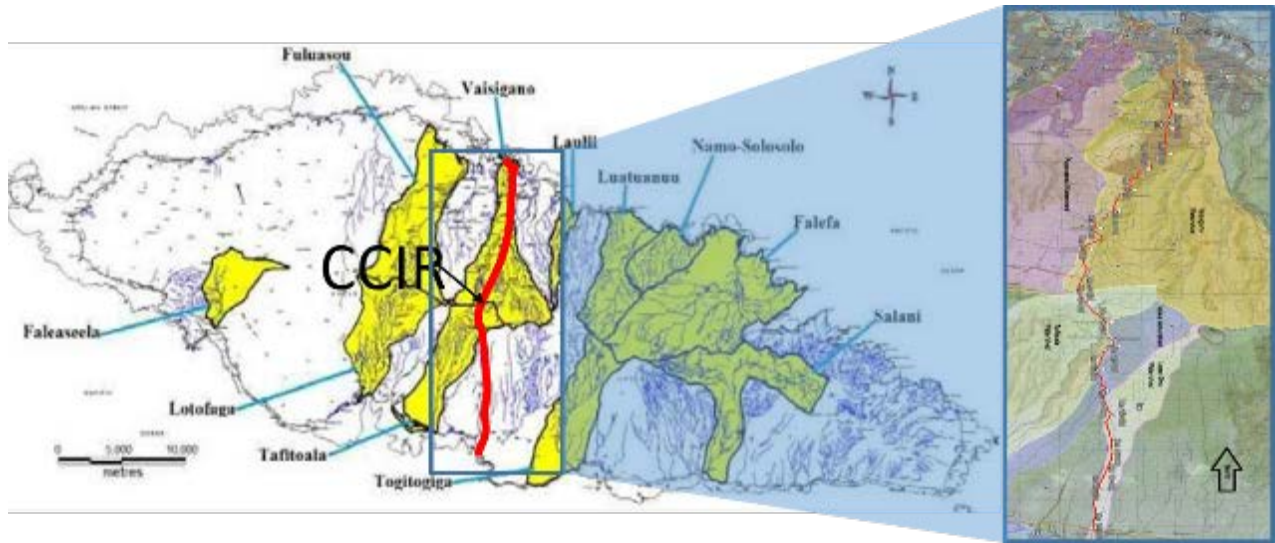


Plate 4.3: Signage advocating for watershed protection on the Central Cross Island Road



4.2 Ecological Environment

4.2.1 Overview and Context

Samoa's vegetation is divided into five primary plant communities, including: littoral vegetation, wetland vegetation, rainforest, volcanic scrub, disturbed vegetation. The country's flora consists of 500 species of native flowering plants and about 220 species of ferns in 96 families and 298 genera, making it one of the most diverse flora in Polynesia. Overall, about 25 percent of the native plant species are endemic to Samoa and 32 percent endemic to the Samoan archipelago. In the agricultural ecosystem, the main cultivated crops are taro, bananas, breadfruits, yams, cacao and coconuts (CBD, 2018).

In terms of faunal diversity, there are 13 species of terrestrial mammals, 44 species of land birds, 21 seabirds, 15 reptiles, 59 species of insects, 64 species of land snails and 28 species of butterflies. In terms of freshwater biodiversity, which remains relatively unknown, 30 species of fish and 17 species of macro-crustaceans have been reported. In 1999, 198 taxa of algae, with a known species count of 287, were reported (CBD, 2018).

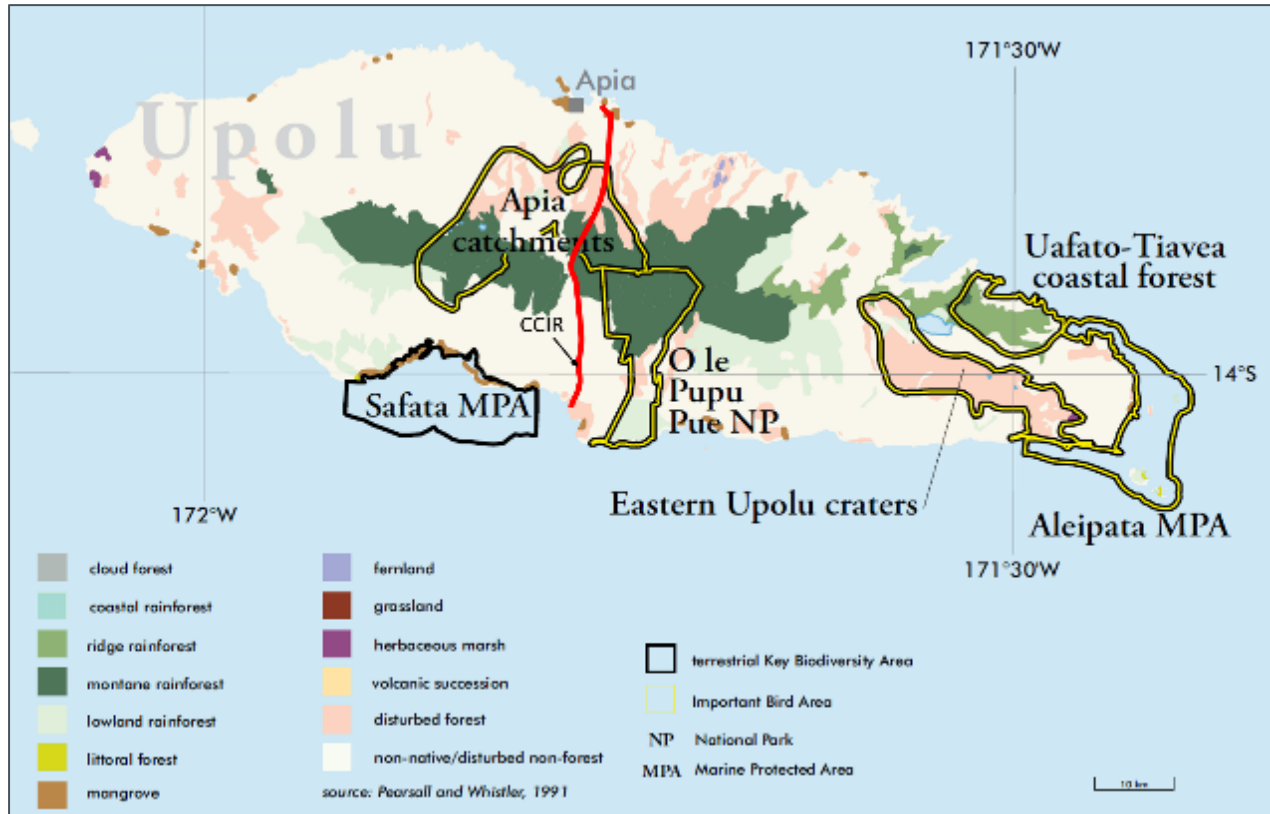
Samoa is part of the Polynesia-Micronesia Biodiversity Hotspot, one of 34 regions of the world where extraordinary levels of biodiversity and endemism are coupled with extremely high levels of threat (Mittermeier *et al.* 2004). Although 12 terrestrial and 101 marine species found in Samoa are listed as globally threatened on the 2018 IUCN Red List of Threatened Species, the true number of threatened species is likely significantly higher than this. The primary threats to biodiversity are habitat alteration caused by agriculture and development, over harvesting of resources (e.g. logging of timber trees), hunting of pigeons and bats and over-fishing and the spread of invasive species (Mittermeier *et al.* 2004).

4.2.2 Terrestrial Habitats

As an inland road, the terrestrial rainforest habitats are of most significance to the Central Cross Island Road (Figure 4.8). The current classification of the Samoan rainforest are (Whistler, 1992):

- Lowland forest (sea level to about 600m and 1000m elevation), classified into coastal, ridge, valley, lava flow and slope forest;
- Montane forest (a'matia forest) which in Upolu starts at about 550 m and 700m and extends to up to 1000 m where it is replaced by cloud forest;
- Cloud forest prevails in the cool and damp highlands of Savaii and Upolu at elevations of 1000m and 1400m; and
- Disturbed vegetation includes vegetation communities that are in transition (either succession or climax) after a natural or man-made disturbance. Developed land, farmlands, pasture land, roads, villages, etc. belong to this category.

Other sub-categories have been added by other workers to better depict the current state of the terrestrial ecosystems of Samoa. One of the added categories is the non-native ecosystem which is described as ecosystem dominated by exotic or introduced species; this is quite extensive and encompasses a substantial portion of Upolu.

Figure 4.8: Main terrestrial habitat types on Upolu Island

4.2.3 Key Biodiversity Areas

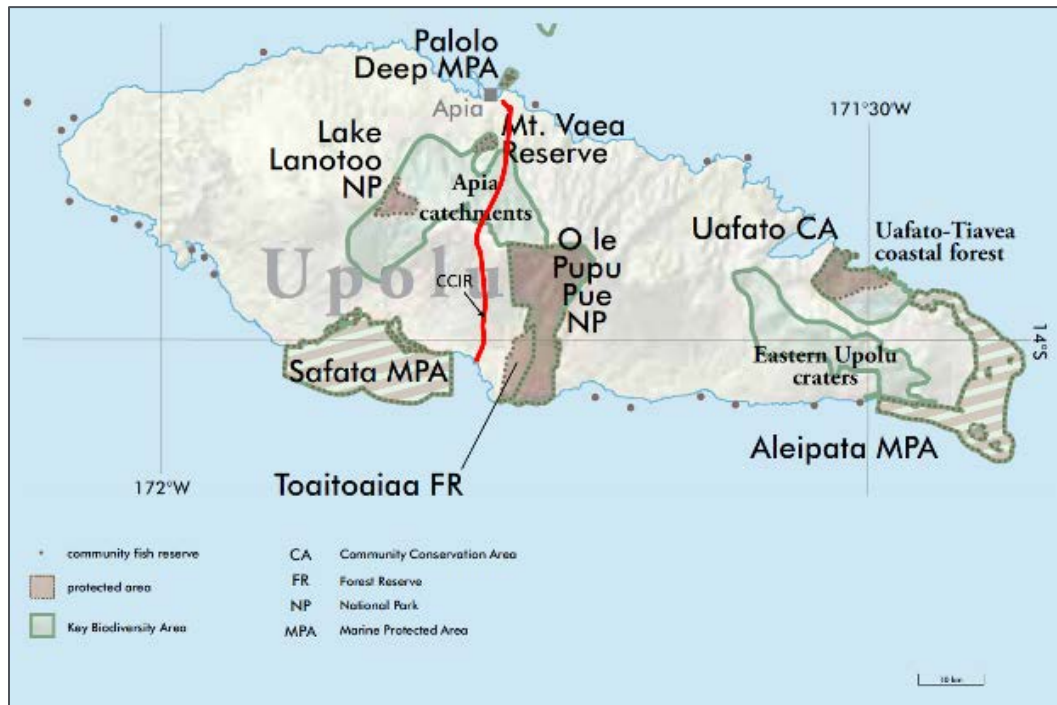
Key biodiversity areas (KBA) are sites of global significance for biodiversity conservation, and are identified using transparent, globally standard criteria (Langhammer *et al.* 2007). The KBA concept extends to all taxonomic groups the data-driven methodology employed by BirdLife International and PlantLife International to identify important bird areas (IBAs) and important plant areas respectively.

KBAs have been identified for globally threatened species of plants, reptiles, birds, snails, flying foxes, corals and fish in Samoa. The eight terrestrial KBAs cover a total of 940 km² or approximately 33 percent of the total land area of Samoa, more than double Samoa's Biodiversity Strategy and Action Plan commitment of 15 percent of land coverage, including representation of 12 of the 13 native terrestrial vegetation communities in the country. The locality of the KBA on Upolu is shown in Figure 4.9, the Central Cross Island Road runs through the Apia Catchments KBA but does not impact on any protected areas. The Central Cross Island Road passes through three main habitat types: disturbed forest, montane rain forest and non-native/disturbed non-forest. Approximately 7 km of the Central Cross Island Road passes through disturbed forest and montane forest within the boundary of the Apia Catchment KBA; this is an area of global significance for biodiversity conservation.

A 2015-2016 UNDP funded study conducted for the MNRE utilized traditional ecological knowledge (TEK) to detect and assess the occurrence of rare and threatened flora and fauna in four KBAs within Samoa, including the Apia Catchments (Serra, 2016). The villages of Lanoto'o, Malololelei and Magiaga were sampled within the Apia Catchments KBA (Figure 4.10). The study aimed to interrogate traditional ecological knowledge to assess the occurrence and distribution of key biodiversity assets within the four KBA studied. This was done by developing targeted questionnaires and accompanying local knowledgeable hunters and trackers on reconnaissance trips within the KBA. The results of the study for the Apia Catchment KBA are summarised in Annex 2.

Based on the traditional ecological knowledge information collected, three species of birds were identified that the IUCN Red List classifies as 'threatened' (1-CR; 2-EN); three additional species of birds are classified as 'near-threatened' (NT); and one species of tree is classified as 'vulnerable' (VU).

Figure 4.9: Protected areas and KBA on Upolu



Source: DEC - MNRE

Figure 4.10: Villages in the Apia Catchment KBA



Of relevance to the Central Cross Island Road is the notation that the critically endangered Tooth-billed Pigeon (*Didunculus strigirostris*) and the endangered Mao (*Gymnomyza samoensis*) are both reported as having been sighted based on interviews conducted at the village of Malololelei, which is located on the Central Cross Island Road at km 7+000. These are classified as two of the most threatened bird species in Samoa (Butler and Stirnemann, 2013).

4.2.4 Threatened Species

As part of the traditional ecological knowledge and KBA study, the IUCN Red List of Threatened Species was interrogated, this search returned 21 species matching the criteria as described in IUCN Red List species for the project area.⁹ An analysis of the likelihood of each IUCN threatened species being present near the Central Cross Island Road project footprint has been undertaken based on known distribution, habitat preferences and documented sightings.

Threatened species with a 'low' likelihood designation are unlikely to be found near to the project footprint based on known distribution and/or habitat preferences and are not considered further by this assessment. A 'possible' likelihood designation means that the presence of a threatened species cannot be ruled out based on known distribution and/or habitat preferences, however, there have been no documented sightings of the species in the vicinity of the project in recent years; no targeted management or mitigation measures are deemed necessary for these species. A 'probable' likelihood designation means that the project footprint is within the known distribution and habitat of a threatened species and there has been a documented sighting of that species in recent years; targeted assessment and the development of specific management and mitigation measures are deemed necessary for these species. The results of this analysis and referenced justification for the likelihood designation are provided in columns 4 and 5 of Table 4.5.

In summary, the study concluded that: "...the results of the likelihood analysis indicate that there is a possibility that two species of endangered skink, one endangered snail, and two endangered palm species (one being CR) are present near the Central Cross Island Road footprint. In addition, there is a probability that the critically endangered Tooth-billed Pigeon (*Didunculus strigirostris*) and the endangered Ma'oma'o (*Gymnomyza samoensis*) are present near the Central Cross Island Road footprint based on reported sightings" (Serra, 2016).

The Samoan Moorhen *Pareudiastes pacificus*, classified as critically endangered on the Red List, is found only on Savai'i. As this species is well beyond the project area it has been excluded from further discussion pertaining to whether the project is situated in critical habitat.

Tooth-billed Pigeon (*Didunculus strigirostris*)

The Tooth-billed Pigeon is endemic to the Samoan islands of Upolu and Savai'i (where it is known as Manumea) and is one of the closest relatives to the legendary extinct dodo. It is an EDGE (evolutionarily distinct and globally endangered) species and it is believed that there is only between 50-249 mature individuals left in the wild (Baptista, et al. 2014). Drivers of declines in numbers are habitat destruction (logging and cattle ranches), hunting, invasive species and damage by cyclones during the 1990s.

The bird species inhabit primary forest at all altitudes up to 1,600 m. Their bill is adapted to saw through tough seeds of *Dysoxylum* sp. of tree, which are related to mahogany, but it will also eat other types of fruit. The breeding season is March to November, with the peak activity being April to September (Collar, 2015). Although a Tooth-billed Pigeon nest has not actually been documented it is thought to lay only two eggs, very little is known about the species' reproductive ecology. Reported sightings of the Tooth-billed Pigeon in relation to the Central Cross Island Road alignment are shown in Figure 4.11 (MNRE, 2006a).

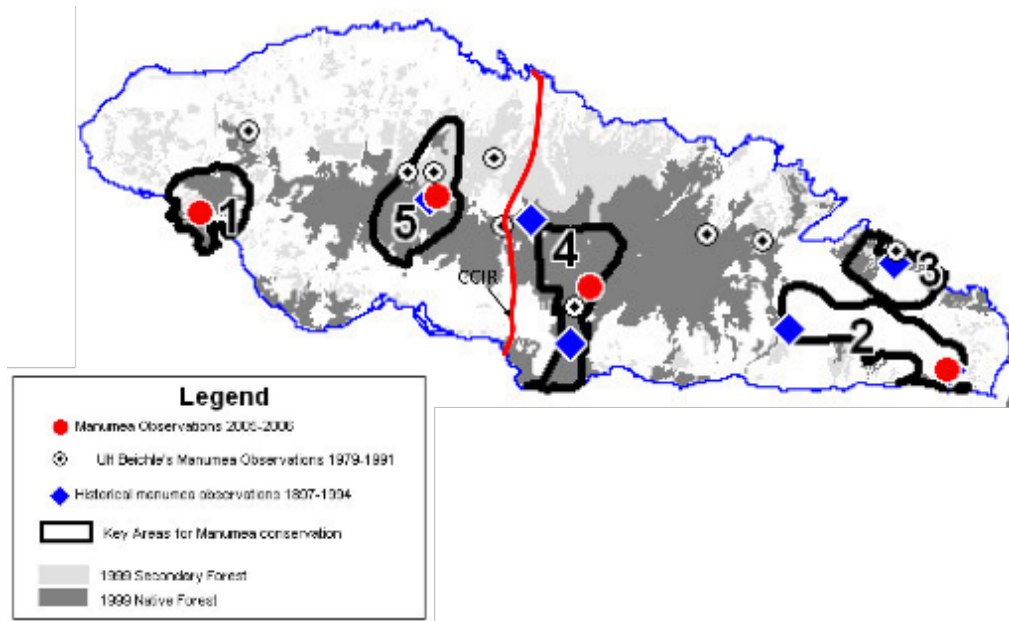
Ma'oma'o (*Gymnomyza samoensis*)

The Ma'oma'o (*Gymnomyza samoensis*) was once distributed through the forests of both American Samoa and Samoa. The Ma'oma'o is now presumed to be extinct in American Samoa and surveys from 2005-2006 suggest population numbers have been declining in Samoa (Baptista, et al. 2014). The Ma'oma'o is currently classified as endangered on the IUCN Red List. The population is in ongoing decline and in need of urgent attention.

⁹ Serra, G. (2016). Biodiversity Surveying of Four KBAs in Samoa Through Traditional Ecological Knowledge. Nov 2015 – Jun 2016. "Strengthening Multi-Sectoral Management of Critical Landscapes" GEF-UNDP project Samoa

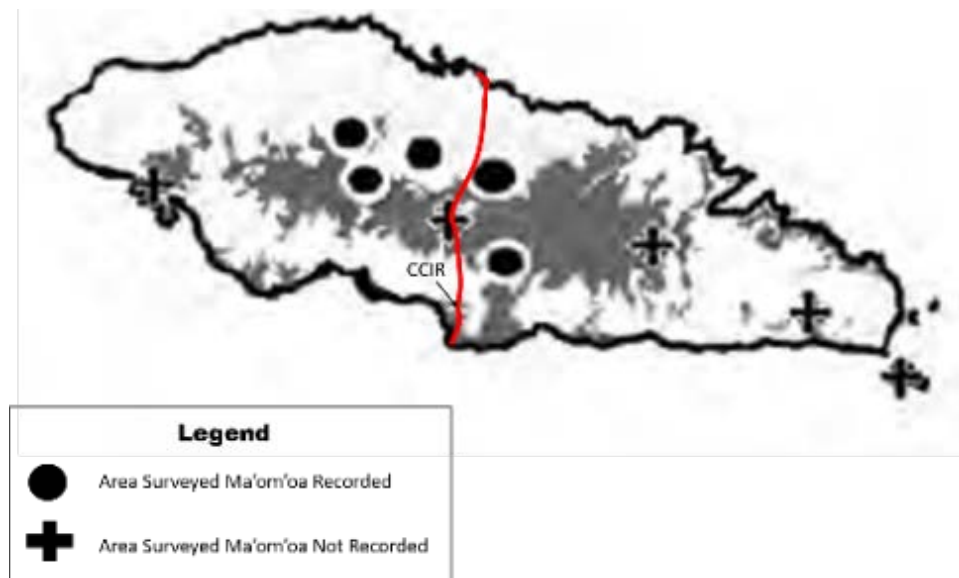
In 2006 the government developed a recovery plan for the Ma'oma'o, which identifies objectives of securing the Ma'oma'o, maintaining its existing populations on Upolu and Savaii, and re-establishing populations at former sites. Reported sightings of Ma'oma'o in relation to the Central Cross Island Road alignment are shown in Figure 4.12 (MNRE, 2006b).

Figure 4.11: Known sightings of Manumea in relation to the Central Cross Island Road alignment



Source: MNRE (2006a)

Figure 4.12: Known sightings of Ma'ama'o in relation to the Central Cross Island Road alignment



Source: MNRE (2006b)

Table 4.5: IUCN Red List species for the project area

Common name	Scientific name	IUCN status	Likelihood	Justification
Micronesian Skink	<i>Emoia adspersa</i>	EN	Low	This lizard is terrestrial in littoral forest areas, including holes in coral sand substrate at the base of breadfruit trees. It will climb into the lower parts of trees. Three records exist from inland areas in higher-elevation forest, but the species appears to be rare away from coastal areas, possibly because of cat predation (Allison <i>et al.</i> 2013).
Samoa Skink	<i>Emoia samoensis</i>	EN	Possible	This is an arboreal species, primarily found on tree trunks and low vegetation at heights of ground level to several metres from the ground. It can be seen in primary and secondary forest, although it is absent from urban areas. It has a clutch size of four to seven eggs. Appeared in surveys around Apia conducted between 2009 and 2012 (Fisher <i>et al.</i> 2013)
Olive Small-Scaled Skink	<i>Emoia lawesi</i>	EN	Possible	Species of this genus tend to inhabit the surface, herbaceous, and low-shrub strata (Brown and Marshall 1953). The habitat on the islands on which this species occurs ranges from lowland to montane rainforest. As other species of this genus are known to inhabit lowland forest, it is inferred that this species can also be found in this habitat type (Allison and Austin, 2010).
Gastropod snail	<i>Thaumatodon hystricelloides</i>	EN	Possible	Minute in size (1-2 mm). Formerly widespread throughout the island of Upolu, now restricted to high elevation forest areas (Mollusc Specialist Group. 1996).
Palm	<i>Clinostigma samoense</i>	EN	Possible	A palm confined to Upolu Island, Western Samoa. Remaining subpopulations appear to be healthy and stable, the species occasionally being quite common (Whistler and Johnson, 1998).
Palm	<i>Drymophloeus samoensis</i>	CR	Possible	A rare palm of the Upolu Island montane cloud forest (Whistler and Johnson, 1998).
Pacific Sheath-tailed Bat	<i>Emballonura semicaudata</i>	EN	Low	This species has now disappeared from Samoa and American Samoa (Bonaccorso and Allison, 2008).
Shy Ground-dove	<i>Alopecoenas stairi</i>	VU	Low	The species remains very rare in Samoa, with just with one injured bird recovered from the main island of Upolu in 2006 (Birdlife International, 2016).
Tooth-billed Pigeon (endemic)	<i>Didunculus strigirostris</i>	CR	Probable	This species has been reported as having been sighted from interviews conducted at the village of Malololelei, which is located on the Central Cross Island Road at Km 7+000 (Serra, 2016).
Beck's Petrel	<i>Pseudobulweria becki</i>	CR	Low	Population status in Samoa uncertain, primarily a coastal/marine species (Birdlife International, 2016). Unlikely to be found in the montane forest habitats the characterise the Central Cross Island Road corridor.
White-necked Petrel	<i>Pterodroma cervicalis</i>	VU	Low	Population status in Samoa uncertain, primarily a coastal/marine species (Birdlife International, 2016). Unlikely to be found in the montane forest habitats the characterise the Central Cross Island Road corridor.
Cook's Petrel	<i>Pterodroma cookii</i>	VU	Low	Population status in Samoa uncertain, primarily a coastal/marine species (Birdlife International, 2016). Unlikely to be found in the montane forest habitats the characterise the Central Cross Island Road corridor.

Common name	Scientific name	IUCN status	Likelihood	Justification
Collared Petrel	<i>Pterodroma brevipes</i>	VU	Low	Population status in Samoa uncertain, primarily a coastal/marine species (Birdlife International, 2016). Unlikely to be found in the montane forest habitats the characterise the Central Cross Island Road corridor.
Phoenix Petrel	<i>Pterodroma alba</i>	EN	Low	Population status in Samoa uncertain, primarily a coastal/marine species (Birdlife International, 2016). Unlikely to be found in the montane forest habitats the characterise the Central Cross Island Road corridor.
Providence Petrel	<i>Pterodroma solandri</i>	VU	Low	Population status in Samoa uncertain, primarily a coastal/marine species (Birdlife International, 2016). Unlikely to be found in the montane forest habitats the characterise the Central Cross Island Road corridor.
Buller's Shearwater	<i>Ardenna bulleri</i>	VU	Low	Population status in Samoa uncertain, primarily a coastal/marine species (Birdlife International, 2016). Unlikely to be found in the montane forest habitats the characterise the Central Cross Island Road corridor.
Polynesian Storm-petrel	<i>Nesofregetta fuliginosa</i>	EN	Low	Population status in Samoa uncertain, primarily a coastal/marine species (Birdlife International, 2016). Unlikely to be found in the montane forest habitats the characterise the Central Cross Island Road corridor.
Ma'oma'o (endemic)	<i>Gymnomyza samoensis</i>	EN	Probable	This species has been reported as having been sighted from interviews conducted at the village of Malololelei, which is located on the Central Cross Island Road at Km 7+000 (Serra, 2016).
Samoa White-eye (endemic)	<i>Zosterops samoensis</i>	VU	Low	Endemic to Savai'i, not reports from Upolu Island (Birdlife International, 2016).
Bristle-thighed Curlew	<i>Numenius tahitiensis</i>	VU	Low	Native to Samoa, primarily a coastal/marine species (Birdlife International, 2016). Unlikely to be found in the montane forest habitats the characterise the Central Cross Island Road corridor.
White-winged Petrel	<i>Pterodroma leucoptera</i>	VU	Low	Population status in Samoa uncertain, primarily a coastal/marine species (Birdlife International, 2016). Unlikely to be found in the montane forest habitats the characterise the Central Cross Island Road corridor.

Table 4.6: Other endemic species

Common name	Scientific name	IUCN status	Likelihood	Justification
Small Samoan Flying Fox	<i>Pteropus allenorum</i>	-	Nil	This species is believed to be extinct. American Society of Mammologists (2018) Mammal Diversity Database, http://www.mammaldiversity.org
Samoan Starling	<i>Aplonis atrifusca</i>	LC	Possible	Classified as Least Concern. Does not qualify for a more at risk category as is widespread and abundant. Its natural habitat is tropical moist forest on volcanic islands. This starling feeds on a variety of fruits, especially guava, and insects. Craig (2009) Natural History of American Samoa. www.nps.gov/npsa .
Flat-billed Kingfisher	<i>Todiramphus recurvirostris</i>	LC	Possible	Although this species may have a restricted range, it is not believed to approach the thresholds for a IUCN Vulnerable listing under the range size criterion (Extent of Occurrence <20,000 km ² combined with a declining or fluctuating range size, habitat extent/quality, or population size and a small number of locations or severe fragmentation). BirdLife International (2019) Species factsheet: <i>Todiramphus recurvirostris</i> . Downloaded from http://www.birdlife.org on 04/02/2019
Samoan Whistler	<i>Pachycephala flavifrons</i>	LC	Possible	Classified as Least Concern. Does not qualify for a more at risk category. Widespread and abundant taxa are included in this category. Its natural habitats are subtropical or tropical moist lowland forests and subtropical or tropical moist montanes. BirdLife International 2004. <i>Pachycephala flavifrons</i> . IUCN Red List of Threatened Species. Accessed 04/02/2019.
Samoan Triller	<i>Lalage sharpei</i>	NT	Possible	Inhabits primary and secondary forest and forest edge up to 200 m on Upolu. It also occurs (rarely) in cattle pastures where there is undergrowth and trees, and in traditional plantations with few permanent houses. It feeds on fruits and invertebrates, foraging largely in the canopy of tall trees BirdLife International (2019) Species factsheet: <i>Lalage sharpei</i> . Downloaded from http://www.birdlife.org on 04/02/2019.
Samoan Fantail	<i>Rhipidura nebulosa</i>	LC	Possible	Natural habitats are subtropical or tropical moist lowland forests and subtropical or tropical moist montanes. BirdLife International (2004). <i>Rhipidura nebulosa</i>
Samoan Flycatcher	<i>Myiagra albiventris</i>	NT	Possible	Its natural habitats are subtropical or tropical moist lowland forests, subtropical or tropical moist montane forests, and rural gardens and is threatened by habitat loss. BirdLife International (2016). <i>Myiagra albiventris</i>
Red Headed Parrot Finch	<i>Erythrura cyaneovirens</i>	NT	Possible	A common species of estrildid finch found in the Samoan Islands. It has an estimated global extent of occurrence of 20,000 to 50,000 km ² . It is found in subtropical/tropical lowland moist forest. BirdLife International (2012). <i>Erythrura cyaneovirens</i> .

4.2.5 Critical Habitat

The SPS includes several thresholds governing project activities in areas of natural and critical habitat. The SPS defines critical habitat as:

A subset of both natural and modified habitat that deserves particular attention. Critical habitat includes areas with high biodiversity value, including:

- (i) habitat required for the survival of critically endangered or endangered species*
- (ii) areas with special significance for endemic or restricted-range species*
- (iii) sites that are critical for the survival of migratory species*
- (iv) areas supporting globally significant concentrations or numbers of individuals of congregatory species*
- (v) areas with unique assemblages of species that are associated with key evolutionary processes or provide key ecosystem services*
- (vi) areas with biodiversity that has significant social, cultural or economic importance to local communities*

Further, in accordance with the SPS Appendix 1 para. 28, no project activity is permitted in areas of critical habitat unless:

- (i) there are no measurable adverse impacts, or likelihood of such, on the critical habitat that could impair its high biodiversity value or ability to function;
- (ii) the project is not anticipated to lead to a reduction in the population of any recognized endangered or critically endangered species, or a loss in the area of the habitat concerned such that the persistence of a viable and representative host ecosystem will be compromised; and
- (iii) any lesser impacts are mitigated to achieve at least no net loss of biodiversity.

Based on this guidance, the Apia Catchment KBA would qualify as critical habitat for both the Tooth-billed Pidgeon and the Ma'oma'o.

There are 7 km of the Central Cross Island Road between km 2+000 and km 9+000 which pass through the Apia Catchment KBA (Figure 4.13 and detailed in Annex 3). Construction works will be entirely confined to the footprint of the existing road right-of-way; the habitat values within the right-of-way are severely degraded due to the influence of the existing road (confirmed by field assessments). In addition, due to the land uses that have been developed around the road, the habitat values up to 50m either side of the road corridor are also degraded (Plate 4.4a). This is also shown in Annex 3 which provides close-up images of the sections of the Central Cross Island Road between km 2+000 and km 9+000 that pass through the Apia Catchment KBA. The non-degraded sections of forest that could potentially be classified as critical habitat for the Tooth-billed Pidgeon and/or the Ma'oma'o, based on their habitat preferences, breeding requirements and habitat quality (example provided in Plate 4.4b), are beyond the road right-of-way and the corridor. It can be seen from Figure 4.13 that the existing road and proposed project upgrading construction limit-of-works (within the green shading on maps in Annex 3) do not impinge on any areas of undisturbed forest (indicated by blue shading on maps in Annex 3). The degraded vegetative zone between the road corridor and the non-degraded forest (as per example in Plate 4.4b) may have habitat values but will not satisfy the criteria for critical habitat.

In addition, the Central Cross Island Road upgrade requires only a 16m wide right-of-way and not the standard 22m; this will minimise any risk posed by project related activities to any areas flanking the corridor that may hold some residual habitat value for endangered species. Provisions are included in the EMP to ensure that all lesser impacts originating from project related activities are mitigated to achieve, at least, no net loss of biodiversity (i.e. not actual harm, nor loss or degradation of habitat) relating to either species. It is anticipated that the Central Cross Island Road will be able to meet the three thresholds required to permit project activities in areas of critical habitat (SPS Appendix 1 para 28 (i), (ii) and (iii)). Assessment of the proposed project against the criteria for critical habitat has been conducted in the following Section 4.2.6.

Figure 4.13: Location of where project road passes 7km of Apia catchment KBA



Plate 4.4a: Disturbed and degraded habitat typical of the road corridor



Plate 4.4b: Non-degraded forest that classifies as critical habitat



4.2.6 Critical Habitat Assessment

Approach. This is an assessment of critical habitat applicable to the project, the assessment is based on the baseline information provided in Section 4.2. The assessment was informed by an extensive literature review and in-field observations and has completed the first two steps of critical habitat determination, as specified in paragraphs GN59 – GN61 of the IFC's Updated Guidance Note 6 (corresponding to Performance Standard 6 (PS6) – Biodiversity Conservation).¹⁰ The scope of this assessment completes step 3 as defined in paragraph GN62 - GN67 which determines if a project is situated in critical habitat.

Critical habitat is defined in Paragraph 16 of the PS6 as an area with high biodiversity value. This includes areas that meet one or more of the following criteria:

- Criterion 1: Critically endangered (CR) and/or endangered (EN) species;
- Criterion 2: Endemic and/or restricted-range species;
- Criterion 3: Migratory and/or congregatory species;
- Criterion 4: Highly threatened and/or unique ecosystems;
- Criterion 5: Key evolutionary processes; and

GN53 and GN54 also note that in general, internationally recognized areas of high biodiversity value will often qualify as critical habitat. Including: areas that meet the criteria of the IUCN's Protected Area Management categories Ia, Ib and II; the majority of Key Biodiversity Areas (KBAs), which encompass, among others, Important and Biodiversity Bird Areas (IBA); UNESCO Natural and Mixed World Heritage Sites; and sites that fit the designation criteria of the Alliance for Zero Extinction. This will include the Apia Catchment which is designated as a KBA and IBA.

The above criteria map closely with the triggers for critical habitat included in the SPS.

The determination of critical habitat can include other recognised high biodiversity values which are to be evaluated on a case-by-case basis and the following examples are provided:

- Areas required for the reintroduction of CR or EN species and refuge sites for these species (habitat used during periods of stress (e.g. flood, drought or fire));
- Ecosystems of known special significance to EN or CR species for climate adaptation purposes;
- Concentrations of vulnerable (VU) species in cases where there is uncertainty regarding the listing, and the actual status of the species may be EN or CR;
- Areas of primary/old-growth/pristine forests and/or other areas with especially high levels of species diversity;
- Landscape and ecological processes (e.g. water catchments, areas critical to erosion control, disturbance regimes (e.g. fire, flood)) required for maintaining critical habitat;
- Habitat necessary for the survival of keystone species; and
- Areas of high scientific value such as those containing concentrations of species new and/or little known to science.

Guidance Note 6 recognises that there are gradients of critical habitat based on relative vulnerability (degree of threat) and irreplaceability (rarity or uniqueness). For Criteria 1-3, quantitative thresholds are provided to assign critical habitat into either Tier 1 or Tier 2. The Guidance Note details the relevant thresholds, these have been reproduced in Table 4.7.

¹⁰ IFC. 2018. Guidance Note 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources.

Table 4.7: Qualitative thresholds for Tiers 1 and 2 of critical habitat criteria 1 – 3

Criterion	Tier 1	Tier 2
1. CR/ EN Species	<p>(a) Habitat required to sustain $\geq 10\%$ of the global population of a CR or EN species/ subspecies where there are known, regular occurrences of the species and where that habitat could be considered a discrete management unit for that species.</p> <p>(b) Habitat with known, regular occurrences of CR or EN species where that habitat is one of 10 or fewer discrete management sites globally for that species.</p>	<p>(c) Habitat that supports the regular occurrence of a single individual of a CR species and/or habitat containing regionally- important concentrations of a Red-listed EN species where that habitat could be considered a discrete management unit for that species/ subspecies.</p> <p>(d) Habitat of significant importance to CR or EN species that are wide-ranging and/or whose population distribution is not well understood and where the loss of such a habitat could potentially impact the long-term survivability of the species.</p> <p>(e) As appropriate, habitat containing nationally/regionally important concentrations of an EN, CR or equivalent national/regional listing.</p>
2. Endemic/ Restricted Range Species	<p>(a) Habitat known to sustain $\geq 95\%$ of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species (e.g. a single-site endemic).</p>	<p>(b) Habitat known to sustain $\geq 1\%$ but $< 95\%$ of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species, where data are available and/or based on expert judgment.</p>
3. Migratory/ Congregatory Species	<p>(a) Habitat known to sustain, on a cyclical or otherwise regular basis, $\geq 95\%$ of the global population of a migratory or congregatory species at any point of the species' lifecycle where that habitat could be considered a discrete management unit for that species.</p>	<p>(b) Habitat known to sustain, on a cyclical or otherwise regular basis, $\geq 1\%$ but $< 95\%$ of the global population of a migratory or congregatory species at any point of the species' lifecycle and where that habitat could be considered a discrete management unit for that species, where adequate data are available and/or based on expert judgment.</p> <p>(c) For birds, habitat that meets BirdLife International's Criterion A4 for congregations and/or Ramsar Criteria 5 or 6 for Identifying Wetlands of International Importance.</p> <p>(d) For species with large but clumped distributions, a provisional threshold is set at $\geq 5\%$ of the global population for both terrestrial and marine species.</p> <p>(e) Source sites that contribute $\geq 1\%$ of the global population of recruits.</p>

Source: IFC - Guidance Note 6 (2012)

Findings. For each of the criterion, the findings of the assessment to determine whether the project is situated in critical habitat are presented below.

Criterion 1: critically endangered and/or endangered and criterion 2: endemic or restricted range species

Table 4.5 identified threatened species that have the potential to be present near the project area. This has been completed with reference to the IUCN Red List of Threatened Species. Species classified as vulnerable or above on the Red List are referred to as 'threatened' species. Of the 21 Red List species identified, five are considered possible and two are considered probable of being present near the Central Cross Island Road project footprint.

Table 4.6: identified restricted range/endemic species that are not classified as ‘threatened’ on the IUCN Red List. Of the eight endemic species identified, seven (four classified as least concern and three classified as near threatened) are considered possible of being present near the Central Cross Island Road project footprint. The species identified as having a possible or probable likelihood of being present within the vicinity of the project area have been screened to identify species that are classified as either critically endangered or endangered (Table 4.5) as well as endemic or range restricted species (Table 4.6) and these are presented in Table 4.8.

Table 4.9 identifies appropriate discrete management units (DMU) and critical habitat determination based on the known life-histories, distribution and population size of threatened, endemic or restricted range species that may be found close to the project area.

Based on the assessment, critical habitat is determined as present for five criteria one – tier 2 species (two skink, 1 snail and two bird species) and five criteria two species. Two bird species identified in Table 4.5 do not trigger critical habitat.

Criterion 3: migratory and congregatory species

Guidance Note 6 defines migratory and congregatory species in the following way:

- Migratory species - any species of which a significant proportion of its members cyclically and predictably move from one geographical area to another (including within the same ecosystem).
- Congregatory species - species whose individuals gather in large groups on a cyclical or otherwise regular and/or predictable basis; examples include the following: species that form colonies; (ii) species that form colonies for breeding purposes and/or where large numbers of individuals of a species gather at the same time for non-breeding purposes (e.g., foraging, roosting); (iii) species that move through bottleneck sites where significant numbers of individuals of a species pass over a concentrated period of time (e.g., during migration); (iv) species with large but clumped distributions where a large number of individuals may be concentrated in a single or a few sites while the rest of the species is largely dispersed (e.g., wildebeest distributions); and (v) source populations where certain sites hold populations of species that make an inordinate contribution to recruitment of the species elsewhere (especially important for marine species).

The Apia Catchments IBA is designated for the presence of four of the eight globally threatened and 16 of the 20 restricted-range species, but not for congregations of migratory (or other) birds. Further, the site is described as predominantly secondary and disturbed forest, with its importance as a watershed area providing protection for native biodiversity including birds (Birdlife International, 2010). For migratory bird species there is a low likelihood that any populations supported by the 54 km² area would approach greater than or equal to one percent of the global population of any migratory species. Therefore, the area is not deemed to meet criterion 3 with respect to migratory bird species.

Criterion 4: highly threatened and/or unique ecosystems

Guidance Note 6 defines highly threatened or unique ecosystems as: at risk of significantly decreasing in area or quality; with a small spatial extent; and/or containing unique assemblages of species including assemblages or concentrations of biome-restricted species.

The IUCN has developed a system for assigning levels of threat to ecosystems at local, regional, and global levels (IUCN, 2016). Ecosystems that fall within the project area and meet the definition of EN or CR per IUCN (2016) are assumed to meet criterion 4 for critical habitat. For many habitat types, data on distribution, quality and functioning are lacking. In these instances, estimates have been made based on available evidence, professional judgement and levels of protection (e.g. habitats specifically protected by law, or proportion of habitat types occurring within protected areas). This is summarized in Table 4.10.

Table 4.8: Threatened and endemic species potentially present near the project area

Species	Proximity to Project Footprint	IUCN Listing	Endemic	Restricted Range*	Explanatory Notes
BIRDS					
Tooth-billed Pigeon <i>Didunculus strigirostris</i>	Potentially utilises forest habitat as nesting/rearing habitat, and disturbed areas flanking the road corridor as foraging habitat.	CR	Yes	Yes	Exists at Uafato and Malololelei forests (Upolu) and Aopo and Taga forests (Savai'i) (Serra et al. 2016, 2017). Non-migratory Estimated number of individuals – 50-249 Number of Locations – 11-100 Extent of occurrence (EOO) – 2900 km2
Ma'oma'o <i>Gymnomyza samoensis</i>	Potentially utilises forest habitat as nesting/rearing habitat, and disturbed areas flanking the road corridor as foraging habitat.	EN	Yes	Yes	Occurs on Savai'i and Upolu. In 1984 was common in preferred habitat on Upolu (Bellingham & Davis 1988) but appears to have become rarer. E.g. not recorded in two surveys (Lovegrove et al. 1992, Park et al. 1992) nor by offshore island surveys in 1999 (Freifeld. in press), only one individual recorded at proposed Uafato conservation area in 1997 (Beichle 1997b). Non-migratory Estimated number of individuals - 250-999 Number of Locations - 11-1000 EOO – 3200 km2
Samoaan Flycatcher <i>Myiagra albiventris</i>	Possibly present in areas of disturbed habitat flanking the road corridor and forest habitat.	NT	Yes	Yes	Widespread on Savai'i and Upolu. Species population size has not been formally estimated but thought to number fewer than 10,000 individuals (G. Dutson 2011). Non-migratory Estimated number of individuals - <10,000 Number of Locations – 11-100 EOO – 4800 km2
Samoaan Triller <i>Lalage sharpei</i>	Possibly present in areas of disturbed habitat flanking the road corridor and forest habitat.	NT	Yes	Yes	Endemic to Samoa; found on Savai'i (<i>Race tenebrosa</i>) and Upolu (<i>Nominate sharpei</i>). In 1984 survey was not common in O le Pupu-pu'e National Park (Upolu) (Beichle & Maelzer 1985) and is regarded as uncommon overall. Has been recorded infrequently on Aleipata Islands (Parrish & Sherley 2012). Non-migratory Estimated no. individuals - ? No published pop. estimates. Number of Locations - ? EOO – 4800 km2
Red Headed Parrot Finch <i>Erythrura cyaneovirens</i>	Possibly present in areas of disturbed habitat flanking the road corridor and forest habitat.	NT	Yes	No	Found in Samoa in closed-canopy or degraded forest and in Vanuatu in closed-canopy forest (Payne 2016). Non-migratory Estimated number of individuals - 10,000 – 19,999 Number of Locations – ? EOO – 897,000 km2

Species	Proximity to Project Footprint	IUCN Listing	Endemic	Restricted Range*	Explanatory Notes
Samoan Fantail <i>Rhipidura nebulosa</i>	Possibly present in areas of disturbed habitat flanking the road corridor and forest habitat.	LC	Yes	Yes	Found in subtropical/tropical moist lowland and montane forests (IUCN 2019). Non-migratory Estimated number of individuals - ? Number of Locations - ? EOO – 3500 km ²
Samoan Starling <i>Aplonis atrifusca</i>	Possibly present in areas of disturbed habitat flanking the road corridor and forest habitat.	LC	Yes	Yes	Common in Samoa and American Samoa (IUCN 2019). Non-migratory Estimated number of individuals - ? Number of Locations - ? EOO – 15,300 km ²
Flat-billed Kingfisher <i>Todiramphus recurvirostris</i>	Possibly present in areas of disturbed habitat flanking the road corridor and forest habitat.	LC	Yes	Yes	Endemic to Samoa; found in multiple habitats (IUCN 2019). Non-migratory Estimated number of individuals - ? Number of Locations - ? EOO – 4800 km ²
Samoan Whistler <i>Pachycephala flavifrons</i>	Possibly present in areas of disturbed habitat flanking the road corridor and forest habitat.	LC	Yes	Yes	Endemic to Samoa; found in forest habitats Non-migratory Estimated number of individuals - ? Number of Locations - ? EOO – 4800 km ²
REPTILES					
Samoa Skink <i>Emoia samoensis</i>	Potentially utilises forest habitat and/or disturbed areas flanking the road corridor.	EN	Yes	Yes	Found in Samoa and American Samoa (Ta'u and Tutuila), where it inhabits elevations of up to around 1,300 m asl. IUCN Red List 2011. <i>Emoia samoensis</i> . Estimated number of individuals – ? Number of Locations – ? EOO – 3070 km ²
Olive Small-Scaled Skink <i>Emoia lawesi</i>	Potentially utilises forest habitat and/or disturbed areas flanking the road corridor.	EN	Yes	Yes	Found on Niue, Samoa, Tonga (Adler et al. 1995) and American Samoa (Steadman & Pregill 2004). Area in which this species is distributed is approx. 3,993 km ² (calculated by taking sum of areas of each of the islands) Estimated number of individuals – ? Number of Locations – 4 EOO – 3993 km ²
INVERTEBRATES (for terrestrial vertebrates, Guidance Note 6 defines restricted-range as those species which have an extent of occurrence of 50,000 km ² or less)					
Gastropod snail <i>Thaumatodon hystricelloides</i>	Potentially utilises forest habitat and/or disturbed areas flanking the road corridor.	EN	Yes	Yes	Formerly widespread throughout Upolu, now restricted to high elevation forest areas (Mollusc Specialist Group. 1996). Estimated number of individuals – ? Number of Locations – ? EOO – ?

Table 4.9: Discrete management units and critical habitat determination

Species	IUCN Status	Discrete management unit	Critical habitat determination
Samoa Skink <i>Emoia samoensis</i>	Classified as EN and endemic to Samoa. Decreasing population trend.	It is difficult to determine an appropriate DMU due to the lack of information on distribution and population size. As this species is rare, and skinks typically have small home ranges, it is unlikely that individuals range more than 1 km. A DMU incorporating 1 km buffer either side of 7km long road section within the Apia Catchment (14 km ² total area) is deemed appropriate.	YES - criteria 1; tier 2 Classified as EN by the IUCN; Endemic; Restricted Range.
Olive Small-Scaled Skink <i>Emoia lawesi</i>	Classified as EN, found on the Islands of Niue, Samoa, Tonga and American Samoa. The area in which this species is distributed is approximately 3,992.7 km ² (calculated by taking the sum of the areas of each of the islands).	It is difficult to determine an appropriate DMU due to the lack of information on distribution and population size. As this species is rare, and skinks typically have small home ranges, it is unlikely that individuals range more than 1 km from the source. A DMU incorporating 1 km buffer either side of 7km long road section within the Apia Catchment (14 km ² total area) is deemed appropriate.	YES - criteria 1; tier 2 Classified as EN by the IUCN; Endemic; Restricted Range.
Gastropod snail <i>Thaumatodon hystricelloides</i>	Classified as EN, formerly widespread throughout the island of Upolu, now restricted to high elevation forest areas.	It is difficult to determine an appropriate DMU due to the lack of information on distribution and population size. As this species is rare, and gastropods typically have very small home ranges, it is unlikely that individuals range more than 1 km. A DMU incorporating a 1 km buffer either side the 7km road corridor within the Apia Catchment (14 km ² total area) is deemed appropriate.	YES - criteria 1; tier 2 Classified as EN by the IUCN; Endemic; Restricted Range.
Tooth-billed Pigeon <i>Didunculus strigirostris</i>	Classified as CR, formerly widespread throughout Upolu, now restricted to high elevation forest. Estimated no. individuals – 50-249 Number of Locations – 11-100 EOO – 2900 km ²	As the species is likely to have large home ranges and occur at low densities, any unit of analysis must be correspondingly large. A DMU incorporating the entire Apia Catchment KBA (approx. 54 km ²) is deemed appropriate for bird species.	YES - criteria 1; tier 2 Classified as CR by the IUCN; Endemic; Restricted Range.
Ma'oma'o <i>Gymnomyza samoensis</i>	Classified as EN by IUCN, occurs on both Savai'i and Upolu. Non-migratory Estimated no. individuals - 250-999 Number of Locations - 11-1000 EOO – 3200 km ²	As the species is likely to have large home ranges and occur at low densities, any unit of analysis must be correspondingly large. A DMU incorporating the entire Apia Catchment KBA (approx. 54 km ²) is deemed appropriate for bird species.	YES - criteria 1; tier 2 Classified as CR by the IUCN; Endemic; Restricted Range.
Samoa Starling <i>Aplonis atrifusca</i>	Classified as LC by IUCN, endemic to Samoa with Restricted Range Non-migratory EOO – 15,300 km ²	As the species is likely to have large home ranges and occur at low densities, any unit of analysis must be correspondingly large. A DMU incorporating the entire Apia Catchment KBA (approx. 54 km ²) is deemed appropriate for bird species.	NO - criteria 2 DMU unlikely to sustain ≥1% but ≤95% of global population based on its area as a proportion of the EOO for this species.

Species	IUCN Status	Discrete management unit	Critical habitat determination
Flat-billed Kingfisher <i>Todiramphus recurvirostris</i>	Classified as LC by IUCN, endemic to Samoa with Restricted Range Non-migratory EOO – 4800 km ²	As the species is likely to have large home ranges and occur at low densities, any unit of analysis must be correspondingly large. A DMU incorporating the entire Apia Catchment KBA (approx. 54 km ²) is deemed appropriate for bird species.	YES - criteria 2 DMU likely to sustain ≥1% but ≤95% of global population based on its area as a proportion of the EOO this species
Samoan Whistler <i>Pachycephala flavifrons</i>	Classified as LC by IUCN, endemic to Samoa with Restricted Range Non-migratory EOO – 4800 km ²	As the species is likely to have large home ranges and occur at low densities, any unit of analysis must be correspondingly large. A DMU incorporating the entire Apia Catchment KBA (approx. 54 km ²) is deemed appropriate for bird species.	YES - criteria 2 DMU likely to sustain ≥1% but ≤95% of global population based on its area as a proportion of the EOO this species
Samoan Triller <i>Lalage sharpei</i>	Classified as NT by IUCN, endemic to Samoa with Restricted Range Non-migratory EOO – 4800 km ²	As the species is likely to have large home ranges and occur at low densities, any unit of analysis must be correspondingly large. A DMU incorporating the entire Apia Catchment KBA (approx. 54 km ²) is deemed appropriate for bird species.	YES - criteria 2 DMU likely to sustain ≥1% but ≤95% of global population based on its area as a proportion of the EOO this species
Samoan Fantail <i>Rhipidura nebulosa</i>	Classified as LC by IUCN, endemic to Samoa with Restricted Range Non-migratory EOO – 3500 km ²	As the species is likely to have large home ranges and occur at low densities, any unit of analysis must be correspondingly large. A DMU incorporating the entire Apia Catchment KBA (approx. 54 km ²) is deemed appropriate for bird species.	YES - criteria 2 DMU likely to sustain ≥1% but ≤95% of global population based on its area as a proportion of the EOO this species
Samoan Flycatcher <i>Myiagra albiventris</i>	Classified as NT by IUCN, endemic to Samoa with Restricted Range Non-migratory Estimated no. individuals - <10,000 Number of Locations – 11-100 EOO – 4800 km ²	As the species is likely to have large home ranges and occur at low densities, any unit of analysis must be correspondingly large. A DMU incorporating the entire Apia Catchment KBA (approx. 54 km ²) is deemed appropriate for bird species.	YES - criteria 2 DMU likely to sustain ≥1% but ≤95% of global population based on its area as a proportion of the EOO this species
Red Headed Parrot Finch <i>Erythrura cyaneovirens</i>	Classified as NT by IUCN, found in Samoa in native, closed-canopy or degraded forest, and in Vanuatu in predominantly closed-canopy forest. Non-migratory Estimated no. individuals - 10,000 – 19,999 Number of Locations – ? EOO – 897,000 km ²	As the species is likely to have large home ranges and occur at low densities, any unit of analysis must be correspondingly large. A DMU incorporating the entire Apia Catchment KBA (approx. 54 km ²) is deemed appropriate for bird species.	NO - criteria 2 DMU unlikely to sustain ≥1% but ≤95% of global population based on its area as a proportion of the EOO for this species.

Table 4.10: Summary of IUCN Ecosystem Red List Criteria

Criterion	CR	EN
Reduction in geographic distribution	Reduction in geographic distribution of >80% in any 50-year time period.	Reduction in geographic distribution of >50% in any 50-year time period.
Restricted geographic distribution	EOO of <2000 km ² AOO <2 10x10 km grid cells EOO	EOO of <20,000 km ² AOO <20 10x10 km grid cells
Environmental degradation	Reduction in an abiotic variable affecting more than 80% of ecosystem in 50-year time period.	Reduction in an abiotic variable affecting more than 50% of ecosystem in 50-year time period.
Disruption of biotic processes or interactions	Reduction in a biotic variable affecting or than 80% of ecosystem in 50-year time period.	Reduction in a biotic variable affecting more than 50% of ecosystem in 50-year time period.
Quantitative analysis that estimates the probability of ecosystem collapse	Quantitative analysis that estimates the probability of ecosystem collapse to be >50% in 50 years.	Quantitative analysis that estimates the probability of ecosystem collapse to be >20% in 50 years.

Source: IUCN (2016)

The proposed project footprint (including limit of construction works) will fall almost entirely within the existing road corridor, with minor deviations in highly disturbed roadside areas to improve drainage and road safety. No ecosystems fall within the proposed project footprint that meet the definition of EN or CR per IUCN (2016) as previously described in Table 4.5. Therefore, criterion 4 is not triggered.

Criterion 5: key evolutionary processes

Evolutionary processes are often strongly influenced by structural attributes of a region, such as its topography, geology, soil and climate over a period. Guidance Note 6 suggests that this criterion is defined by: (i) the physical features of a landscape that might be associated with evolutionary processes; and/or (ii) sub-populations of species that are phylogenetically or morpho-genetically distinct and may be of special conservation concern given their distinct evolutionary history.

For the purposes of this assessment, the project area has been screened against the following factors:

- Level of isolation (e.g. islands, mountaintops, lakes are associated with populations that are phylogenetically distinct)
- Extent of endemism (areas of high endemism often contain flora and/or fauna with unique evolutionary histories)
- Spatial heterogeneity;
- Presence of environmental gradients (ecotones produce transitional habitat which has been associated with the process of speciation and high species and genetic diversity)
- Edaphic interfaces; and
- Connectivity between habitats (e.g. biological corridors).
- The importance of the proposed project footprint from an evolutionary perspective is assessed by screening its features against factors that indicate importance for evolutionary processes.

Table 4.11 details the factors considered likely to indicate importance for evolutionary processes and their relevance to the proposed project footprint.

Table 4.11: Screening of criterion indicating importance for evolutionary processes

Criterion indicating importance for evolutionary processes	Relevance to proposed project footprint	Critical habitat triggered?
Level of isolation (e.g., islands, mountaintops, lakes are associated with populations that are phylogenetically distinct)	Not relevant - all construction works and operations will occur within the footprint of an existing road corridor with negligible, if any, habitat values.	No
Extent of endemism (Areas of high endemism often contain flora and/or fauna with unique evolutionary histories)	Not relevant - all construction works and operations will occur within the footprint of an existing road corridor with negligible, if any, habitat values.	No
Spatial heterogeneity	Not relevant - all construction works and operations will occur within the footprint of an existing road corridor with negligible, if any, habitat values.	No
Presence of environmental gradients (ecotones produce transitional habitat which has been associated with the process of speciation and high species and genetic diversity)	Not relevant - all construction works and operations will occur within the footprint of an existing road corridor with negligible, if any, habitat values.	No
Edaphic interfaces	Not relevant - all construction works and operations will occur within the footprint of an existing road corridor with negligible, if any, habitat values.	No
Connectivity between habitats (e.g. biological corridors).	Not relevant - all construction works and operations will occur within the footprint of an existing road corridor with negligible, if any, habitat values.	No

In summary, there is no indication that the proposed project footprint is important for evolutionary processes and therefore critical habitat is not triggered under criterion 5.

Internationally and/or nationally recognised areas

The Apia Catchment is recognised as an important bird area (Birdlife International, 2010) and a key biodiversity area (Birdlife International, 2019).and as such qualifies as critical habitat under this criterion.

4.3 Socio-economic Environment

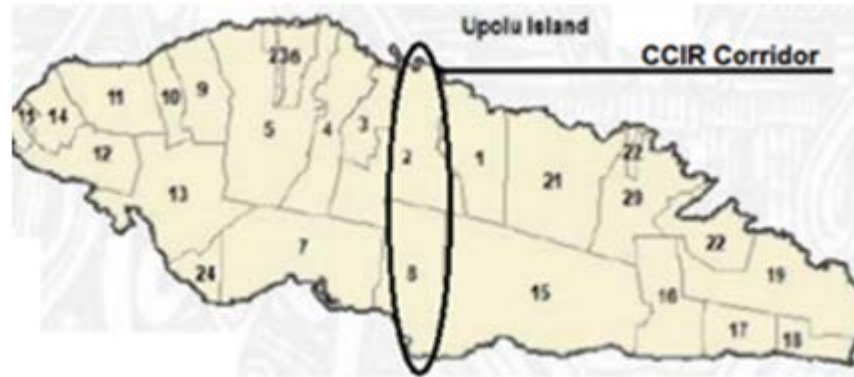
4.3.1 Population and Village Administration

Upolu is divided into 24 districts and 229 villages. The Central Cross Island Road traverses the villages of Leufisa, Papauta, Vailima, Vaoala, Tiapapata, Afiamalu, Tiavi, Siumu within the districts of Vaimuga West (2) and Si'umu (8), as shown on Figure 4.13.

Population. Samoa is comprised of two large islands, Upolu and Savai'i, and eight small islets. Samoa's total population of 195,979 (2016) is distributed across two main and two smaller islands. Upolu accounts for three-quarters of the total population. Savai'i is the larger of the two islands but accounts only for a quarter of the population.

Some 80% of the population (151,085 people) live in rural areas. Based on the 2016 Census, the population increased from 187,820 in 2011 and is projected to reach more than 200,000 by 2020 and 218,824 by 2030.

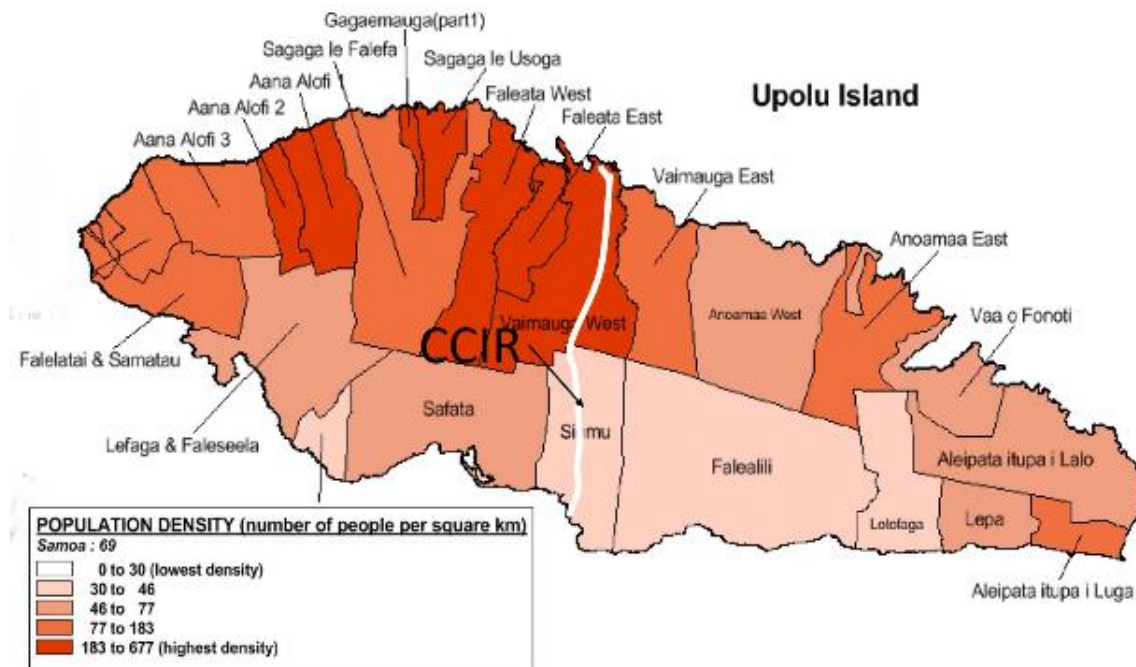
Figure 4.13: District map of Upolu



Source: Samoa Socio-Economic Atlas (2016)

The population of Upolu Island is highest in the Apia urban area which includes Vaimuga West. Five districts, including Apia urban area are the most populous with between 7,731 and 24,105 people. Across Samoa, the average population density is 69 people/km² and average household size is 7-8 people. Four districts, including Apia urban area, have the highest population density of 308-584 people/km². Figure 4.14 shows the distribution of population in Samoa with the highest being concentrated in the Apia urban area.

Figure 4.14: Population map of Upolu



Source: Samoa Socio-Economic Atlas (2016)

Population density. Table 4.12 enumerates the population of the two districts and the corresponding population density. The population of these two districts make up about 14% of the country's total population. Vaimuga West, which is a part of the Apia urban area, is the third most densely populated district in Samoa, the first two most densely populated are also part of the Apia urban area.

Table 4.12: Population and population density of Samoa, and Vaimuga West/Sium'u districts

Districts	Population	Land area (km ²)	Population Density
Vaimauga West	23,527	78.63	299
Si'umu	2,342	37.34	63
Samoa	195,979	2,830	69

Source: Samoa Bureau of Statistics (2016)

Village administration. Over 98% of the villages are traditional i.e. governed by the Fono (council of chiefs). A traditional village has a recognized traditional salutation (fa'alupega) and typically consists of a number of extended families each headed by a matai (chief), and each extended family comprises a number of households living often in a cluster of houses on extended family land.

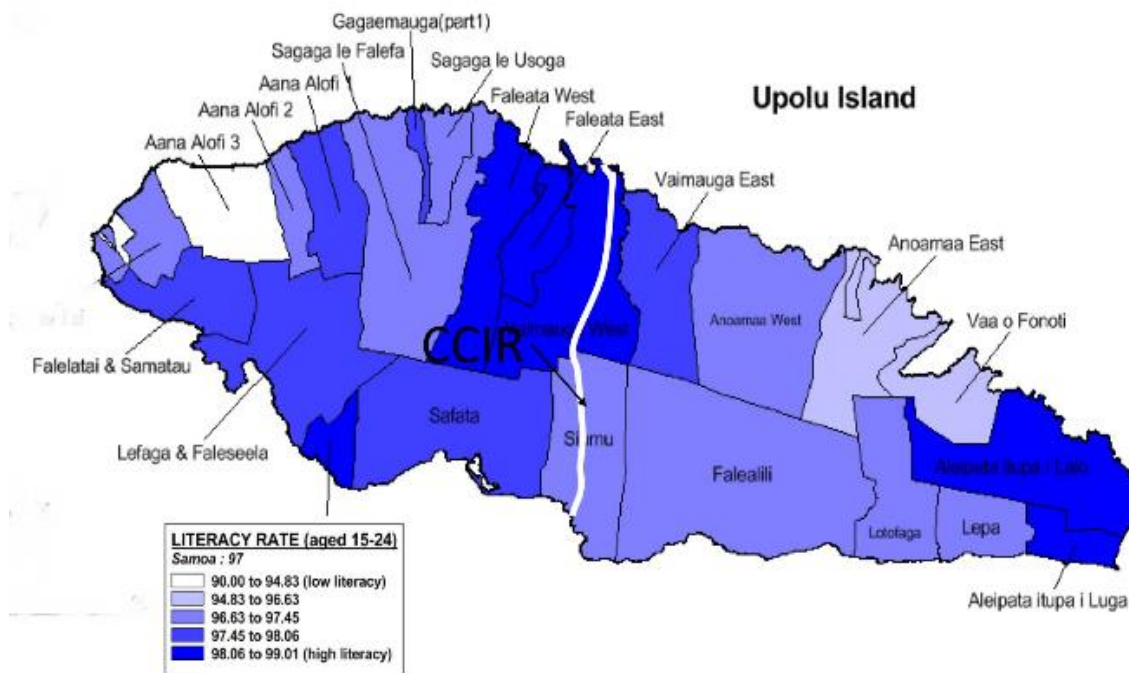
About 14% of Samoan population 15 years and older have matai (chief) title from their village of residence. The island of Savai'i has the most districts with 18% or more people 15 years and older with matai title. On Upolu only one district records 18-21% of the population with matai title, eight districts record 15-17% of the population with matai title and 15 of the districts record up to 14% of the population with matai title.

Traditional village organization consist of three main bodies (i) the Fono comprising all matai title holders; (ii) aumaga (untitled men); and (iii) aualuma ma tamaita'i often referred to as the women's committee. Each organization has well defined functions and responsibilities. The Fono makes bylaws and adjudicates on matters of law and order and ensures the proper allocation and use of communal resources especially village owned lands.

The aumaga generally serve the needs of the Fono, enforce Fono decisions and are responsible for implementing the physically demanding community activities including cultivation and fishing. The aualuma ma tamaita'i has responsibility for health and hygiene-related matters, but their more important traditional role is as weavers of highly-valued fine mats (toga) that are the main currency of value for exchange at occasions including weddings, funerals and the bestowing of chiefly titles.

4.3.2 Education and Health Status

Education and literacy. The literacy rate of Samoa for population aged 15 to 24 years is very high at 97.0%. Literacy is defined as the ability to read, write and understand simple instructions either in English or Samoan. With the Central Cross Island Road corridor, literacy is highest in Vaimuga West at 98.1 to 99.0% and relatively lower in Siumu at 97.5% to 98.1% (Figure 4.15). In terms of attendance to primary school (grades 1 to 8), the national rate is 84% and it is surprising, that the urban districts, including Vaimuga West have relatively low attendance, 82% to 84%. The rate of attendance is similarly low in Si'umu. For secondary and tertiary school attendance, the national rates are 81% and 4% respectively. The districts in the Apia urban area, including Vaimuga West have the rate of secondary attendance at 81% to 84%. Rate of attendance in Siumu is a bit lower at 78% to 81%. Similarly, rate of attendance to tertiary level education is highest in the urban areas, including Vaimuga West which is at 5% to 6%. while in Si'umu, the rate is 3% to 5%. The fact that the only institution for higher learning in Samoa is in Apia maybe a factor in the observed trend of the rate of attendance to tertiary level education.

Figure 4.15: Literacy rate in Upolu

Source: Samoa Socio-Economic Atlas (2016)

Health. The government of Samoa's health services is delivered through 12 national health facilities, one national hospital in Apia, seven district hospitals and four health and medical centers. These district hospitals and health centers are visited by doctors on rotation, i.e. general practitioner and OB gynaecologist. Samoa's national hospital, the Tupua Tamasese Meaole Hospital, is located at Motootua, in Apia. Samoan tertiary care is limited and mainly provided through arrangement with New Zealand's health care system.

In the most recent survey, conducted between 1997 and 2010, there were 48 doctors, and 185 nurses and midwives per 100,000 people.¹¹ The private health care sector has expanded in recent years, but is mostly confined to Apia and consists of small hospitals and clinics able to offer only a limited range of medical services.

In Vaimauga West 83% of population have access to improved drinking water and 98% have access to improved sanitation. The National Report for Samoa (2014) noted increasing concern surrounding high levels of non-communicable diseases and related health issues in the country, and the costs involved with addressing these problems.

Non-communicable disease is on the rise and is the most significant health threat to Samoa. This is brought on by preferences for diets rich in fat, salt and sugar and low levels of activity resulting to obesity. Incidents of diabetes mellitus has significantly increased and has become among the leading causes of death reported by public health facilities from FY 2005-2006 to FY 2009-2010. Morbidity data during the same period also indicate a rapid increase in non-communicable diseases: diabetes mellitus cases doubled from 264 to 523, and pneumonia cases almost doubled from 789 to 1506 cases.

¹¹ http://www.commonwealthhealth.org/pacific/samoa/health_systems_in_samoa/

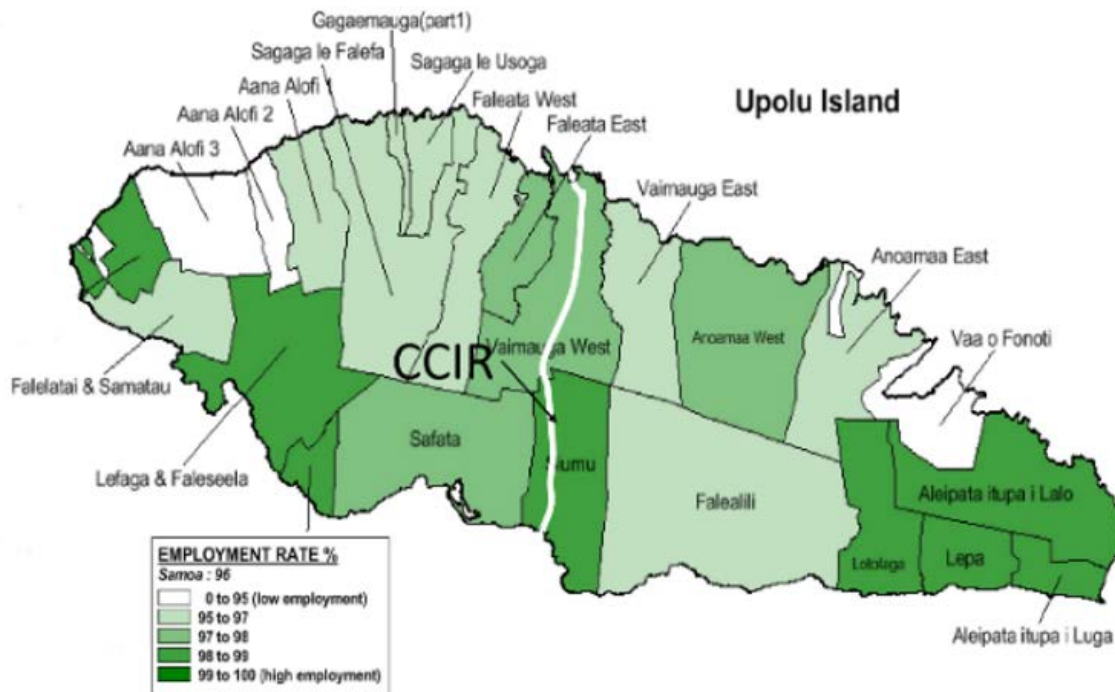
4.3.3 Economy, Livelihoods and Employment

Economy. Samoa's economy is dominated by subsistence agriculture and related activities, which support around three-quarters of the total population, including almost the entire rural population. The economy of Samoa has traditionally been dependent on development aid, family remittances from overseas, tourism, agriculture, and fishing. Agriculture and fishing employs roughly two-thirds of the labor force and furnishes 90% of exports, featuring fish, coconut oil, nonu products, and taro. The manufacturing sector mainly processes agricultural products. Industry accounts for nearly 24% of gross domestic product while employing less than 6% of the work force. The service sector accounts for nearly three-quarters of gross domestic product and employs approximately 50% of the labor force. Tourism is an expanding sector accounting for 25% of gross domestic product; 132,000 tourists visited the islands in 2013 (indexmundi, 2018).

Labor force and unemployment. The employed population comprises people 15 years and older working as employees, employers, self-employed, street vendors and subsistence workers; it should be noted the high employment rate (96%) in Samoa is due to the large number of people in rural areas engaged in the subsistence economy (Figure 4.16). The total working age population comprises 68% who reached secondary level education, 15.2% primary and 2.8% without formal education. The unemployed population are people 15 years and older actively seeking jobs. The national unemployment rate is 5.7% (male 5.2 and female 6.8%), Apia urban area has an unemployment rate of 5.7% (male 6.3% and female 4.6%) and north-west Upolu has an unemployment rate of 6.7% (male 6.6% and female 6.9%).

The non-economically active population are those attending schools, performing unpaid domestic duties, and those who are not capable of working; the national rate is 60%. The labor force participation rate is the proportion of working age population (15 years and older) who are economically active in the production of goods and services. The national labor force participation rate is 41%.

Figure 4.16: Employment rates in Upolu



Source: Samoa Socio-Economic Atlas (2016)

According to the Samoa Bureau of Statistics, employment rate in the districts traversed by Central Cross Island Road is high at about 97%; conversely, unemployment rate is low at 4-6% which is generally true for most parts of the country. The high employment rate in rural areas is attributed to subsistence economic activities, the backbone of local food production. The non-economically active population is estimated at 60% for the entire country compared with 58% in Vaimuga West and 62% - 64% in Si'umu.

4.3.4 Poverty and Hardship

The Samoa Hardship and Poverty Report 2016 provided the information from the 2013/14 household income and expenditure survey. The per capita/week basic needs poverty line (BNPL) was set nationally at WST 59.27 (WST 69.27 for Apia urban area and WST 57 for rest of Upolu) and the food poverty line (FPL) was set at WST 34.49.

Between 2002 and 2013/14, nationally the level of food poverty decreased (from 10.6% to 4.3%), but results are uneven with rate of food poverty in Apia urban area increasing and nearly doubling in north-west Upolu. In general, over the period 2002-2013/14, the rate of basic needs poverty declined steadily across the country and in Apia urban area and north-west Upolu, however the effects of the global financial crisis post-2008 saw an increase in basic needs poverty in many areas (Table 4.13).

Table 4.13: Population falling below poverty lines

Area	Population falling below food poverty line (%)			Population falling below basic needs poverty line (%)		
	2002	2008	2013/14	2002	2008	2013/14
National	10.6	4.9	4.3	22.9	26.9	18.8
Apia urban area	7.6	3.5	4.5	25.9	24.4	24.0
North-west Upolu	16.2	3.3	6.6	29.5	26.8	23.7
Rest of Upolu	6.1	8.1	2.4	15.1	26.6	13.6
Savai'i	10.3	5.1	2.9	19.1	28.8	12.5

Source: UNDP - Samoa Hardship and Poverty Report (2016)

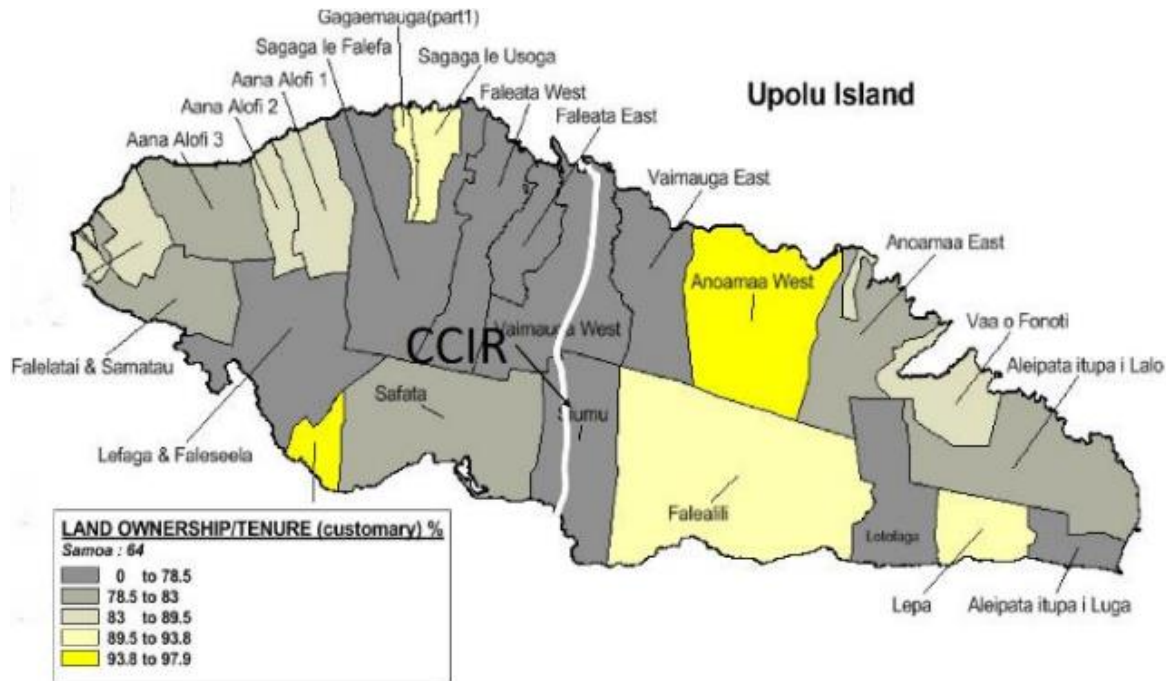
The report noted the high correlation between poverty and vulnerability and level of education; notably the incidence of food and basic needs poverty being significantly higher among people with low levels of education. There is also a noticeable correlation between gender, poverty and geographical distribution with around 28% females and 30% males with only primary school education in Apia urban area falling below the BNPL compared with the national average of 16.1% and 16.6% respectively.

4.3.5 Land Ownership and Use

Land ownership. Land ownership in Samoa falls into the following category: customary, freehold, government owned.

As indicated in the 2016 socio-economic atlas, customary land ownership is relatively low in the Apia urban area (including Vaimuga West) and adjoining Si'umu district (Figure 4.17).

Most of the land still held under customary title is on Savai'i. On Upolu nine districts are 78.5% or less of land under customary title, six districts comprise 78.5-83% land under customary title, six districts are 83-89.5% customary land, three districts register 89.5-94% and two districts register 94-98% customary land. Vaimuga West is approximately 30% while Si'umu is approximately 80% customary land.

Figure 4.17: Customary land ownership in Upolu

Source: Samoa Socio-Economic Atlas (2016)

Land use and land cover. The Central Cross Island Road upgrade starts near the intersection of Ifiifi St with Central Cross Island Road (Km 0+000). This section is within the urban sprawl of Apia which extends to about Km 4+000. Land use is predominantly built-up with residential houses, commercial establishments which includes hotels, restaurants, grocery stores; schools and churches; government institutions like the SPREP, the Department of Forestry, the Scientific Organization of Samoa, the US Embassy. Beyond Km 4+000 The corridor is occupied by scattered residences, institutions, resorts, farms and pastureland. Road side vegetation is a mix of grasses, planted trees like teak and some mahogany, falcata. *Gliricedia sp.* Morinda (noni), *Erythrina sp.*, coconut, taro, breadfruit is common along the road side. Properties are commonly fenced with hedges or wire fences.

Scenic views and aesthetics. The mountainous topography and lush forest along much of the Central Cross Island Road corridor provides the route with scenic values. Views along the way include natural features as well man-made features such as iconic structures (e.g. Baha'i), the well-designed residences and the structures after traditional Samoan design, the RLS Museum. The natural scenic attractions are the Mount Vaea Scenic Reserve, the Vasigano Watershed forest, the Papapapatai Waterfalls (Km 11+500), the views of the northern and southern coastlines.

Because of the road elevation, there are several spots with high scenic view values. Southwards after the Papapapatai Waterfalls, the road opens a sweeping view of the southern coastline. Northwards, the road offers a panoramic view of the northern coastline including Apia, several eco-tourism establishments have capitalized on these scenic views and viewing areas like the Maloloe Eco-tours, the Lupesina Treesort, Forest Café (Km 6+200).

Plates 4.5 a-d show typical road side conditions along various sections of the road.

Plates 4.5 a-d: Typical road side condition along the Central Cross Island Road

4.3.6 Cultural Heritage Resources

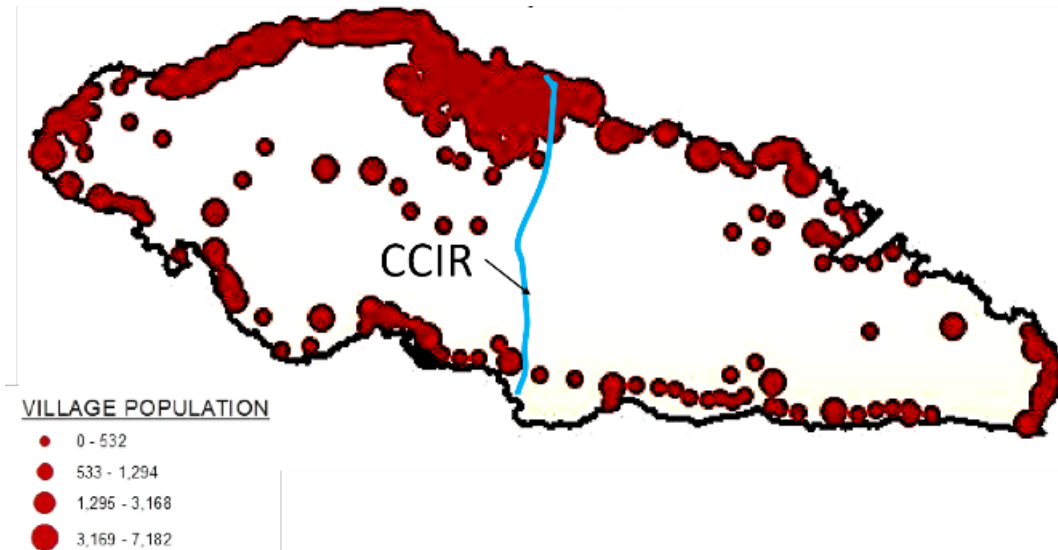
Physical cultural resources. As far as can be determined, all the cultural resources along the Central Cross Island Road corridor are relatively modern, comprising primarily of churches and other places of worship. The museum of the house of author Robert Luis Stephenson is located at approximately Km 1+900, however it is set back approximately 300m from the road; although the perimeter wall of this historic landmark may have to be pushed back several meters, the main house and surrounds won't be impacted in any way. Although we can find no record of archeologically significant sites or artefacts on the alignment the contractor will be required to develop a chance finds procedure based on the measures identified in the EMP, should earth works uncover any physical cultural resources.

Knowledge of traditional skills. The Samoan indigenous culture is rich in arts and traditions such as tattooing, carving, fishing, weaving, carpentry among others. The distribution of the population that possess these skills is lowest in Si'umu and much higher in the Apia urban area. It is also noted to be higher in Safata, district immediately west of Si'umu.

4.3.7 Social Conditions of the Central Cross Island Road Corridor

Population and demography. Villages vary widely in population, from around 100 people in smaller villages to 1000 individuals or more in larger peri-urban villages. The distribution of population centres on Upolu along the Central Cross Island Road corridor are shown in Figure 4.18:

Figure 4.18: Upolu village population disbursement



Source: Samoa Socio-Economic Atlas (2011)

There is a total of 17 communities along the road corridor for the project. The catchment population is approximately 7,031 people, which includes villages that are located along the road or rely on the road for access to essential services. The first 3-5 km of the Central Cross Island Road runs through some of the most affluent residential land and business development in Apia. This area, with its views across Apia to the sea, has become a desirable and expensive residential area. The first five kilometres is a mix of customary and freehold land.

Sensitive receptors. There are regular travellers and commuters who use the road including: (i) residents and businesses along the road who use the road to access essential services such as schooling and health; (ii) businesses and residents on the south coast who use the road as a link to Apia for work, education and other purposes. Women carry small quantities of produce by bus to sell in the Apia markets. The buses have a side rider on board to help the women load and unload their produce at the market; and (iii) tourists and other travellers who travel from one side of the island to the other for work or leisure. Specific facilities, residences and businesses along the road identified as sensitive receptors include:

- Australian High Commission
- US Embassy
- Several prime church lands – Baha'i, Methodist and Catholic
- Robert Louis Stevenson Memorial
- Several boutique hotels and rental accommodation
- Two schools and a preschool, plus a further seven schools/colleges on subsidiary roads
- Several grocery shops of various sizes.

Major community schools are shown in Table 4.14.

Table 4.14: Major community schools along or nearby the Central Cross Island Road

Village	Schools	Administration	No. students	No. staff
Vailima, Avele and Letava	<ul style="list-style-type: none"> Vaiala Beach School Vailima Primary School CCIS Theological College 	Private Government Mission	205 352	14 10
Vaoala and Tiapapata	<ul style="list-style-type: none"> Avele College Divine Mercy School Technical school 	Government Mission Private	870 189	52
Siumu East	<ul style="list-style-type: none"> Siumu East Pre-school Siumu Primary School Palalaua College 	Private Government Government	27 461 224	1 12 17

Source: Census 2016 - MESC (2018)

Students currently face the challenge of not having a safe walking path along the first three kilometres of the road. As a more densely populated area with schools in the vicinity this is a concern voiced by many respondents. They either walk along the road, which is quite narrow in places, or on a narrow verge (Plate 4.6). Neither of these are safe for children or adults.

Furthermore, those students that travel by bus do not have bus stopping bays. Buses stop along the road itself when commuters board or disembark. During the consultations, this was noted by Central Cross Island Road residents and commuters to be a major traffic hazard for both car drivers and passengers. Buses stop along the road whenever hailed by residents, with cars behind backing up and quite frequently overtaking in areas where it is not safe to do so.

Plate 4.6: School children walking on the narrow verge

Police records indicating accidents along the Central Cross Island Road over the period of 2013 to 2018 confirm that the road is an unsafe pedestrian environment. The public and focus consultations confirmed the residents and commuters request for a footpath on either one or both sides of the road especially for the students to safely walk on. At the Siumu end of the road the village has requested a footpath for the final 1-2 km where children walk to attend the local school.

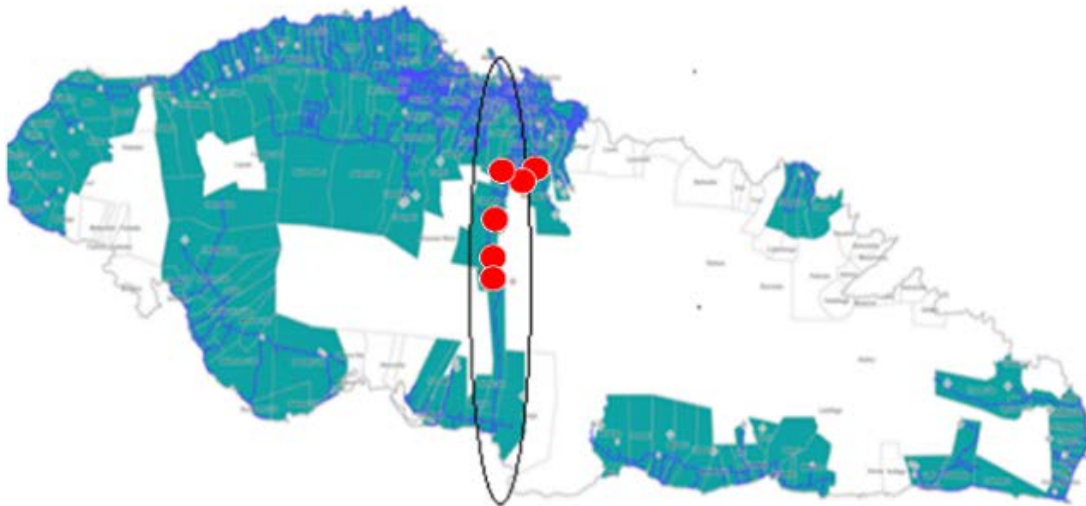
4.3.8 Infrastructure and Services

Power supply. The Samoa Electric Power Corporation (EPC) operates 22kV transmission networks on Upolu and Savai'i with upgrades in both transmission and generation undertaken with assistance through the ADB's Power Sector Expansion Project. Bulk of Samoa's existing transmission network is via overhead cable with newer sections of the network shifting to underground cabling. The island of Upolu currently has a combination of hydropower, solar and diesel generation as the primary sources of electricity. A diesel power station has been constructed at Fiaga to replace the aged Tanugamanono power station. The hydropower generation of EPC consists of four run-of-river and one dam-based hydroelectric power stations with a total capacity of around 12 MW. Hydro generators on Under the EPC Expansion Plan. The Fiaga power station consists of four new diesel engines (5.78MW each) all-generating at 11kV. Also, three existing diesel units will be relocated from Tanugamanono to Fiaga generating at 6.6kV. Most of Upolu's load is in the Apia area, with the remainder spread out around the coastal ring and project road. Power distribution line is located alongside Central Cross Island Road and some of the electric posts may have to be relocated.

Water supply and sanitation. Approximately 75% of the households of Samoa have access to improved drinking water (SBS, 2011). This is defined as water from metered tap, rain water, closed spring or purified water from shop. In Vaimuga West, 61 to 88% of households have access to improved drinking water while in Si'umu 29% to 60% of households. It is reported though that not all domestic water supply complies with the WHO standard.

The Samoan Water Authority has several water supply intakes in the Vaisigano river with the main treatment plant located at Alaoa.¹² Another is located at Tapiapata, below Central Cross Island Road at about Km 6+000. The general location of the intakes in the Vaisagano River is shown in Figure 4.19.

Figure 4.19: General location of water intakes in Vaisagano River catchment



A water distribution line runs along the Central Cross Island Road conveying water to service areas along the road and into Si'umu. Aside from the water line, there are small concrete reservoirs and several sewage treatment tanks situated along the Central Cross Island Road in Tapiapata (Plates 4.7 a and b).

¹² MWH New Zealand Ltd. 2014. SAM: Renewable Energy Development and Power Sector Rehabilitation Project Initial Environmental Examination

Plates 4.7: (a) SWA concrete water tank along Central Cross Island Road and(b) treatment plant at Tiapapata



Over 95 percent of households in Samoa have access to improved sanitation. Improved sanitation is described as households using flush or pour flush type of toilets. The same percentage of households in both districts of Vaimuga West and Si'umu have access to improved sanitation (SBS, 2011).

Roads and transportation. Savai'i and Upolu are served by coastal ring roads. Upolu is served by 3 cross-island roads strategically located at the eastern, western and central sections (Central Cross Island Road). All 3 cross island roads are tar sealed with relatively good maintenance. The main international port is Apia, with an inter-island ferry service operating between Mulifanua at northwest Upolu and Salelologa at southeast Savai'i. The main international airport is Faleolo Airport in northwest Upolu. Samoa also has many secondary roads, some paved, but many with earth and gravel surfaces.

Solid waste management. Specific data on the kinds of wastes generated on Samoa is not available, but solid waste in Pacific island countries in general includes an extremely high proportion—nearly 60% by weight—of organic, or biodegradable, materials. Next come recyclable substances, like paper, plastics, glass, and metals, each constituting between 6% and 12% of the waste by weight. Other wastes include household hazardous waste, textiles, and construction and demolition debris. Waste collection and transfer observations show that, for the most part, Upolu is a relatively clean and garbage-free island, where those who generate household and commercial wastes are careful in the way they handle, store, and dispose of it. Most households keep wastes on a raised platform, ready for collection by a waste pickup truck. A relatively small number of households, around 5% of the total, still either burn their waste; or dump it within their property boundaries or in vacant areas, rivers, or the ocean. This is evidence along sections of the Central Cross Island Road where people dump solid waste in creeks and culverts (Plate 4.8).

Plate 4.8: Garbage dumped in a culvert on the Central Cross Island Road



The construction activities associated with the Central Cross Island Road will generate multiple types of solid waste. This will be disposed of in accordance with the provisions detailed in a waste management plan (WMP) developed as part of the CEMP. The WMP will include details on how waste should be disposed in accordance with the best practice of adhering to the waste hierarchy: eliminate – reduce - reuse – recycle - dispose.

4.3.9 Noise

The Central Cross Island Road corridor is urban to semi-urban in nature for the first 4.5 km and rural after that. Preliminary noise levels along sections of the Central Cross Island Road were measured on 25/10/18 as part of the baseline studies (Figure 4.20). Measurements were taken on the same day, mid-week, between the hours of 11:00 am and 12:30 pm, in both the urban and rural sections of the Central Cross Island Road alignment. Each measurement was recorded as the average reading over a 10-minute period.

The main sources of noise identified during the survey were from traffic, road-side residences and birds. A median noise level from the preliminary survey was $Leq44.2$ dB(A). The World Bank standard applies an ambient criterion of $Leq55$ dB(A) for sensitive receptors such as residential areas, hospitals and schools. Where the background exceeds the ambient standard the criterion is background +3 dB(A).

Comprehensive baseline data on noise levels close to sensitive receptors (schools, offices, residences etc.) will be collected before commencement of civil works.

Figure 4.20: Locations of preliminary noise assessment sites



5 Consultation and Disclosure

Several rounds of stakeholder consultations have been conducted to date which have relevance to the project. LTA conducted stakeholder consultation in 2013 as a component of the ERAP. Consultations were also conducted in 2016 when the as part of the feasibility studies for the World Bank financed project. A third round of consultation was conducted for the current project. The comments, opinions and concerns raised during these consultation efforts have been considered in the development of this PEAR. The main points of discussion and issues raised during these consultations are described below.

5.1 Enhanced Road Access Project

LTA has previously conducted public consultation as part of the ERAP, of which the project is a major component. A total of three consultations were carried out, one each for Upolu and Savaii islands and a third for key stakeholders who are mainly involved in the implementation. This included government ministries and corporations as well as private sector entities who would be affected by the ERAP. The Upolu public consultation was attended by 51 participants and the consultation with key stakeholders was attended by seven participants.

The community was very supportive of the Project far and urged LTA to continue with upgrading the entire road (LTA, 2013). The concerns for LTA were the consistency of the road width reserves, which needed to be resolved prior to any further works. The participants were informed that the current works were aimed at rehabilitating areas severely damaged by Tropical Cyclone Evan with the proposed works mirroring the new road works under the emergency program. The proposed works look at improving the road from Leufisa to Vailima such that buried drainage and footpaths will be considered as preferable features of this section of road.

The LTA also took steps to keep the public informed of the project activities. Prior to undertaking topographic survey, the LTA publicly announced on television and published in the newspaper about the project. LTA also assigned Ms. Anelisa Auelua, Public Relations Specialist to be the contact person and in charge of any issues associated with the communities that may arise during the undertaking of the survey.

5.2 World Bank Feasibility Study

The objective of this consultation was to present to stakeholders the status of the design and to secure public understanding of the importance of the project's requirements, particularly for components that may affect existing properties and businesses. The first consultation took place in April 2016; the main points raised at each consultation are summarised in Table 5.1.

Table 5.1: Summary of 2016 public consultations

Stakeholders	Participants	Comments
People of Vailima to Tiapapata (residents and businesses)	35-40 men and women	Safety concerns Outfall concerns with upgrade Need for pavement Concern regarding the current state of the road Compensation important but the need for improved road most important Importance of following Samoan cultural protocol Buses can be unsafe
Siumu community	8 – five men and three women	Safety concerns Need for pavement and lights close to the end of the road at Siumu Concern regarding the current state of the road and effect on vehicles Compensation important but the need for improved road most important

Stakeholders	Participants	Comments
		Importance of following Samoan cultural protocol emphasized Need for ongoing consultation
Vailima Primary School	School Principal – female respondent	Safety of students a concern Need for footpath
Retail outlets along Central Cross Island Road	Two shop-owners - females Two restaurant owners – one female and one male	Loss of carpark key concern Largely see the positive benefits of road upgrade
Individual households	9	Safety concerns Outfall concerns with upgrade Information sought regarding extent of land acquisition

Source: World Bank feasibility study consultations (2016)

The concern about safety stemmed from the present condition of the Central Cross Island Road (as of 2016), the unsafe operations of buses and the presence of accident-prone areas. The present narrow width of the Central Cross Island Road and the lack of pedestrian walkways was found to be among the major concerns of those consulted. They conveyed their concerns that this current situation exposed school children to traffic hazards. Respondents also indicated that the buses posed a safety hazard along the road, especially along the narrow first 3 km, as there no bus stops where passengers can safely get on and alight from the buses. Instead, buses stop anywhere to take on and unload passengers. Police records show that accidents involving buses due to negligent and reckless driving and driving under the influence of alcohol have occurred along the Central Cross Island Road.

The public's concern with drainage outfalls was apparent current inadequacy that resulted in too frequent and excessive flooding on the Central Cross Island Road, and into adjacent properties. Concerns were also expressed about resultant rubbish collection after a heavy deluge, and due to the current outfall inadequacies.

Both above of the above concerns (safety and outfalls) have been addressed in the 2018 (current) road design.

Consultations during the design stage were also carried out in 2016. These are summarised below.

A meeting was held by the LTA with the owner of Myna's supermarket on 26-Apr-16. The main issue was their carpark occupying the current right-of-way, and the road safety risk this posed. The owner understood the risk but said that no accident had yet occurred in their carpark. As requested by LTA, the consultant presented five combined carpark and Central Cross Island Road realignment options for consideration and subsequent negotiation with the Myna's owner. The option agreed upon was to maintain but improve the current practice of Myna's right angled off-street parking within the current right-of-way, and to more safely accommodate this by realigning the centreline of the Central Cross Island Road further away from Myna's. This problem has therefore been satisfactorily resolved.

Initial consultations with the Le Manumea Resort were undertaken 27-Apr-16 as the project was expected to adversely impact on their current hotel entry / exit driveway (u-shaped with two access points to the Central Cross Island Road) which substantially encroaches into the current right-of-way. The owner was supportive of the project and willing to remove the access but was asking for possible alternative options and an official letter of notification from LTA. Based on the current (2018) design, there is no longer any need to remove this hotel's entrance. Rather, the new road design includes a specific retrofit into the current entrance, thus avoiding any long term direct negative impact to their business operations.

Initial consultation with proprietor of the Robert Luis Stevenson Museum was undertaken 28-Apr-16 as the project was expected to affect their main gate. The museum staff understood the problem and support the project, however, the property administrator was away during this time. The property administrator and owner in the US were successfully contacted subsequently. They also understood the problem, conveyed support of the project, and requested an official letter from the LTA.

As an update following the detailed design; the existing driveway to the entrance gate and small ornamental garden will need to be reconstructed, and part of the currently protruding ornamental fence will need to be removed. Additionally, further up the Central Cross Island Road from the entrance the same ornamental fence line will need relocation backwards further into the current property in order to provide sufficient new right-of-way for the road upgrading works. Further consultations with the museum management and owner will be undertaken.

Consultation with the Theological College Vailima was undertaken 28-Apr-16. At the time, it was perceived that the college's main gate / ornamental fence line would need relocation, although it is mainly within their property boundary. They understood the problem and requested the LTA to suggest the final location of the gate; a location that would not be affected by the project. They asked for an official letter from LTA that could be presented during their June board meeting. Following detailed design, the main gate / ornamental fence line no longer requires relocation as the limit of construction works can be carried out up to and in front of it. Follow-up consultation with the hotel owner will be undertaken.

Consultation with the New Zealand High Commission was undertaken 05-May-16 by LTA as the project required a drainage outfall pipe across this property. The High Commission compound was inspected, and it was discovered that the cliff is 10-15 m from the fence. The slope is almost vertical with rocks and trees. The main concern of the High Commission was a drainage outfall alignment that would avoid the trees. In consideration of this the drainage designer has reflected an outfall detail and alignment that would avoid adverse direct impacts on the large trees in this area. The High Commission has been further consulted on the matter by the LTA around specific outfall details.

5.3 ADB Feasibility Study

The objective of this consultation was to update stakeholders on the status of the project since the last consultations in 2016. The consultations commenced in April 2018; the main points raised at each consultation are summarised in Table 5.2.

Table 5.2: Summary of 2018 public consultations

Stakeholders	Participants	Venue	Key Points
Siumu focus group	29 women	Sui ole Nuu resident (women's representative)	Women have to use buses more than men – few women have licenses Raised issues such as sexual harassment on overcrowded buses and speeding vehicles. Poor designs of wooden buses that result in accidents – do not feel safe Current road is very unsafe for pedestrians especially the school due to absence of proper footpaths and bus shelters Take small amounts of produce to sell in Apia on buses
Vailima	9 women	Vailima Primary School hall	Current road is very unsafe for pedestrians especially for school children due to no proper footpaths and bus shelters Runoff at times makes it harder for women to walk along the road when bringing the children to school Bus service unreliability / no time schedule which at times results in school children being late and served detention at respective schools.
Bus driver - Rural side	Individual - male	Bus depot	Road is so narrow and with no proper bus shelters make their job so much harder; at times they receive evil looks and verbal abuse from other vehicle drivers.

Stakeholders	Participants	Venue	Key Points
			The road is starting to crack and it needs attention before it returns to the bad situation it was in previously.
Bus drivers Urban side	Individual - male	Bus depot	Poor current road designs which often let the runoff to continually damages the road No allocated bus stops thus causing road blocks at times especially during the peak hours of the morning and after work.
Naomi - Landowner	Individual - female	Afiamalu	Proper road design is needed to minimize runoff and the adverse effects on her family's properties Ensure fair compensation for any land acquired.
Mynas	Individual – male shop owner	Mynas supermarket	Awareness of the Central Cross Island Road upgrading prompted them to act - Already building a new Supermarket at the adjoining land to the existing shop Build bus shelters and sufficient road humps to control speeding traffic – see several accidents near to shop
Vailima Public consultation	9 – 4 women; 5 men	CCJS Hall	Disappointment at the delay of the project Highly concerned about land acquisition and compensation Road design to be more vigilant of new developments encroaching along certain parts of the Central Cross Island Road
Siumu Public consultation	30	Village mayor's house	Paramount chief, mayor and the village council have given their support for the road upgrade Reiterated the importance of respecting the fa'a Samoa Willing to collaboratively engage when necessary; either as workers or with land compensation matter Raised concern on the current poor road design and asked to ensure footpaths, signage and traffic lights are included in the upgrading road design

Source: ADB feasibility study consultations (2018)

Many of the safety issues raised during previous consultations were reiterated in 2018, along with general support for the project. A few new issues were raised in 2018 that hadn't been addressed previously, including:

- Incidences of sexual harassment on busses;
- Safety concerns around poor bus designs;
- Verbal abuse from bus drivers towards women;
- Existing repairs are already starting to deteriorate;
- Lack of designated bus stops;
- Issue with Mynas supermarket has now been addressed as building has now been moved.

Many of the issues not raised previously were tabled by female stakeholders, targeting female stakeholders during the 2018 consultations helped identify gender-specific issues that were not identified previously. This process was informed using information and findings from the Rapid Gender Assessment Report (SMEC, 2018), which made the recommendations described in Table 5.3.

Table 5.3: Recommendations from the project gender assessment report

Issues	Recommendations
Project design and budget	Factor into the design plan the need for bus shelters, footpaths and pedestrian crossings that would provide greater mobility and safety for pedestrians Integrate safety training activities into the plan to commence before the construction phase Identify available local 'work monitors' to assist in reporting on any unnecessary and suspicious act before, during and after the project Inventory loss is a key area in the project and ensure there is good coordination amongst relevant parties involved (MNRE, LTA and communities).
Training	Present and share findings from the RGA to raise profile of Gender issues – Gender Sensitization training including: Briefing sessions for government personnel involved in land issues to ensure both constitutional laws and cultural protocols are followed Integrate sessions on equal decision making, gender norms, communication and conflict resolution mechanisms into all training throughout the project Comprehensive safety training to be conducted in affected communities during the project Training for bus drivers using the Central Cross Island Road on preventing/managing personal safety concerns for women and young girls LTA to encourage drivers to undergo training and subsequent licensing.
Monitoring	Encourage collaborative efforts between Construction contractors and affected communities – for example, providing securities/supervision on operations sites and equipment to ensure smooth running of the project A current practice by the Ministry of Women is to employ the Women's committee to maintain public roads in the villages - this can offer an option to getting the local communities involved.
Policy and Advocacy	LTA to review and enforce strict fines imposed on negligent drivers and overloaded buses. Use influential stakeholders as advocates for gender issues such as school principals, sui o nu'u and religious leaders.

Source: SMEC (2018)

The gender-specific recommendations identified in Table 5.3: have been integrated with the environmental and social mitigation measures described in Table 7.2 and be taken through to the CEMP where relevant and as appropriate.

The project's communication and consultation plan (CCP) will guide the consultations and project information during the subsequent stages of implementation.

5.4 Disclosure

Project information, including this PEAR and other safeguard instruments prepared for the project, will be disclosed in compliance with the SPS and ADB's Access to Information Policy 2018. In accordance with the project's CCP, LTA will facilitate disclosure. The grievance redress mechanism (GRM), see also section 7.4, will be established by LTA and this will be implemented for the period of the project. The contractor will be required to address relevant elements of the CCP and GRM in their CEMP.

During the project implementation stages, SPA will implement the CCP, ensuring that project information flows to and from stakeholders and potentially affected people at appropriate times.

6 Environmental Impacts

6.1 Introduction

This environmental impact assessment is based on the detailed drawings produced by SMEC February 2018. Determining the scale of impact depends on (i) spatial scale of the impact (site, local, regional, or national / international); (ii) time horizon of the impact (short, medium, or long term); (iii) magnitude of the change in the environmental component brought about by the project activities (small, moderate, large); (iv) importance to local human populations; (v) compliance with international, national, provincial, or district environmental protection laws, standards, and regulations; and (vi) compliance with guidelines, policies, laws and regulations of Samoa and safeguard requirements of ADB.

Where potential negative impacts are identified, mitigation measures are developed to avoid the impacts or minimise them to acceptable levels. Where this is not possible, negative impacts can act as a trigger for further detailed environmental assessment. There are several types of impacts to be considered. Direct impacts are caused by a project activity and occur at the same time and place and can be created during both project construction and operation. Indirect impacts, although reasonably foreseeable, are usually realised at a later in time or at a point distant from the project footprint.

Short-term impacts, like the noise and fumes associated with heavy equipment occur during road construction and are usually without long-lasting effects. Long-term impacts, on the other hand, could affect regional land use and development patterns, lead to permanent loss of unique and sensitive habitats and even population mobility and migration. The project, however, is limited to relatively small-scale road rehabilitation works with additional maintenance (as required). There is little scope for long-term environmental impacts arising from such works and measures in the project area.

Impacts created during construction activities are dependent on several factors including:

- The temporary use of land and its rehabilitation post-construction;
- 'Best practices' being employed during construction activities;
- Coordination and cooperation with local authorities in terms of impact management;
- Strict enforcement of environmental clauses and conditions included in project bid documents, the contract and technical specifications; and
- Adherence by the contractor to the EMP contained in the PEAR and the CEMP, once approved.

6.2 Pre-Construction Impacts

Pre-construction impacts are limited to the following activities: climate change adaptation measures (incorporated into design); vegetation removal during surveying and demarcation of corridor and extent of works; site clearance, digging and excavations; and, restrictions on land use associated with foregoing and/or need for resources and materials. Planning for materials extraction and identification legitimate sources of materials must also take place in the pre-construction phase.

Climate change considerations. The climate risk profile for Samoa indicates sea level rise, extreme wind events, more intense cyclones and increased air and water temperatures. The project has included appropriate climate change adaptation and mitigation measures into the design.

Updating of documents and development consent application. Any issues arising during updating of the environmental due diligence may largely be mitigated and/or managed by: (i) ensuring that good practice is observed in terms of detailed design incorporating recommendations on environmental matters made in the PEAR; (ii) the PEAR being further updated, as required, based on the detailed design and the EMP reflects the updates and changes made during detailed design; (iii) all permits and consents under CSS are

applied for and obtained; and (iv) the requirements (conditions) of development consent and any permits and consents and the updated EMP are incorporated into the bid and contract documents.

6.2.1 Development Consent Application

Following project approval and during the pre-construction phase, LTA will prepare and submit the development consent application for review and approval by the PUMA. The application requires submission of the following documents:

- Completed development consent application form
- Approved design plans
- Site plan
- EIA report (this document)
- Consultation report (which shall include consents from affected property owners)
- Resettlement plan (or land due diligence report)
- Application fee

For more complex developments, such as the project, the review and decision timeframe is 2-3 months, and will require referral to the PUMA Board for approval.

6.2.2 Sourcing of Materials

Legal requirements. Part V of the Planning and Urban Management Act 2004 stipulates that quarry development or operations is required to apply and obtain a development consent from PUMA. COEP 8 contains guidelines specific to quarrying, requiring the contractor to subject the site identification to a public consultation. If required, land acquisition should also comply with the land acquisition procedure as set out in COEP 4.

Quarry management. A quarry management plan (QMP) needs to be prepared and approved, all necessary permits and government approvals secured. A QMP for each site/source to be used for the project will be prepared and approved, along with obtaining the necessary development consent and permits under the country system. The bid and contract documents will specifically require contractors to develop a QMP as part of the CEMP. The QMP will need to be linked with the traffic management plan in terms of haulage routes and controls. The QMP should include:

- A site development and extraction plan that shows the mining area, extent of overburden removal, and location of stockpile areas;
- Environmental management facilities such as cut-off drains, and siltation ponds, among other requirements and controls;¹³
- Protocols and arrangements for blasting (if required);
- Mitigation of visual impacts of quarrying, among others;
- Health and safety measures and equipment including emergency facilities/equipment for workers;
- Designation of a quarry manager;

¹³ It should be noted that the lack of environmental management was noted during the quarry assessment done by Tonkin and Taylor (2013), particularly the lack of surface water control. As a minimum measure, Tonkin and Taylor recommended the regrading of quarries to develop a suitable fall and a series of surface cut off drains to convey run-off into an excavated sump or sediment control pond where water can percolate through the natural rock fractures.

- Guidelines for vegetation removal, including a prior vegetation survey and plan indicating vegetation and trees to be removed, agreed and approved with the PMU
- Overburden stripping and dust suppression; and
- Rehabilitation plan.

The measures to mitigate and manage impacts from sourcing of materials include:

- Sources of material (gravel, aggregate etc.) and quarry sites for the project will be approved by the LTA and CSC prior to commencement of activities;
- Prioritize existing quarry operations and facilitate necessary development consent and permit applications for unlicensed operations;
- Prioritize licenced approved quarries with highest ratio between extractive capacity (both in terms of quality) and loss of natural state. Procure materials only from quarries/sites approved by LTA and CSC and with a development consent issued by PUMA;
- For each site/operation to be used for the project, the bid and contract documents will specifically require the contractor to develop a QMP as part of the CEMP which addresses the matters identified above;
- Select haul routes and times to minimise road congestion and disruption to local communities and do not haul materials during peak traffic periods;
- Vehicles transporting materials from an extraction area to the project site, will be covered and secured with tarpaulin to prevent dust or spillage;
- Prioritize approved quarries with development consent either closest to the port or to minimise impacts of haulage on communities (i.e. transportation by barge);
- For all locally sourced materials (including sand or aggregate), in addition to obtaining development consent and permits, the contractor must obtain an agreement from, including payment of royalties to, the land/resource owner;
- Any materials required for the project will only be extracted in accordance with the approved plan (reviewed and cleared by the LTA and CSC in addition to PUMA approvals); and
- Reinstate damaged access roads, agricultural land and other properties upon completion of construction works at each section, if damaged due to transport of quarry/borrow materials, other construction materials or any other project related activities.

LTA to check legitimacy of material sources. Sources of material (gravel, aggregate etc.) and quarry sites for the project will be approved by LTA and the CSC prior to submission of required consent and permit applications and the QMP reviewed and approved by LTA and the CSC prior to commencement of extraction activities.

The project must comply with development partner requirements and best practice in relation to material sourcing. Materials must be fit for purpose determined through laboratory tests as applicable.

For the Central Cross Island Road upgrade all construction materials must be sourced from legitimate and licenced quarries for existing sources; for any new source the contractor wishes to open for the project, the contractor is required to comply with the development consent and permitting process. As part of the construction contractors bidding documentation the proposed sources of construction materials must be identified and verification provided to LTA that the quarry is both appropriately licenced and has the capacity to fulfil the materials requirements for the works. If more than one quarry is nominated each must be verified separately. The LTA will include this requirement in the in the bidding and contract documentation for civil works.

6.2.3 Construction Environmental Management Plan

Through the bid and contract documentation requirements, LTA shall ensure that the contractor prepares a site-specific CEMP for the construction stage impacts, which includes all the relevant provisions in the EMP included in the PEAR (Section 7). A CEMP will be prepared for each of CW-1 and CW-2 with site-specific plans for construction elements or particularly difficult conditions as necessary. Prior to commencement of construction works the contractor will prepare their construction program and work method statements and the CEMP will be based on these, reflecting the specific construction approach and activities and setting out exactly how the contractor will implement the mitigation measures and meet the targets identified in the EMP (Section 7).

The CEMP will be activity and site specific and demonstrate the manner (location, responsibilities, schedule/timeframe, budget, etc.) in which the contractor will implement the mitigation measures specified in the EMP. The CEMP will be updated as necessary to respond to any unanticipated impacts that may arise as the project is implemented.

The CEMP will be prepared at least one month prior to any physical works commencing and will be reviewed and approved by the LTA and CSC. The contractor will demonstrate how the CEMP will be properly resourced and implemented including through the recruitment of a qualified/experienced person to be the full-time environment and safety officer (ESO).

The following will be included in the CEMP either as sections or sub-plans:

- Approach to environmental management viz the project requirements;
- Organizational arrangements including reporting and communication channels (also to be shown on an organization chart), training, awareness raising and linkages between sections or sub-plans;
- Consents and permits required to be obtained by the contractor, timeframe and plan for application;
- Materials management and spoil disposal (including QMP, borrow areas)
- Vegetation removal, tree cutting and replanting (including any enhancement planting);
- Power and utilities relocation and protection;
- Waste management plan (covering general waste and hazardous waste);
- Asphalt, hot mix plant, rock crushers and bitumen supply;
- Erosion control and sediment runoff;
- Dust and noise minimization and controls (including noise baseline, watering schedule);
- Water quality plan including drainage system, irrigation and water resources and water contamination prevention;
- Traffic management and controls (including haulage routes);
- Code of conduct – protocols for workers' behaviour – as agreed with village leaders;
- Health and safety - workers and community (including training);
- Chance find procedures for accidental discovery of archaeological assets, cultural sites or resources;
- Decommissioning, rehabilitation, revegetation and recontouring of construction materials processing and storage areas;
- Communications, information and grievance redress (demonstrating compliance with the project's CCP and GRM); and
- Monitoring and reporting (including proposed checklists).

Guidelines for the content of the CEMP have been included in Annex 4.

The ESO will maintain a site diary and complete checklists which will be summarized in weekly and monthly reports to the CSC. The CSC will conduct regular checks and joint inspections of compliance with the approved CEMP, LTA and ADB will audit the effectiveness of the supervision and implementation of the approved CEMP and review mitigation measures as the project proceeds.

6.2.4 Surveying and Demarcation of Centre-line

Minor impacts upon terrestrial habitats and flora of the project area may result from the surveying and demarcation of centre-line. Surveying and demarcation may cause minor degradation of local ecology through the clearance of small areas of roadside vegetation, but to minimise loss of trees, the specimens that are not within the paved area or hard-shoulder but are in the embankment will not be cut unless for justifiable engineering or safety reasons.

There will be a requirement for the removal of some minor permanent boundary structures such as fences and gates, temporary structures such as minor road-side vendor stalls, relocation of hedges and some plants (where possible), and removal of trees, etc. Plant species present within the existing right-of-way are largely introduced ornamental species or ubiquitous native species, which are highly tolerant of disturbances. However, there is no vegetation that has any conservation significance nor is it representative of the original vegetative cover in the existing right-of-way.

Measures to be included in the project to ensure minimization of impacts from vegetation removal include:

- Vegetation clearance during surveying and demarcation activities, especially of trees along the road-side, will be minimized. Major trees (if any) to be removed will be clearly identified in a surveyed tree removal plan to be included in the CEMP.
- Trees identified for removal will be clearly marked in the field, only marked trees will be removed;
- To minimize loss, trees that are not within the paved area or hard-shoulder but are within the right-of-way will not be cut unless for justifiable engineering or safety reasons;
- The contractor will be responsible for providing adequate knowledge to construction workers in relation to existing laws and regulations regarding illegal logging. Contract documents and technical specifications will include clauses expressly prohibiting the felling of trees, not requiring to be cleared by the project, by construction workers for the term of the project; and
- Construction workers will be informed about general environmental protection and the need to avoid un-necessary felling of trees.

6.2.5 Site Clearance and Excavations

Any site clearance, digging and excavation activities undertaken during preconstruction can un-earth physical cultural resources including cultural or archaeological assets and grave sites. In the event this occurs; work shall cease immediately, and the relevant authorities, including Centre for Samoan Studies in the National University of Samoa, will be informed. Activities shall not re-commence until the authorities have signed-off that the site/resources have been dealt with appropriately and that work may continue.

The contractor shall be responsible for complying with the requirements of authorities, and the LTA shall monitor the same. The contractor will develop a chance finds procedure in their CEMP based on the measures identified in the EMP. Mitigation measures for potential impacts on include:

- Site agents will be instructed to keep a watching brief for relics in excavations.
- Should any potential items be located, the LTA will immediately be contacted, and work will be temporarily stopped in that area.
- The LTA, in coordination with the relevant authorities, will determine if that item is of potential significance and the appropriate government ministry who may arrange for an

inspection of the physical cultural resources and work will be stopped to allow time for this inspection.

- Until the appropriate government ministry has responded to the inspection request work will not re-commence in this location until agreement has been reached between the parties as to any required mitigation measures, which may include supervised excavation.

6.2.6 Contractor Mobilisation

Mobilisation of the contractor and initial establishment of site office, work sites and materials storage areas will bring about interaction between local people and construction workers. Prior to contractor mobilization to the site, LTA will work with the contractor to establish the communications protocol between the project and communities as per the project's CCP. The contractor will identify one member of their staff to be the liaison between village leaders and the contractor, as well as between the contractor and LTA.

The contractor will adopt good management practices to ensure that fuels and chemicals, raw sewage, wastewater effluent, and construction debris/scarified material is disposed of in controlled conditions to reduce the risk of contamination. Measures to minimise disturbance by construction workers and presence of the works site/area include:

- Code of conduct–workers' protocols to be discussed and agreed with village leaders—to be shared with workers as part of awareness and mobilization training;
- The contractor is to ensure that workers' actions outside work site are controlled and that rules of conduct are observed always;
- The contractor will identify one member of their staff, fluent in Samoan and English, to be the liaison between the village leaders and contractor, as well as between the contractor and LTA;
- Adequate signage and security will be provided at the site office and works yard and prevention of unauthorized people (especially children) entering the area;
- Hire and train as many local workers as possible by using labour from local villages if possible;
- Potable water, hygienic sanitation facilities/toilets with sufficient water supply, worker rest area and first aid facilities will be provided.
- Portable lavatories (or at least pit latrines in remote areas) shall be installed and open defecation shall be prohibited and use of lavatories encouraged by cleaning lavatories daily and by keeping lavatory facilities clean always;
- Wastewater effluent from contractors' workshops and equipment washing yards will be passed through gravel/sand beds and all oil/grease contaminants will be removed before discharging it into natural streams. Oil and grease residues shall be stored in drums awaiting disposal in line with the agreed waste management section of the EMP;
- Predictable wastewater effluent discharges from construction works shall have the necessary permits/approvals from the local authorities before the works commence;
- To the extent possible, food shall be provided from farms nearby or imported to the area;
- Bush meat supplies from protected areas will be banned to discourage poaching. Solid and liquid wastes will be managed in line with the provisions of the waste management section of the EMP;
- Use of guns and hunting equipment by workers will be banned and workers will be dismissed for taking or using timber, hunting or being in possession of wildlife;
- Provision of adequate protection to the public near the work site, including notice of commencement of works, installing safety barriers as required by villagers, and signage or marking of the work areas;

- Provision of safe access across the works site (particularly during construction of drains) to people whose access are temporarily affected during construction works;
- At all times workers should respect village and land owner's boundaries and recognize and follow village rules and terms of conduct, including those addressing women and elders;
- Avoid damage to productive trees and gardens, water resources and springs; and
- Land used for worksites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned.

6.2.7 Biosecurity

To prevent or reduce risk of introduction and/or spread of invasive or alien species (flora and fauna) any equipment/plant, vehicles and construction materials (or even food and alcohol brought in for foreign workers) imported to Samoa for the project and the vessels that import them will be subject to clearance procedures under the Quarantine (Biosecurity) Act and may require issue of phytosanitary certificates from Samoa Quarantine Services.

6.3 Construction Impacts on Physical Environment

6.3.1 Impacts from Clearing and Grubbing

The drainage system, irrigation and water resources on surrounding lands will be affected by construction activities as follows: (i) local water supplies may need to be tapped to meet construction requirements, so bringing project based water use into competition with local use; (ii) surface and subsurface water resources near the selected project road sections could be contaminated by fuel and chemical spills, or by solid waste and effluents generated by toilets at construction sites; (iii) irrigation channels run close to or cross the works areas and require re provisioning; and (iv) natural streams may become silted by sediment in the runoff from the construction area, workshops and equipment washing-yards.

The contractors will be required to implement the provisions of the CEMP and to provide drainage facilities to avoid ponding/flooding within the project site and other areas used for project-related activities. Potential impacts on water quality are already identified in the subsequent sections (e.g., under hazardous materials and hazardous waste disposal, water quality, etc.). In areas close to the sensitive receptors, the contractors will provide appropriate drains so that the outfalls of the surface run-off from the carriageway are diverted away from the sensitive receivers. Measures will also be taken by the contractors during the construction phase to ensure that storm drains and road drainage systems are regularly cleared to maintain storm water flow.

6.3.2 Impacts on Air Quality

The air quality of the project area is generally good due to lack of industry and low numbers of vehicles. During the construction phase the rehabilitation works will have a minor and temporary impact on local air quality through emission of exhaust from construction vehicles and aggregate crushing plant; as well as through dust generation from vehicles transporting materials and from exposed stock-piles of construction materials.

Earthworks and rock crushing activities will be the main sources of dust. The works in any given section of the road will generally be of short duration and in many locations, there will be sufficient buffer distance such that no significant impact is expected from the construction works on residential sensitive receivers in terms of noise, vibration, and dust. Also, works will not take place at night except in special circumstances justifiable to the LTA. Baseline data will be collected for monitoring of total suspended particulates.

There are several good construction practices that can be employed to ensure that any air quality impacts generated during construction are mitigated. These include:

- Construction equipment being maintained to a good standard. The equipment will be checked at regular intervals to ensure they are maintained in working order and the checks will be recorded by the contractor as part of environmental monitoring;
- Prohibition of the use of equipment and machinery that causes excessive pollution (i.e. visible smoke) at the project site;
- Material stockpiles being in sheltered areas and to be covered with tarpaulins or other such suitable covering to prevent material becoming airborne and runoff of fine particles;
- Ensuring that all vehicles transporting potentially dust-producing material are not overloaded, are provided with adequate tail-boards and side-boards and are adequately covered with a tarpaulin (covering the entire load and secured at the front, sides and tail of the vehicle) during transportation. This is especially important as there are a few villages, and many schools and churches along the road; and
- Spraying of unsealed roads, works yards, quarries with water several times per day (as per the agreed watering schedule) as a means of dust suppression.

6.3.3 Work In or Adjacent to Rivers and Streams

There are a few perennial and seasonal drainages along the project alignment, and between km 11+000 and km 13+000 the road runs close to the western branch of the Vaisigano River. If works in these sections are carried out during the wet season it may be necessary to implement surface water and sediment control measures detailed in the EMP to minimise erosion and runoff of suspended particles in to nearby water ways. Stockpiled materials may be eroded and dispersed in to receiving waterways during the heavy downpours often experienced the wet season. If works close to water bodies must be conducted during the wet season measures should be implemented to cover erosive stockpiles and minimise run off as detailed in the EMP.

Potential impacts on aquatic habitats will be mitigated by implementation of the following measures:

- All land used for storage will be for temporary uses and will be rehabilitated to original condition or better condition upon completion of the works to the satisfaction of LTA;
- Scour protection will be used as temporary measures, as needed, to ensure temporary structures and water discharges do not damage river configuration;
- Movements of vehicles and machinery, and hence disturbance, within the riverine habitats will be minimized at all times;
- No vehicles or machinery shall be washed in the river;
- If the contractor causes damage to the river bank or other structural parts of a river, the contractor is solely responsible for repairing the damage and/or paying compensation;
- Embankments and in-stream/river activities will be monitored during construction for signs of erosion;
- Re-vegetation with local fast-growing species, or other plants in consultation with the land owners and village chiefs, will be carried out incrementally and as quickly as possible after work within any river habitat has been completed;
- Spoils, rubbish or any material will not be disposed of within any river system including riverbed, banks or floodplain areas. Suitable disposal sites will be designated in consultation with land owners and village chiefs and approved by LTA.

6.3.4 Impacts from Spoil Disposal

The CEMP submitted by the contractor will be will include a section on spoil disposal to ensure waste from project road improvement is managed properly. Contractors will agree appropriate spoil disposal locations with the LTA and local authorities. The CEMP will cover all aspects of construction waste disposal. It is preferred that government land is used for stockpiling and dumping of material.

If private land is to be used for dumping it shall commence only after written permission from the land owner is checked and recorded by the LTA and agreeable to the local authority.

The spoil disposal section of the CEMP will include; (i) locations and quantities of spoil and agreed locations for disposal; (ii) methods of transportation to minimize interference with normal traffic; (iii) establishment of acceptable working hours and constraints; (iv) agreement on time scale and programme for disposal and chain of custody; (v) programming issues including the time of year and available resources; (v) discussion of the LTA inspection/monitoring role; and (vi) links to the grievance redress mechanism and complaints management system for duration of the works.

Mitigation measures will seek to prevent impacts and control the impacts at source in the first place. The mitigation measures in the CEMP will include but not necessarily be limited to:

- Spoil will be reused as far as possible for bulk filling;
- The surplus shall not be stockpiled at the side of the road near the works or dumped over the edge of the road;
- Spoil will not be disposed of in rivers and streams or other natural drainage path;
- Under no circumstances will spoil be dumped into any other watercourses (the sea, cliffs near the sea, rivers, streams, drainage, irrigation canals, etc.);
- Spoil disposal shall not cause sedimentation and obstruction of flow of the sea, watercourses, damage to agricultural land and densely vegetated areas;
- Spoil will not be disposed of on fragile slopes, flood ways, wetland, farmland, forest, mangrove and associated salt flats, beaches, religious or other culturally sensitive areas or areas where a livelihood is derived;
- Surplus spoil will be used where practicable for local repair works to fill eroded gullies and depression areas and degraded land in consultation with local community;
- Spoils shall only be disposed to areas approved by local authority;
- Spoil disposal will be monitored by LTA and recorded using a written chain of custody (trip-ticket) system to the designated disposal sites;
- Disposed spoil will be spread in 15 cm layers and compacted to optimum moisture content, covered with topsoil, landscaped and provided with drainage and vegetation to prevent erosion in line with best practice; and
- The spoil disposal site shall be located at least 50m from surface water courses and shall be protected from erosion by avoiding formation of steep slopes and grassing.

6.3.5 Impacts on Water Quality

Through works on drainage systems and adjacent to rivers and streams (culvert replacement), project has the potential to create some temporary and minor adverse impacts on water quality including: (i) increase in silt loads at culverts to be replaced and/or constructed; (ii) construction materials such as small gravels, sand, and fill, being 'washed out' into streams, rivers during rain; (iii) oil and fuel leakage and/or spills from vehicles and plant or workshop/storage locations; and, (iv) discharge of waste-water and sewage from construction site office and work yard to local streams and rivers.

Impacts can be reduced by confining activities to the dry season when there will be little or no water in the rivers and streams close to the project road. In addition, the following best practice measures will be included in the CEMP to mitigate soil impacts and erosion effects:

- Lubricants will be stored in containers / dedicated enclosures with a sealed floor >50m from water bodies;
- Work adjacent to rivers will be scheduled during dry season and work duration shall be as short as possible. Bare slopes shall be stabilized immediately after works are completed;

- Stockpile areas and storage areas for hazardous substances shall be located away from water bodies;
- Washing of machinery and vehicles in surface waters shall be prohibited;
- Diversion ditches will be dug around material stockpiles;
- Solid wastes, debris, spent oil or fuel from construction machinery or plant, construction material, or waste vegetation removed from work sites will not be dumped in or near streams, rivers or waterways;
- Discharge of sediment laden construction water or material (including dredged spoil) directly into the rivers, sea, inter-tidal area or surface waters will not be permitted. All such construction water will be discharged to settling ponds or settling tanks with sufficient capacity to provide holding times that will allow settlement, prior to final discharge;
- Discharge zones from culverts and drainage structures will be carefully identified, and structures will be lined with rip-rap. Down-drains and chutes will be lined with rip-rap, masonry or concrete. Spillage ways will be lined with rip-rap to prevent under-cutting;
- Spoil and material stock piles will not be located near the coast, on the coastal side of the project road, or within 50 m of waterways, streams or rivers;
- Hydro-carbons, fuel, and other chemicals as required for the works, will be stored in secure containers or tanks located away from the coast, surface waters, or streams;
- Hydro-carbons, fuel, and oil spills will be contained and immediately cleaned up as per the requirements of the emergency response plan to be prepared as part of the CEMP by the contractor (and approved by LTA at the preconstruction stage);
- Surplus used oil and waste hydrocarbons will be disposed of at a licenced/approve oil collection site and under no circumstances should oil be discharged to soil;
- contractor's site office and works yard are to be equipped with portable sanitary latrines or septic tank that do not discharge directly to or pollute surface waters and waterways; and
- All water, waste-water and other liquids used or generated by project works and activities will be collected and disposed of in an approved manner and in an approved location. Such disposal will not be permitted to cause either pollution or nuisance.

6.3.6 Waste Management

Uncontrolled waste disposal operations can cause significant impacts. Mitigation measures will seek to reduce, recycle and reuse waste as far as practicable. The LTA will be responsible to monitor the contractor's progress of implementing the provision of the waste management section of the EMP and all mitigation measures. The waste management section of the CEMP will also include consideration of all matters related to solid and liquid waste disposal including the following: expected types of waste and quantities of waste arising, waste reduction, reuse and recycling methods to be employed, agreed reuse and recycling options and locations for disposal / endorsement from LTA and local authorities, methods for treatment and disposal of all solid and liquid wastes, methods of transportation to minimize interference with normal traffic, and establishment of regular disposal schedule.

The mitigation measures in the EMP will include but not necessarily be limited to the measures listed below. The contractors shall ensure implementation of these measures.

- The contractor will prepare a waste management plan (WMP) as part of the CEMP;
- Areas for disposal to be agreed with LTA and local authorities;
- No burning of waste associated with the project or the supporting activities. Burning of waste will not be allowed anywhere on the project;
- Segregation of wastes shall be observed. Organics (biodegradables) shall be collected and disposed-off on-site by composting (burning waste not be allowed anywhere within the project site footprint);

- Construction sites and offices shall be provided with garbage bins for segregating waste into organic, paper/carboard, glass/tin and other waste streams;
- Disposal of solid wastes into flood ways, wetland, rivers, other watercourses, farmland, forest, mangrove, salt marsh, beaches, places of worship or other culturally sensitive areas or areas where a livelihood is derived such as agricultural fields and public areas will be strictly prohibited; and
- There will be no site-specific landfills established by the contractors. All solid waste will be collected and disposed in local authority designated waste disposal sites (as agreed with LTA and local authority and as noted in the WMP).

6.3.7 Use and Disposal of Hazardous Materials

Use of hazardous substances such as oils and lubricants can cause significant impacts if uncontrolled or if waste is not disposed correctly. Mitigation measures will seek to control access to and the use of hazardous substances such as oils and lubricants and control waste disposal. The LTA will be responsible to monitor the contractor's progress of implementing the hazardous materials and waste section of the EMP to avoid or minimize impacts from use of hazardous substances such as oils and lubricants.

The hazardous materials and waste management section of the EMP will include consideration of all matters related to hazardous waste disposal including the following: (i) expected types and volumes of hazardous materials and waste; (ii) methods for treatment and disposal of all hazardous wastes; (iii) approvals and environmental licenses required; (iv) methods of transportation to minimize interference with normal traffic; and (v) establishment of regular disposal schedule as agreed or as condition of granting of environmental license. The mitigation measures to be implemented include:

- The contractor will prepare a hazardous materials management plan as part of the CEMP;
- Ensure that safe storage of fuel, other hazardous substances and bulk materials are agreed by LTA and have necessary approval/permit from local authorities;
- Hydrocarbon and toxic materials will be stored in adequately protected sites consistent with national and local regulations to prevent soil and water contamination;
- Equipment/vehicle maintenance and re-fuelling areas will be confined to areas in construction sites designed to contain spilled lubricants and fuels. Such areas shall be provided with drainage leading to an oil-water separator that will be regularly skimmed of oil and maintained to ensure efficiency;
- Fuel and other hazardous substances shall be stored in areas provided with roof, impervious flooring and bund/containment wall to protect these from the elements and to readily contain spilled fuel/lubricant. All hazardous materials will be stored above flood level;
- Segregate hazardous wastes (oily wastes, used batteries, fuel drums) and ensure that storage, transport and disposal shall not cause pollution and shall be undertaken consistent with national and local regulations. Ensure all storage containers are in good condition with proper labelling in English and Samoan;
- Regularly check containers for leakage and undertake necessary repair or replacement;
- Discharge of oil contaminated water shall be prohibited and separated oil shall be disposed in an authorized facility off-site. Used oil and other residual toxic and hazardous materials shall not be poured on the ground. Used oil and other residual toxic and hazardous materials shall be disposed of in an authorized facility off-site;
- Adequate precautions will be taken to prevent oil/lubricant/ hydrocarbon contamination from mobile equipment of river channel beds;
- Ensure availability of spill-kit with materials (e.g., absorbent pads, etc.) specifically designed for petroleum products and other hazardous substances where such materials are being stored;

- Spillage, if any, will be immediately cleared with utmost caution using absorptive clean up materials to leave no traces. All spillage waste will be disposed at disposal sites approved by the LTA; and
- The contractors shall identify named personnel in their CEMP in-charge of storage of hazardous materials and ensure staff are properly trained to control access to these areas and entry will be allowed only under authorization.

All areas intended for storage of hazardous materials will be quarantined and provided with adequate facilities to combat emergency situations complying with all the applicable statutory stipulations.

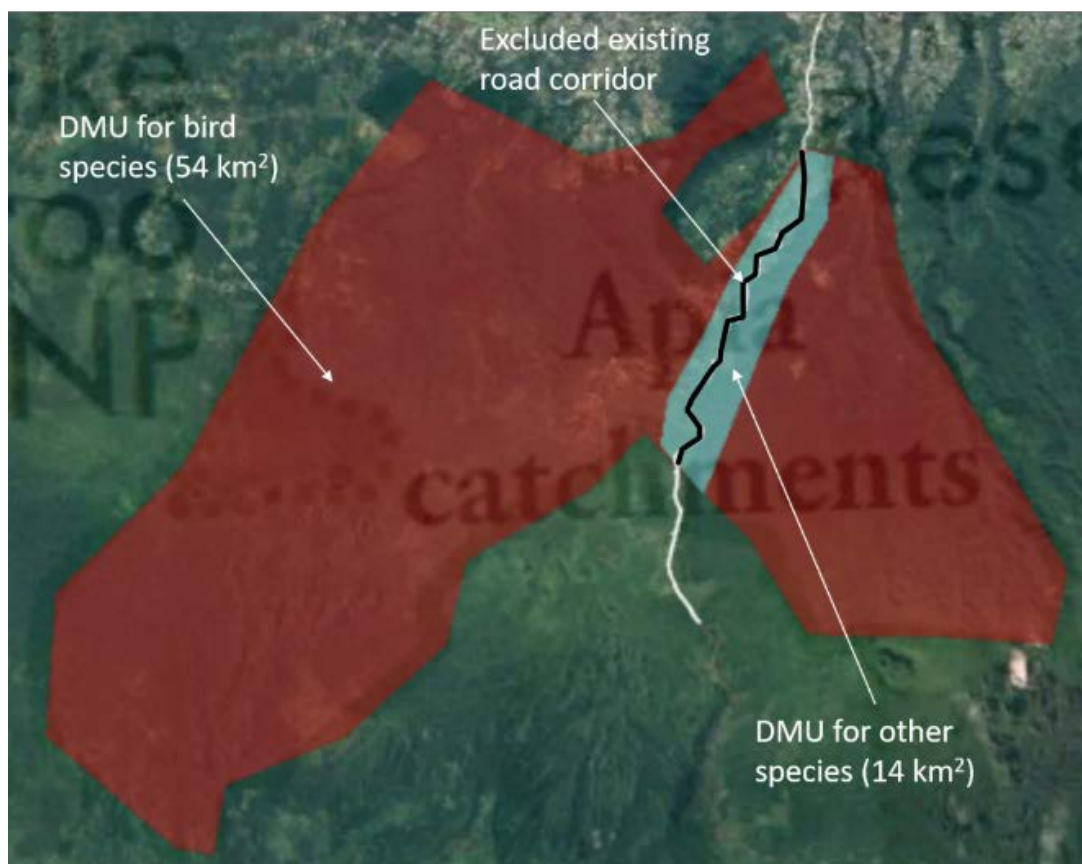
6.4 Construction Impacts on the Biological Environment

Identification of critical habitat. Based on the assessment conducted (see Section 4.2.6), while there is critical habitat in the KBA beyond the road corridor, there is no critical habitat within the proposed project footprint itself as it is an existing road corridor with degraded margins with negligible, if any, habitat values. The identified DMU for threatened and endemic/restricted range species which include critical habitat are summarised in Table 6.1 and shown on Figure 6.1.

Table 6.1: Summary of critical habitat near proposed project footprint

Feature	PS6 criterion	Rationale	Critical habitat
Samoa Skink <i>Emoia samoensis</i>	Criterion 1 - tier 2	IUCN Endangered; Endemic; Restricted Range	Yes - 14 km ² (excluding existing road corridor footprint)
Olive Small-Scaled Skink <i>Emoia lawesi</i>	Criterion 1 - tier 2	IUCN Endangered; Endemic; Restricted Range	Yes - 14 km ² (excluding existing road corridor footprint)
Gastropod snail <i>Thaumatodon hystricelloides</i>	Criterion 1 - tier 2	IUCN Endangered; Endemic; Restricted Range	Yes - 14 km ² (excluding existing road corridor footprint)
Tooth-billed Pigeon <i>Didunculus strigirostris</i>	Criterion 1 - tier 2	IUCN Critically Endangered; Endemic; Restricted Range	Yes - 54 km ² (excluding existing road corridor footprint)
Ma'oma'o <i>Gymnomyza samoensis</i>	Criterion 1 - tier 2	IUCN Critically Endangered; Endemic; Restricted Range	Yes - 54 km ² (excluding existing road corridor footprint)
Flat-billed Kingfisher <i>Todiramphus recurvirostris</i>	Criterion 2	Endemic; Restricted Range	Yes - 54 km ² (excluding existing road corridor footprint)
Samoa Whistler <i>Pachycephala flavifrons</i>	Criterion 2	Endemic; Restricted Range	Yes - 54 km ² (excluding existing road corridor footprint)
Samoa Triller <i>Lalage sharpei</i>	Criterion 2	Endemic; Restricted Range	Yes - 54 km ² (excluding existing road corridor footprint)
Samoa Fantail <i>Rhipidura nebulosa</i>	Criterion 2	Endemic; Restricted Range	Yes - 54 km ² (excluding existing road corridor footprint)
Samoa Flycatcher <i>Myiagra albibentris</i>	Criterion 2	Endemic; Restricted Range	Yes (54 km ² - excluding existing road corridor footprint)
Internationally recognised area	Criterion 6	Identified as such by BLI (2010 and 2019)	Yes – Apia Catchment KBA

Figure 6.1: DMU for birds and other species



Impacts on critical habitat. The DMU identified in Figure 6.1 represent the extent of critical habitat for seven species of birds, two species of skink and one gastropod. As the proposed project footprint lies exclusively within an existing road corridor and its highly degraded margins (as shown in Figure 4.13), direct impacts on critical habitat will be readily avoided by confining all construction activity to the existing road corridor. Indirect impacts from water run-off, noise generation, dust generation etc. can be mitigated by the implementation of the mitigation measures identified in the EMP.

Due to the lack of potential impact pathways linking project related activities and the surrounding critical habitat (largely because all activities will be confined to the existing road corridor), additional field studies at the PEAR stage to confirm the presence/absence of critically endangered and/or endangered species are not deemed necessary as the potential for impact to critical habitat is assessed to be negligible. It is recommended that prior to ground breaking on the 7 km of existing road corridor which passes through the Apia Catchment KBA, a suitably qualified person is engaged to survey, and potentially relocate, any specimens of Samoa skink (*Emoia samoensis*), olive small-scaled Skink (*Emoia lawesi*) and gastropod snail (*Thaumatodon hystricelloides*) that might happen to be present beside the road.

The commitment to confine all construction activity to the existing right-of-way, recruit a biodiversity specialist to relocate Red List fauna during construction activities in the 7km that passes through the KBA and undertake monitoring, the established lack of impact pathways connecting the project footprint with the surrounding critical habitat and the prescribed mitigation measures for indirect impacts demonstrates that the following three thresholds can be readily achieved by the project, i.e.:

- (i) there are no measurable adverse impacts, or likelihood of such, on the critical habitat that could impair its high biodiversity value or ability to function;

- (ii) the project is not anticipated to lead to a reduction in the population of any recognized endangered or critically endangered species, or a loss in the area of the habitat concerned such that the persistence of a viable and representative host ecosystem will be compromised; and
- (iii) any lesser impacts are mitigated to achieve at least no net loss of biodiversity.

Other impacts on the biological environment. Impacts on other elements of the biological environment including minor vegetation and tree removal from road-sides and potential water quality effects (aquatic flora and fauna impacts) will be managed and mitigated by measures already identified including: (i) preparation of a plan identifying vegetation and tree to be removed, marking of trees and implementation and monitoring of the plan; and (ii) preparation and implementation of erosion and sediment control plan, waste management plan and hazardous materials management plan.

6.5 Construction Impacts on Social Environment

6.5.1 Presence of Construction Workers

Risk of social conflict through presence of foreign workers or workers from other parts of the island creating: (i) increased risk of illicit behaviour and crime; (ii) influx of additional population (workers and their “followers”); (iii) impacts on community dynamics; (iv) increased burden on and competition for public service provision; (v) increased risk of communicable diseases and burden on local health services; (vi) gender-based violence; (vii) child labour and school dropout; (viii) local inflation of prices; and (ix) increase in traffic and related accidents. In addition, presence of workers can induce environmental issues and problems including: (i) inadequate waste disposal and illegal waste disposal sites; (ii) wastewater discharges; (iii) increased demand on freshwater resources; (iv) camp related land use, access roads, noise and lights; (v) increased deforestation, ecosystem degradation, and species loss; and (vi) increased use of / demand for natural resources.

The contractors will provide information boards near the work sites to inform and instruct the public on how to conduct themselves and to be aware of their surroundings if they must approach the works. No tolerance will be allowed for any form of gender-based violence of public and commuters. Information boards will be refreshed as necessary and show the name and telephone contacts in LTA and contractors offices for complaints about the works. Information boards will also state that the LTA and contractor have an open-door policy with regard to complaints.

- Contractor to prepare labor influx management plan and agree with chiefs and heads of women’s committees in adjacent villages and villages along haul routes a code of conduct (social protocols) the workers will adhere to;
- Induction of workers on requirements of the project’s CCP¹⁴ and GRM¹⁵ and a code of conduct (socially and culturally appropriate protocols) established for any contact between local communities and contractor/workers;
- The contractor will engage an approved service provider to deliver a communicable disease awareness and prevention program targeting risk of spread of STIs and HIV. The training will be delivered to the communities and workers;
- The contractor will put up notice boards regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions;

¹⁴ A CCP has been prepared for the project. The CCP will be further developed during the initial stage of project implementation.

¹⁵ See Section 7.4.

- The facilities will be fenced and sign-posted and unauthorized access or entry by general public will be prohibited;
- Potable water, clean water for showers, hygienic sanitation facilities/toilets with sufficient water supply, worker canteen/rest area and first aid facilities will be provided onsite. Adequate toilet facilities shall be installed. Separate toilets shall be provided for male and female workers;
- For unskilled activities and labour, as many local people (including women) as possible will be recruited and trained;
- Standing and open water (including puddles, ponds, drains etc) within the camp or office/yard shall not be permitted to reduce possible disease vectors;
- To reduce risk of ground contamination, wastewater effluent from contractors' workshops (if any) will be passed through gravel/sand beds or an oil separator and all oil/grease contaminants will be removed before discharging into drainage channels. Oil and grease residues shall be stored, handled and disposed of as per the agreed WMP;
- The contractor's facilities area will be cleaned up to the satisfaction of SPA PMU and local community after use; and
- Post-construction, the area shall be fully rehabilitated, and all waste materials shall be removed and disposed to disposal sites approved by local authorities.

Effective implementation of the above measures will ensure that potential social impacts associated with the contractor's workforce, site office, works yard and laydown area etc will be negligible.

Utilising local companies and village unskilled labour will minimize risks related to an influx of external workers and related social and health ailments. A program of delivery of communicable diseases awareness and prevention (including HIV/AIDS and gender-based violence) on the construction site will be built into the CEMP and monitored.

6.5.2 Noise

Construction noise is generally intermittent, attenuates quickly with distance, and depends on the type of operation, location and function of equipment. During construction, there will be temporary adverse impacts due to the noise of the construction equipment (especially heavy machinery) when construction activities are carried out near sensitive receptors such as villages, churches or schools. The most sensitive receptors along the project road include the villages, residential areas, government buildings, churches and schools. Cooperation between the contractor and the residents is essential and it is the responsibility of the contractor to arrange meetings between these parties to arrange such matters as work schedules (hours of equipment operation etc.), locations of material storage areas, and the locations of rock crushers and asphalt plant >500m from and sensitive receptor.

Clearing of vegetation, bulldozing, compaction equipment, excavation of existing pavement materials, and grading will produce noise. Aggregate processing is one of the noisiest activities required in construction processes, however, this will be undertaken at a designated site located at least 500m away from the nearest sensitive receivers.

Noise impacts may be short lived, although can be very intrusive if not controlled properly. Noise measurement shall be undertaken in response to noise complaints using hand held noise meter and shall follow the methodology specified by the manufacturer. Noise shall be measured in dB(A) over 24 hours covering the different periods (i.e., 6h to 18h, 18h to 22h and 2h to 6h). Measurement will also be taken to establish if the EHSG criterion of Leq55dB(A)1-hour is exceeded at the measurement points. If it is exceeded by the existing noise a criterion of background +3dB(A) will be applied in the impact monitoring. Works are not expected to be carried out at night but if this is unavoidable for unexpected reasons separate measurements will also be taken before construction commences to establish if the EHSG criterion of Leq45dB(A)1-hour is exceeded and the monitoring assessment criteria will be established accordingly.

Measures included in the EMP to mitigate the effects of noise include:

- The EMP and contract documents will require that all vehicle exhaust systems and noise generating equipment be acoustically insulated and maintained in good working order and that regular equipment maintenance will be undertaken to minimize noise emissions;
- The contractor will prepare a schedule of operations that will be approved by LTA. The schedule will establish the days, including identifying days on which there should be no work, and hours of work for each construction activity and identify the types of equipment to be used;
- Vehicles and plant will be maintained in good condition to reduce emissions including noise;
- Workers will be provided with ear protection as required; and
- Any complaints regarding noise will be dealt with by the contractor in the first instance through the communications plan and if unresolved they shall be referred through the grievance redress mechanism.

6.5.3 Traffic Management and Safety

The project will cause temporary negative impacts through presence of vehicles and equipment. Inconvenience, minor disruptions to traffic on the road as well as on local access to and from the villages along the project road during the construction period. Of concern is the increase in haulage trucks passing schools along the Central Cross Island Road and the potential for accidents with school children. To address these issues the contractor will prepare and submit to LTA, a traffic management plan (TMP) detailing diversions and management measures. These measures will include, but will not be limited to, the following:

- The contractor will prepare a TMP including traffic controls (signage, flaggers and spotters etc) and identifying haulage routes and times;
- Consultation and necessary training at local schools and other vulnerable stakeholders as necessary;
- Management of signage and traffic flows – especially safety signage during implementation;
- Enforcement of speeding limits and driver monitoring – no tolerance of speed for contracted truck drivers;
- Improved safety awareness programs in schools;
- Measures to ensure children do not have access to work sites, road crossing protocols and other related actions;
- Speedhumps and cameras at specific 'black spots';
- Signs and other appropriate safety features will be used to indicate construction works are being undertaken in English and Samoan;
- Contract clause specifying that care must be taken during the construction period to ensure that disruptions to access and traffic are minimized and that access to villages along the project road is maintained at all times; Provincial Works and village officials will be consulted in the event that access to a village has to be disrupted for any time and temporary access arrangements made;
- Construction vehicles will use local access roads, or negotiate access with land owners, rather than drive across vegetation or agricultural land, to access the construction site. Where local roads are used, they will be reinstated to their original condition after the completion of work;
- The road will be kept free of debris, spoil, and any other material at all times;
- Disposal sites and haul routes will be identified and coordinated with local officials;

- Provision of adequate protection to the general public in the vicinity of the work site, including advance notice of commencement of works, installing safety barriers if required by villagers, and signage or marking of the work areas; and
- Provision of safe access across the work site to people whose villages and access are temporarily affected during road re-sheeting activities.

6.5.4 Health and Safety – Workers

The project's construction phase can cause a range of health and safety impacts. The SPS requires that health and safety impacts on workers and the community are identified and mitigation measures proposed in line with the requirements of the EHSR. Air pollution, noise, traffic, and risk of spread of communicable diseases which are also relevant to health and safety aspect, have already been discussed.

Observing general health and safety requirements, including provision of safety and protective gear and equipment to workers, will reduce the risk of accidents at the work sites. The construction work site will be equipped with a health post which will include first-aid and basic medical supplies and first aid kits will be provisioned in all vehicles. To reduce the risk of incidents at the work site, access to the site by people other than those authorized will be prohibited.

Worker occupational health and safety is generally governed by the Samoa Occupational Safety and Health Act No. 5 (2002). The contractor's EMP will address worker health and safety and will establish routine safety measures including mandatory communicable diseases awareness and prevention (including HIV/AIDS) training.

Mitigation measures for reducing and avoiding impacts on worker health and safety include:

- The contractor will prepare a health and safety plan (HSP) covering both workers and community as part of the CEMP;
- The contractors will demonstrate to the LTA they are properly resourced by identifying a qualified/experienced ESO in the bid and subsequently in the CEMP;
- Establishment of safety measures as required by law and by good engineering practice and provision of first aid facilities at work sites, in vehicles and establishment of a first aid/health post at the work site will be at the core of the CEMP;
- The contractor will conduct regular training for all workers on safety and environmental hygiene at no cost to the employees. The contractor will instruct workers in health and safety matters as required by law and by good engineering practice and provide first aid facilities;
- Instruction and induction of all workers shall be carried out for all operatives before they start work in health and safety matters, including road safety;
- The contractor will instruct and induct all workers in health and safety matters (induction course) including construction site rules and site agents will follow up with toolbox talks on a weekly basis. Workforce training for all workers starting on site will include safety and environmental hygiene;
- Workers shall be provided with appropriate personal protection equipment (PPE) and safety equipment appropriate to their tasks. PPE will include safety boots, helmets, reflector vest, gloves, protective clothes, dust mask, goggles, and ear protection at no cost to the workers;
- Fencing will be installed on all areas of excavation greater than 1m deep and sides of temporary works;
- Reversing signals (visual and audible) shall be installed on all construction vehicles and plant;
- Provision of potable water supply shall be maintained at all times in all work locations sufficient for each worker to receive at least 2 liters per day;

- Scheduling of regular (e.g. weekly tool box talks) to orientate the workers on health and safety issues related to their activities as well as on proper use of PPE;
- Where worker exposure to traffic cannot be eliminated, protective barriers and warning signs shall be provided to shield workers from passing vehicles. Another acceptable measure is to install channelling devices (e.g., traffic cones and barrels) to delineate the work zone and trained flag men at each end of the current working zone;
- Work sites shall be provided with men and women's toilets/sanitation facilities in accordance with local regulations to prevent any hazard to public health or contamination of land, surface or groundwater. These facilities shall be well maintained and cleaned regularly to encourage use and allow effective operation and emptied regularly so as never to overflow; and
- The contractor will maintain an accidents and incidents register which will include documentation of near misses. All accidents will be fully documented to the LTA and CSC within 24 hours and a follow up report after investigation has been completed within 3 days of the accident.

6.5.5 Health and Safety - Community

Public safety, particularly of pedestrians and children, can be threatened by the excavation of the trenches for side drain construction. Within 500m of settlements and villages, fencing will be installed prior to excavation work commencing on all sides of temporary excavations. The contractor will provide security and guards, trench barriers and covers to other holes and any other safety measures as necessary at all sites including the office compound. The contractor will provide warning signs at the periphery of the site warning the public not to enter. The contractor will restrict the speed of project vehicles and control traffic by contra-flow and provide flag men and warning signs at either end of the works where the traveling lanes must be temporarily reduced.

The HSP to be prepared and implemented as part of the approved CEMP will cover health and safety risks to the community. In addition, the contractors will implement the following safety measures to protect the public:

- The contractor will appoint an ESO to address health and safety concerns and liaise with the LTA and village leaders within the project area;
- Barriers (e.g., temporary fence), and signs shall be installed at construction areas to deter pedestrian access to the roadway except at designated crossing points;
- Adequate signage and security will be provided at the site office and works yard and prevention of unauthorized people (including children) entering work areas. Warning signs will be provided at the periphery of the site warning the public not to enter;
- The public/residents shall not be allowed in high-risk areas, e.g., excavation sites and areas where heavy equipment is in operation;
- Speed restrictions shall be imposed on project vehicles and equipment traveling within 50m of villages, schools and other sensitive receptors (e.g. residential, places of worship, etc.);
- Provisions will be made for site security; safety barriers and signs will be erected outside trenches deeper than 1m and covers will be placed over other holes. Other safety measures will be installed as necessary;
- Drivers will be educated on safe driving practices to minimize accidents and to prevent spill of spoil, hazardous substances (fuel and oil) and other construction materials during transport;
- Contractors will ensure that no wastewater is discharged to local rivers, streams, lakes and irrigation channels and any other water bodies;
- Measures to prevent proliferation of mosquitoes shall be implemented (e.g., provision of insecticide treated mosquito nets to workers, installation of proper drainage to avoid

formation of stagnant water. Standing water will not be allowed to accumulate in the temporary drainage facilities or along the roadside);

- The contractor will engage an approved service provider to deliver the communicable diseases awareness and prevention program. The contractor will ensure that all workers attend the training. The training will commence prior to contractor mobilization for the communities and during initial mobilization of the contractor's workforce prior to commencement of any civil works and will continue throughout the project implementation; and
- The contractor will agree a code of conduct with village leaders. Workers will be required to comply with the agreed code of conduct. Workers will also undergo training on gender-based violence in the workplace and construction site.

6.5.6 Accidental Damage to Services and Utilities

The LTA and contractor will consult with all relevant authorities to ensure that they minimise any disruptions to existing infrastructure and services. This includes water supplies, telecommunications infrastructure and electricity supply wherever applicable. Plans will be obtained from utility/service providers showing all underground facilities and/or services to avoid damage or disruption during works. Where plans and drawings are not available, the contractor will review by field observation and report locations to LTA in the pre-construction stage.

Mitigation measures to be included in the CEMP in the pre-construction stage will require the contractor to:

- Reconfirm power, water supply, telecommunications and irrigation systems likely to be interrupted by the works and any additional trees to be cut near utilities;
- Contact all relevant local authorities for utilities and local village groups to plan reprovisioning of power, water supply, telecommunications and irrigation systems;
- Relocate and reconnect utilities well ahead of commencement of construction works and coordinate with the relevant utility company at the district and subdistrict levels for relocation and reconnection well before works commence and include for compensatory planting for trees;
- Inform affected communities well in advance;
- Arrange reconnection of utilities and irrigation channels in the shortest practicable time before construction commences; and
- If utilities are accidentally damaged during construction, it shall be reported to the LTA and utility authority and repairs arranged immediately at the contractor's expense.

6.5.7 Cultural Sites and Chance Finds

Cultural property includes monuments, structures, works of art, or sites of significance points of view, and are defined as sites and structures having archaeological, historical, architectural, or religious significance, and natural sites with cultural values. This includes cemeteries, graveyards and graves. If during construction activities resources of cultural value are found, the following procedures for identification, protection (including from theft), and treatment of discovered sites or artefacts will be included in the bid and contract documents, detailed in the CEMP and followed during construction. No churches will be affected by the proposed works. However, given the proximity of many of the churches to the alignment, careful consideration should be given as not to disturb them during construction and to preserve access for parishioners. There is a possibility that project activities may result in damage to other physical cultural resources unless identified early.

A chance finds procedure will be detailed in the CEMP. Activities that may occur in areas with possible physical cultural resource will specify procedures for identifying and avoiding impacts on this, including: (i) consultation with the appropriate authorities, community leaders, residents and communities to identify

known or possible sites during the design of project activities; (ii) siting of proposed activities to avoid identified sites (including protected areas and zones); (iii) the cessation of work until the significance until the significance of a 'find' has been determined by authorities or relevant experts; and (iv) mitigation and management measures (e.g. buffer zones) for chance find procedures.

Chance find procedures will be undertaken as follows:

- Stop the construction activities in the area of the chance find;
- Delineate the discovered site or area;
- Secure the site to prevent any damage or loss of removable objects.
- Notify the Engineer who in turn will notify the responsible local authorities;
- Responsible local authorities (including the Centre for Samoan Studies of the National University of Samoa) will be in charge of protecting and preserving the asset/site before deciding on subsequent appropriate procedures;
- Decisions on how to handle the finding shall be taken by the responsible authorities and the relevant local authority. This could include changes in the layout (such as when finding an irremovable remain of cultural or archaeological importance) conservation, preservation, restoration and salvage;
- Implementation for the authority decision concerning the management of the finding shall be communicated in writing by the relevant local authority; and
- Construction work should resume only after permission is given from the responsible local authorities and the relevant local authority concerning safeguard of the heritage.

During project supervision, the CSC (through the Engineer) and shall monitor the above regulations relating to the treatment of any chance find encountered are observed.

These procedures will be included as standard provisions in the bidding and contract documentation for civil works construction contracts.

6.5.8 Temporary Loss of Business

Local businesses in the urban area may experience a temporary reduction in business due to the inconvenience posed by proposed works and possibly temporary restrictions in access and/or parking opportunities due to project related works. The CEMP will include a TMP which will include provisions for minimising such disruptions to local businesses.

Popular shops such as Myna's already have built a new structure further back from right-of-way with car parks a safe distance from the road. As already agreed with LTA, the Le Manumea hotel must relocate its car park to Eugene street.

6.5.9 Positive Impacts

In the short term, it will be important to ensure that the local communities see benefits out of the construction of the project. This will require the nurturing of local ownership and acceptance—the Fa'a Samoa protocol—needs to be respected in this process.

Short-term opportunities for the local communities will include: (i) labouring jobs for construction period e.g. catering, truck driving, security, catering and cleaning of construction site; and (ii) a local procurement plan should be developed to assist local businesses both male and female in relevant opportunities; this must be endorsed by traditional leaders.

In the long term the project will generate positive impacts for local businesses, including:

- Business will recover the temporary losses from implementation and with better road conditions there is potential for increased customer flows;
- Improved conditions to cart small amounts of produce to market;
- Better travel experience for tourists who must travel to beach locations;
- Decreased time frames for travel, yet speed limits need to be better regulated;
- Road features such as shoulders, speed humps, solar lighting and signage all will help to manage improved accessibility;
- While it will not enable larger heavy trucks to negotiate the inclines and bends, it will improve the ability for smaller commercial vehicles to bring produce to market;
- Potential local management of road maintenance and roadside clearance will be built into procurement plans;
- Through reducing the time required to traverse the improved and safer road there is likely to be positive improved worker productivity; and
- There will also be a range of unskilled labour jobs on a temporary basis during construction that can be advertised to local community residents, both male and female. For example, the Si'umu community indicated that they were very keen to work in such roles.

6.6 Operation Impacts

6.6.1 Operation Impacts on the Physical Environment

Gaseous emissions. Vehicle emissions as indicated by concentration of oxides of nitrogen will be the main air pollution sources during operation. Following the rehabilitation of the road its use will create air pollution such as hydrocarbons, carbon monoxide, nitrous compounds, sulphur dioxide and particulate matter. The anticipated levels of traffic are unlikely to result in additional adverse impacts to the baseline air quality. There will be few other sources of emissions near the project road other than from domestic fuel burning. Sensitive receptors are set far enough back from the project road to allow adequate dispersion that there will be no significant additional impacts at the sensitive receivers above the baseline condition.

Particulate emissions. Particulate contamination such as dust and fumes will also be air pollution sources during operation; however, due to the rural nature of the road and low density of sensitive receptors toxic residues from vehicle emissions near the project road are unlikely to accumulate or create significant impacts. Dust generation from the existing road will be reduced due to the better asphalt surface for the new road.

The conclusion is that the Central Cross Island Road upgrade will not generate any significant air quality impacts warranting mitigating actions are anticipated during operation and maintenance phase.

Routine and ongoing maintenance. Constriction of water flows from debris blocking the flow in the drainage structure could result in damage to culverts and drainage structures, riverbanks or land through altered flow patterns. LTA will ensure that all culverts and drainage structures are adequately maintained so that debris does not build up causing waters to deviate around the structures stranding them and resulting in severe erosion and loss of land.

Increasing awareness about the need to maintain vegetative cover of areas adjacent to the road in terms of assisting in reducing silt laden run-off to waterways and contributing to the stability of drainage paths, can be included as a component of the project's communication plan and identified as part of the maintenance activities.

Erosion and alteration to overland flow. Soil erosion will be minimised by developing a comprehensive suite of engineering controls in the detailed designs to prevent and maintain erosion. A system will be implemented to control erosion and flooding on either side of the embankments in case of heavy rains.

Apart from affecting the community land and resources, this would otherwise cause natural streams and irrigation channels to become silted.

Measures will also be taken during the operational phase to ensure that the frequency of maintenance is increased and that storm drains and highway drainage systems are periodically cleared to maintain clear drainage to allow rapid dispersal of storm water flow. An adequate system of monitoring, reporting and maintenance will be developed.

Water quality and run-off. Potential impacts on water quality or availability of water for domestic or agricultural use are not expected to occur. During operation, negative impacts on water quality could be caused by accidental spills resulting from vehicular accidents.

There is a very minor risk of impacts on sedimentation and water quality through improving drainage from the road and areas landward of it in the few months when there is significant rainfall. At other times, there will be virtually no run-off but the drains will need to be kept clear of dry matter constricting the drains. The project will lead to longer term environmental benefits for water quality created by the project through proper compacting of the road and surface and reducing mobilisation of surface dust during rain. The maintenance contractor will be responsible for regular clearing of drainage structures to keep them effective. Additional plantings around drains will be appropriate and will help to retain surface particles on land.

Water quality may show slight improvements after rehabilitation and maintenance due to reduced erosion from improved embankments on the slopes, stabilization by rip-rap, and re-vegetation to prevent erosion. However, any improvements are unlikely to be detectable in water samples due to the infrequency of rainfall. To cater for the times when there is heavy rain, the replacement of dilapidated or damaged culverts will facilitate passage of high flows and reduce scouring and remove overland flows, ensuring the integrity of the surface of the road pavement and removing a potential hazard from overflowing.

The area of impervious surface is not being significantly increased by project and therefore increased runoff due to rehabilitation activities (if any) will be negligible in the project area.

6.6.2 Operation Impacts on Biological Environment

Improved access to previously inaccessible areas. The operation of the project is not likely to induce people to the area to poach or hunt timber, flora or fauna as it does not comprise provision of additional access to previously inaccessible areas. The road already exists and does not provide additional access to the interior and still forested areas. An improved speed environment could pose additional risks to rare or endangered (Red List) species of flora or fauna from the upgrade above the baseline condition (i.e. increased risk of roadkill). Therefore, the design will include speed limits and speed reducing measures (speed humps and the like) through the 7km of road that passes through the KBA in addition to the speed limiting measures through villages.

Increased levels of illegal logging and deforestation are not likely to increase above baseline levels because of the project as there is an existing road and the upgrade will not provide additional access to previously inaccessible areas.

6.6.3 Operation Impacts on the Socio-economic Environment

Gender dimensions. Samoa has made considerable advances in addressing gender-based issues in policies and development planning, including gender-based violence, as well as mainstreaming gender equality into public service opportunities. For example, government passed the Labour and Employment Relations Act in April 2013, providing stricter guidelines for sexual harassment, as well as clauses to address workplace discrimination based on gender. As the largest formal sector employer, the government employs approximately 53 percent women in the public service. Women also comprise 40 percent of the non-agricultural workforce. In the private sector, women dominate the manufacturing sector and head more than 40 percent of small businesses. There has been a major increase in the number of women in top management positions, that is, from 18% in 2001 to 53.3% in 2010 (UN Women, 2015).

Yet discrepancies remain in senior roles. While women in Samoa hold high government, non-government and private sector positions, their numbers are well below their male counterparts. For example:

- Only five out of fifty seats of Parliament are held by women
- Two of the 14 members of cabinet are women
- Of 54 Government Ministries, Government Corporations and Constitutional Authorities, since 2015 only 17 women as compared to 31 men appointed to Chief Executive Officer or General Manager
- Of all public board members, 19 percent are female compared to 81 percent male.
- Only registered holders of chiefly titles may stand for elections and women only make up an estimated 10.5 percent of the total chiefly title holders.

Most villages have women's committees' which play a major practical role in village development but not in decision-making which largely relies on the male traditional hierarchy. In this respect the system of traditional village government in Samoa presents a 'constraint to women's access to and participation in decision-making forums in local government councils, church leadership, school management and community-based organisations. Si'umu village has no female matai currently, although women are not constrained from taking a matai title as in some villages. Yet despite this, the previous mayor of Vailimato Vaoala was a woman – indeed a female headed householder whose land will be affected by the project.

Universal access issues. The principle of “leaving no one behind” underpins the Sustainable Development Goals. Those people with disabilities are among the poorest, most vulnerable members of society and are most at risk of being left behind. They often lack consistent access to health care, education, employment and economic opportunities that is equal to those without disabilities. In communities along the Central Cross Island Road an estimated 1.7 percent people have some form of disability (Census 2016). On consultation with Loto Taumafai school for the disabled in Apia, they informed the team that they currently have a bus service that picks up at least 10 disabled students a day from along the Central Cross Island Road. While the current roads edge does not offer a safe place for the disabled to mobilise on, an upgraded road with a safe footpath is likely to provide the opportunity for some disabled residents to become more mobile and have greater autonomy.

The detailed design has considered universal access requirements such as access to/from footpath and bus stops for wheelchair-bound people.

Transportation and access. Three key dimensions of transportation that are important in this social assessment include: safety, accessibility and mobility. There were no reported differences in 'mobility' and 'accessibility' between men and women in utilizing the Central Cross Island Road link. However, there is a difference in terms of use of modes of transport. Reportedly, more women than men travel by bus, while more men travel by car.¹⁶ In a female focus group of 14 (of women aged 35-650 there was no one with a driving license. All travelled to Apia by bus.

Bus travel. Seven buses travel the Central Cross Island Road on a return trip from West Upolu (three from Fale'alili and four from Si'umu) twice a day, taking commuters to and from Apia. The following approximation of bus commuters is typical: 34 passengers each trip, morning and afternoon including: ten school children, 15 women and nine men.¹⁷ While women predominantly use the buses, all 14 women interviewed in Si'umu indicated they felt unsafe travelling by bus for the following reasons: (i) buses are not mechanically safe; (ii) Central Cross Island Road not safe with many curves, and it is worse in wet weather. One woman had been on a bus when it had an accident recently and continues to feel traumatized; and (iii) young girls and mums can be sexually harassed when the bus is full. This was seen by several respondents and young girls are being counselled to be alert.

¹⁶ Si'umu focus group, 2018

¹⁷ Bus driver of 20 years along Central Cross Island Road (2018)

Bus travel can accentuate time poverty implications especially for many women who follow a 'trip chain' travel pattern. That is, getting on and off the bus several times during the journey. For example, traveling to and from work in Apia and stopping to drop and pick up children from school; then again to pick up foodstuffs for meals from one of the local supermarkets en-route.

Heavy vehicles. The main forms of heavy vehicles travelling along the Central Cross Island Road include buses and trucks. These vehicles are predominantly driven by men. Approximately 2 percent of commercial driving licenses are held by women in Samoa. This low level of commercial licensing among women can also constrain access to some specific economic opportunities.

Heavy trucks carrying heavy goods including farm produce tend to avoid the Central Cross Island road and travel along the more even Alafa'alava Road which although longer is safer with less steep ascents and descents. Many of these vehicles are second hand reconditioned vehicles from overseas.

Traffic and pedestrian safety. Safety has been discussed in terms of pedestrians through this report. However, in terms of drivers along the road there are several sections of the road that are considered 'black spots' with a history of a number of accidents or near misses. The key areas where accidents have occurred include the curves in the road in Tiavi, Vaoala and Vailima.

Some of these have resulted in fatalities. These black spots include: blind corners; steep ascents; narrow road segments with exposed guttering along the sides and few passing opportunities; slippery road surfaces especially when wet; and dangerous ravines beside the road with poor protective barriers, road warning and speed signage along some dangerous sections. Table 6.1 shows the accidents recorded along the Central Cross Island Road from 2013 to September 2018.

Table 6.1: Number of accidents along Central Cross Island Road 2013 – 2018

Year (Jan – Dec)	Negligent driving causing:		Dangerous driving:		Refusal to comply with lawful requirements	Police help	Total
	injury	death	reckless and careless	under the influence of alcohol			
2013	7	-	24	4	-	-	35
2014	3	-	17	6	-	-	26
2015	4	2	31	3	-	-	40
2016	4	1	20	7	1	19	52
2017	2	0	16	6	3	24	51
2018 (Jan-Sep)	4	0	15	3	0	7	29

Source: Police (2016, 2018)

Police statistics indicate that the Central Cross Island Road accounts for the highest number of accidents in Samoa. Most accidents occur along the stretches where the road curves going up and downhill, as well as where the narrower sections. A key accident summary for the Central Cross Island Road is provided in Table 6.2.

Table 6.2: Key accidents along the Central Cross Island Road

No.	Location	Comments
1	Malololelei - in front of Alan Grey Vaoala - in front of Mynas Shop + gas station Vaoala - before reaching the Bahai Church	The most cases received along this section are around the curve going up and down the hill, as well as where the road is narrow with limited space for vehicles.
2	Vailima - in front of Primary School Vailima - in front of Princessa Shop and Manumea Hotel.	Bad condition of the road and also there is a lot of curves going uphill. Road is also narrow/tight and the ditch as well
3	Papauta - in front of SROS Company	Bad condition of the road and also there is a lot of curves going uphill.
4	Tiapapata – Past the Latter-Day Saint Church- from Apia to South.	The road curves and also the road is very tight/narrow /ditch and slippery
5	Tiavi - uphill to downhill – from Apia towards Siumu.	Most accidents take place heading downhill to the South side of Upolu Island. Most cases reported along this area are due to Dangerous Driving, overtaking vehicles and exceeding speed limits.

Source: Police (2018)

Risk of spread of communicable diseases. In terms of risk of transmission of communicable diseases during operation, roads have the potential to pose a risk as a pathway for disease transmission only if they carry a large volume of traffic, including high proportions of heavy traffic such as trucks, are routes that connect cities, towns or large numbers of villages, especially roads or highways with international borders where improved access to major markets can facilitate international trade, and there is a hospitality service industry established that is geared towards large numbers of truck drivers and mobile populations.

The road does not provide linkages to any new areas; therefore, in terms of risk of transmission of communicable diseases during operation, the Central Cross Island Road upgrade has a low potential of increasing this risk above the baseline level. This small risk will be mitigated by implementation of the project's STIs/HIV/AIDS awareness and prevention campaign.

All other impacts. Other unanticipated impacts might happen in the future. Routine maintenance by LTA will be able to recognize these previously unforeseen impacts. Pro-active contingency measures should be put in place for unanticipated impacts.

7 Environmental Management Plan

7.1 Introduction

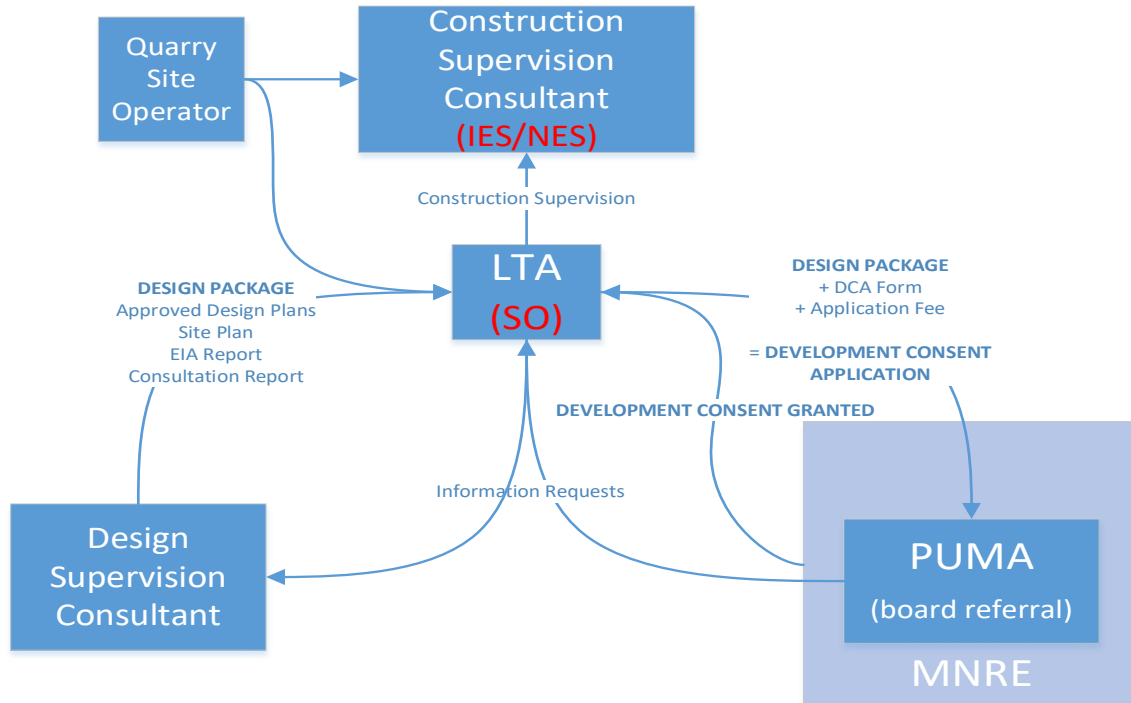
This PEAR has been prepared to identify and assess environmental and social impacts and set out a range of measures to avoid and/or mitigate those impacts. The mitigation of impacts during the pre-construction phase will be the responsibility of LTA, the design consultant and the contractor, the mitigation of impacts during the construction phase will be the responsibility of the contractor, and the mitigation of impacts during the operations phase will be the responsibility of LTA.

The mitigation measures that will be implemented during the project to minimise negative impacts are described in the EMP matrix (Table 7.2); this details several components crucial to effective environmental management, including: (i) organizational responsibilities (for various aspects of EMP implementation); (ii) consultation and information disclosure; (iii) plan for mitigation of impacts (during pre-construction, construction and operation); (iv) grievance redress; and (v) monitoring and reporting. These are explained in detail in the sub-sections below.

7.2 Institutional Arrangements for Environmental Management

Successful implementation of the mitigation measures described in the EMP depend on a coordinated effort between all participants in planning, design and construction of the project. The relationships between the primary participants in the proposed project are shown in Figure 7.1 and described below.

Figure 7.1: Institutional arrangements for environmental management



7.2.1 Key Institutions and Parties

Land Transport Authority. As the agency implementing the project, LTA will perform the role of project management, including overseeing the production of the tender package, review and evaluation of the bids, award of contract, supervision of construction and post-construction activities. For the design stage, LTA is the coordinating agency in Samoa, ensuring that all government departments and agencies are circulated and kept informed about the project. The LTA will be supported by the CSC and together with MNRE and other government departments and agencies, ensure compliance with policies and regulations. In this manner, the LTA and other agencies play an important role in ensuring that the mitigation measures are included in the tender package prepared by the consultant. During construction, LTA will take the lead for site supervision, and through site inspections and support of the CSC will evaluate the effectiveness of the implementation of the approved CEMP. The LTA will recruit a safeguards officer (SO) to work with the CSC.

Ministry of Natural Resources and Environment. The MNRE leads the management of Samoa's environment and natural resources and comprises several departments to advise, inform and support community and government decision-making and deliver services to the people and communities. MNRE also works with ministries, non-governmental organizations (NGOs) and the private sector. The role of MNRE is to make sure that the environment and human health are protected, and that natural resources and services are as sustainable as possible and contribute to economic growth.

PUMA is responsible for development regulatory and strategic planning and will review the PEAR as part of the project development consent application made by LTA. The PUMA of MNRE is responsible for: (i) development consent and compliance of development activity; (ii) environmental impact control and compliance; (iii) establishes the Planning Tribunal; and (iv) enforcement of provisions.

Construction supervision consultant. The CSC will assist the LTA to supervise the proposed works and ensure that the project is implemented according to the environmental safeguards of the CSS and SPS. The CSC will include an international environmental specialist (IES) and national environmental specialist (NES) to liaise between government agencies, CSC, contractor and the LTA. The IES and NES will work closely with the SO.¹⁸ The CSC will also include a biodiversity (terrestrial ecologist) specialist for Red List species relocation and additional monitoring.

Contractor. The civil works contractors will be responsible for responding fully to all contract conditions including those covering environmental mitigation, mobilisation, awareness raising/training and monitoring and reporting. The contractor will then be responsible for implementing all environmental, health and safety actions included in the EMP and relevant clauses in the bidding documents and contract during the pre-construction and construction period. The contractors will prepare their CEMP based on the site-specific conditions and construction methodologies they propose to use and the direction in the EMP. The CEMP will further develop the EMP in Table 7.2 and will detail measures for all impacts covered in the EMP including but not limited to traffic management, waste management, hazardous material and waste management and health and safety. The LTA and CSC will review and approve the CEMP before the commencement of construction. The approved CEMP will be submitted to PUMA for information.

The contractor will appoint an ESO who will be responsible for site inspections on a daily and weekly basis to check compliance with the approved CEMP and ensuring implementation of all health and safety requirements, these will be documented and subject to monitoring by LTA and PUMA. The responsibilities of the contractor include:

- Participate in induction on EMP and mitigation measures to be delivered by LTA prior to preparation of the CEMP;

¹⁸ Given the availability of qualified and experienced national consultants in Samoa, the IES may be a national consultant with international experience.

- Appointing an ESO, sending letter to LTA confirming that this position has been filled and by whom before construction commences (the bidding documents and contract specify the roles and tasks of the ESO);
- Seeking training and support from LTA/PUMA on any aspects of environmental management, as required;
- Coordinating with LTA for preparing and submitting the CEMP following detailed design, the ESO will be responsible for ensuring that the contractor complies with the clauses in the contract and bidding documents in respect of environment, health and safety;
- As required, preparing, and submitting for approval, appropriate plans (tree removal, traffic management, waste management etc.);
- Coordinating with LTA in respect of community consultation i.e. establishing GRM etc.; and
- Undertaking daily and weekly site inspections (by the ESO) recording the findings in a site diary and participating in monitoring and coordinating with LTA to ensure that environmental management activities are reported in monthly reports as required.

Quarry site operator - The contractor shall select the most appropriate and certified quarry site operator from which to extract materials for construction works. PUMA issues development consents to companies that provide quarrying services, and the agency has indicated that the contractor needs to submit an application form for the use of a particular site prior to construction works commencement so that they can assess its condition accordingly. Only quarries—either existing or new—with development consent will be permitted to be used for the project. The contractor will ensure, however, that the operation of the quarry activities within its control, including the safety of its personnel, is in accordance with the requirements set forth in CEMP.

7.2.2 Roles and Responsibilities

The roles and responsibilities of the various agencies tasked with implementing the EMP are described in Table 7.1.

Table 7.1: Responsibilities for environmental management and monitoring

Agency	Responsibilities
Implementing agency - Land Transport Authority	Overall responsibility for project construction and operation Ensure that sufficient funds are available to properly implement all agreed environmental safeguards measures Ensure that the project complies with the requirements of the CSS and SPS Ensure that tender and contract documents for civil works include all relevant parts of the environmental assessment and project agreements Recruit the SO Ensure that requisite measures from the PEAR and EMP are incorporated into the bid and contract documents Ensure that environmental protection and mitigation measures in the PEAR and EMP are incorporated into the detailed design including climate change adaptation measures Submit at least quarterly safeguards monitoring reports to ADB
MNRE and PUMA	Ensure that development consent conditions and EMP provisions are implemented to mitigate environmental impacts to acceptable levels Undertake environmental management capacity building activities and orientation and awareness training for contractors Ensure that the contractor has obtained necessary environmental permits and license(s) prior to award of civil works contracts Assist in the establishment and implementation of the GRM Undertake inspections of implementation of the CEMP
Construction supervision consultant	Support LTA in implementation of environmental safeguards for the project in compliance with the CSS and SPS

Agency	Responsibilities
	Work with LTA to undertake any additional environmental assessment for the project Red List species relocation and specialist monitoring Prepare quarterly or semi-annual environmental monitoring reports for submission to MOF and ADB
Construction contractor(s)	Participate in induction training on EMP provisions and requirements delivered by the LTA Prepare the CEMP and submit to LTA and CSC for approval Obtain necessary environmental license(s) for Project works, quarries, hot-mix plant etc. prior to commencement of civil works contracts Ensure that all workers, site agents, including site supervisors and management participate in training sessions. Maintain a record of training and conduct of awareness sessions for staff to ensure compliance with environmental and safety statutory and contractual obligations including the approved CEMP Ensure compliance with environmental statutory and contractual obligations and proper implementation of ADB requirements including approved CEMP Based on the results of CEMP monitoring, cooperate with the LTA to implement environmental corrective actions and corrective action plans, as necessary. Respond promptly and efficiently to requests and instructions from LTA for environmental corrective actions and corrective actions and implement additional environmental mitigation measures, as necessary. Provide sufficient funding and human resources for proper and timely implementation of required mitigation measures in the EMP.

7.3 Environmental Mitigation and Management Costs

The costs of implementing the measures identified in the EMP are either included as a cost of the project covered by the LTA/MWTI and/or in the contract of services of the CSC or will be included in the civil works contracts and covered by the contractor. Implementation of mitigation measures will be part of the construction costs and will be included in the bill of quantities (BOQ) as a monthly line item for implementation of CEMP.

The estimated costs for environmental management include costs for staffing, mitigation, monitoring during construction and permitting costs. The costs for training proposed include the costs incurred towards the site visits, travel to the training program by the participants, printing of training materials and other logistic arrangements. Estimated costs are summarised in Table 7.2.

Table 7.2: Summary of estimated costs for EMP implementation

Item	Costs covered by	Cost estimate (US\$)
Safeguards officer – LTA/	Project - LTA/ MWTI	TBD
Environmental specialist – IES – CSC (6 months intermittent)	Project - CSC	54,000
Environmental specialist – NES – CSC (x 2 - full-time)	Project - CSC	288,000
CEMP implementation (construction mitigation measures)	Contractor	BOQ
Environmental consents and permitting - project	LTA	TBD
Environmental consents and permitting – material sources/quarries	Contractor	TBD
Noise baseline and follow-up monitoring	Contractor	BOQ
Recruit specialist for relocation of Red List sp. + monitoring	Project	65,000
Environmental impact monitoring	LTA + contractor	Project + BOQ

Table 7.2: Environmental Management and Monitoring Plan

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
Pre-construction phase						
Climate change adaptation	Risk of increased erosion and damage to road infrastructure.	Ensure all adaptation measures identified in the feasibility study and assessment are incorporated in to the design	LTA - design consultant	Designs include appropriate adaptation measures	Inspection of design reports and drawings	LTA
Updating of documents and development consent application	Issues for compliance with CSS	Ensuring that good practice is observed in terms of detailed design incorporating recommendations on environmental matters made in the PEAR; PEAR further updated, as required, based on the detailed design and the EMP reflects the updates and changes made during detailed design; Permits and consents under CSS are applied for and obtained; Requirements (conditions) of development consent and any permits and consents and the updated EMP are incorporated into the bid and contract documents	LTA, CSC, PUMA	CSS and SPS compliance	Documents updated; Dev. consent application	LTA PUMA
Materials sources identified and agreed	A QMP for each site/source to be used for the project will be prepared and approved, along with obtaining the necessary development consent and permits under the country system. The bid and contract documents will specifically require contractors to develop a QMP as part of the CEMP	Sources of material (gravel, aggregate etc.) and quarry sites for the project will be approved by the LTA and CSC prior to commencement of activities; Prioritize existing quarry operations and facilitate necessary development consent and permit applications for unlicensed operations; Prioritize licensed approved quarries with highest ratio between extractive capacity (both in terms of quality) and loss of natural state. Procure materials only from quarries/sites approved by LTA and CSC and with a development consent issued by PUMA; For each site/operation to be used for the project, the bid and contract documents will specifically require the contractor to develop a QMP as part of the CEMP which addresses the matters identified above; Select haul routes and times to minimize road congestion and disruption to local communities and do not haul materials during peak traffic periods; Vehicles transporting materials from an extraction area to the project site, will be covered and secured with tarpaulin to prevent dust or spillage; Prioritize approved quarries with development consent either closest to the port or to minimise impacts of haulage on communities (i.e. transportation by barge);	LTA, CSC, contractor	CSS and SPS compliance	Dev. consent and other permit(s) applications; QMPs prepared and approved	LTA, CSC, PUMA

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
		For all locally sourced materials (including sand or aggregate), in addition to obtaining development consent and permits, the contractor must obtain an agreement from, including payment of royalties to, the land/resource owner; Any materials required for the project will only be extracted in accordance with the approved plan (reviewed and cleared by the LTA and CSC in addition to PUMA approvals); and Reinstate damaged access roads, agricultural land and other properties upon completion of construction works at each section, if damaged due to transport of quarry/borrow materials, other construction materials or any other project related activities				
Check on legitimacy of material sources	Project complies with donor bank requirements, best practice and material suppliers are fit for purpose	Check on the legitimacy of material suppliers proposed by contractor in the CEMP contractor identifies construction material sources and obtains location approval and inspects licenses	LTA, CSC Contractor	CEMP prepared and endorsed; Sighting of quarry licenses.	Review inspection of QMPs and CEMP	LTA, CSC
Contractor CEMP prepared; Awareness and orientation of contractor's staff	All foreseeable impacts captured in CEMP.	Approach to environmental management viz the project requirements; Organizational arrangements including reporting and communication channels (also to be shown on an organization chart), training, awareness raising and linkages between sections or sub-plans; Consents and permits required to be obtained by the contractor, timeframe and plan for application; The following sections or method statements shall be included in the CEMP based on this EMP: <ul style="list-style-type: none"> Waste Disposal (covering spoil disposal, general waste and hazardous waste); Quarries and construction materials management; Asphalt, hot mix plant, rock crushers and bitumen supply; Erosion control and runoff; Water contamination prevention; Dust and noise minimization; Tree cutting and replanting; Enhancement planting; Power and utilities protection; Drainage system, irrigation and water resources; Safety precautions - workers and public; Temporary traffic management; 	Contractor to compile a CEMP based on this EMP.	CEMP prepared and endorsed; Resources in place for CEMP implementation (ESO etc)	Review inspection of CEMP; Management and monitoring system established; Checklists	LTA, CSC

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
		<ul style="list-style-type: none"> Accidental discovery of archaeological assets, sites or resources; and Decommissioning, rehabilitation, revegetation and recontouring of sites incl. quarries, borrow areas 				
Surveying and demarcation of centre-line	Minor loss of vegetation during demarcation	<p>Vegetation clearance during surveying and demarcation activities will be minimized. Major trees to be removed will be identified in a Tree Removal Plan developed by the contractor; and trees to be removed will be clearly marked, only marked trees will be removed;</p> <p>To minimize loss of trees the trees that are not within the paved area or hard-shoulder but are in the embankment will not be cut unless for justifiable engineering or safety reasons;</p> <p>Contract documents and technical specifications will include clauses expressly prohibiting the felling of trees, not requiring to be cleared by the project, by construction workers for the term of the project; and</p> <p>Construction workers will be informed about general environmental protection and the need to avoid unnecessary felling of trees.</p>	Contractor	Area/number of felled trees/vegetation removal.	Approved plan and survey; Trees/vegetation marked on ground; Trees/vegetation removed	LTA, CSC
Site clearance and excavation	Discovery of physical and/or cultural resources or cultural property sites	<p>Contractor's CEMP to include a chance finds procedure;</p> <p>Site agents will be instructed to keep a watching brief for relics in excavations.</p> <p>Should any potential items be located, the LTA will immediately be contacted and work will be temporarily stopped in that area.</p> <p>The contractor with the assistance of the LTA will determine if that item is of potential significance, if so the chance finds procedure will be implemented; and</p> <p>Until the appropriate government ministry has responded to the inspection request work will not re-commence in this location until agreement has been reached between the parties as to any required mitigation measures, which may include supervised excavation</p>	Contractor, Centre for Samoan Studies in the National University of Samoa	Sites and/or resources discovered and protected.	If PCR is found Chance Finds Procedure is properly implemented.	LTA, CSC Centre for Samoan Studies in the National University of Samoa
Mobilization of contractor, presence of construction workers, associations with local people	Social disruption and conflict, presence of workers	<p>Code of conduct-workers' protocols to be discussed and agreed with village leaders-to be shared with workers as part of awareness and mobilization training;</p> <p>The contractor is to ensure that workers' actions outside work site are controlled and that rules of conduct are observed always;</p>	Contractor, village leaders (protocols)	Complaints of incidents between workers and villagers;	Code of conduct agreed; Checking records for complaints (GRM register);	LTA, CSC

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
		<p>The contractor will identify one member of their staff, fluent in Samoan and English, to be the liaison between the village leaders and contractor, as well as between the contractor and LTA;</p> <p>Adequate signage and security will be provided at the site office and works yard and prevention of unauthorized people (especially children) entering the area;</p> <p>Hire and train as many local workers as possible by using labour from local villages if possible;</p> <p>Potable water, hygienic sanitation facilities/toilets with sufficient water supply, worker rest area and first aid facilities will be provided.</p> <p>Portable lavatories (or at least pit latrines in remote areas) shall be installed and open defecation shall be prohibited and use of lavatories encouraged by cleaning lavatories daily and by keeping lavatory facilities clean always;</p> <p>Wastewater effluent from contractors' workshops and equipment washing yards will be passed through gravel/sand beds and all oil/grease contaminants will be removed before discharging it into natural streams. Oil and grease residues shall be stored in drums awaiting disposal in line with the agreed waste management section of the EMP;</p> <p>Predictable wastewater effluent discharges from construction works shall have the necessary permits/approvals from the local authorities before the works commence;</p> <p>To the extent possible, food shall be provided from farms nearby or imported to the area;</p> <p>Bush meat supplies from protected areas will be banned to discourage poaching. Solid and liquid wastes will be managed in line with the provisions of the waste management section of the EMP;</p> <p>Use of guns and hunting equipment by workers will be banned and workers will be dismissed for taking or using timber, hunting or being in possession of wildlife;</p> <p>Provision of adequate protection to the public near the work site, including notice of commencement of works, installing safety barriers as required by villagers, and signage or marking of the work areas;</p> <p>Provision of safe access across the works site (particularly during construction of drains) to</p>		Number and effectiveness of signs.	Consultation with workers about protocols. Monthly observation, consultation	

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
		people whose access are temporarily affected during construction works; At all times workers should respect village and land owner's boundaries and recognize and follow village rules and terms of conduct, including those addressing women and elders; Avoid damage to productive trees and gardens, water resources and springs; and Land used for worksites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned.				
Import of plant. Materials and equipment	Risk of introduction and/or spread of invasive or alien species (flora and fauna)	Equipment/plant, vehicles and construction materials (or even food and alcohol brought in for foreign workers) imported to Samoa for the project and the vessels that import them will be subject to clearance procedures under the Quarantine (Biosecurity) Act and may require issue of phytosanitary certificates from Samoa Quarantine Services	Contractor Samoa Quarantine Services	Equipment and materials subject to inspection and cleaned as required	Phyto-sanitary and biosecurity clearances and permits	LTA, CSC, Samoa Quarantine Services
Construction phase						
Clearing, grubbing, cut and fill activities, construction of embankments; Stockpile and staging areas lead to loss of land use.	Soil erosion and silt generation; Increased runoff / erosion; Sediment contamination of rivers; Turbidity.	All required materials will be sourced in strict accordance with CSS, SPS and the EMP; Material stock-piles and borrow pits (if any) will only be located on unused land or non- agricultural land following consultation with LTA, land owners and Village chiefs. All land will be rehabilitated to its original condition or better condition upon completion of the project works; Excavated material will be reused wherever possible; If the contractor causes damage to agricultural land, productive land or gardens, the contractor is solely responsible for repairing the damage and/or paying compensation based on the rates in the approved resettlement plan; Random and uncontrolled fly-tipping of spoil, or any material, will not be permitted. Suitable dump sites will be designated in consultation with land owners and Village chiefs. Dump sites will not be permitted within 50m of rivers or streams or on garden land or in areas used for livelihood production by Village residents; Obtaining all necessary permits or approvals for project from appropriate government agencies prior to works commencing.	Contractor	Reduced erosion; Damaged culverts replaced; Reduced flooding and overtopping; Vegetation clearance minimized; No garden or agricultural land used; No dump sites near waterways or coast	Monthly - visual inspection	LTA, CSC

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
Operation of construction plant and vehicles generating emissions	Impacts on air quality (incl. dust)	<p>Construction equipment will be maintained to a good standard. The equipment will be checked at regular intervals to ensure they are maintained in working order and the checks will be recorded by the contractor as part of environmental monitoring;</p> <p>Prohibition on the use of equipment and machinery that causes excessive pollution (i.e. visible smoke) at project sites;</p> <p>Material stockpiles being in sheltered areas and be covered with tarpaulins or other such suitable covering to prevent dusty material becoming airborne;</p> <p>Ensure that all truck hauling quarried materials are in good condition, and that haulage does not occur during peak traffic periods;</p> <p>Ensuring that all vehicles transporting potentially dust-producing material are not overloaded, are provided with adequate tail-boards and side-boards and are adequately covered with a tarpaulin (covering the entire load and secured at the front, sides and tail of the vehicle if necessary) during transportation. This is especially important as there are many sensitive receptors along the road;</p> <p>Damping down of the road, especially within 100m from any sensitive receptor along the road and any roads being used for haulage of materials, during the dry season shall take place at least four times per day;</p> <p>Periodic qualitative air quality monitoring against WHO standards;</p> <p>Confine works close to Critical habitat to the periods outside the nesting seasons for endangered bird species (i.e. December-February).</p>	Contractor	<p>Air quality, emissions, dust, particulate matter;</p> <p>Use of tarpaulins and loading of vehicles;</p> <p>Stockpiles covered.</p>	Monitoring monthly to against WHO standards. Also, and after and complaints. Watering schedule Any particulate matter and smoke managed as per EMP	LTA, CSC
Works adjacent to rivers and streams	<p>Erosion of riverbanks due to concentrated water discharge points from the construction sites;</p> <p>Increased turbidity of river waters due to construction site runoff</p>	<p>All land used for storage will be for temporary uses and will be rehabilitated to original condition or better condition upon completion of the works to the satisfaction of LTA;</p> <p>Scour protection will be used as temporary measures, as needed, to ensure temporary structures and water discharges do not damage river configuration;</p> <p>Movements of vehicles and machinery, and hence disturbance, within the riverine habitats will be minimized at all times;</p>	Contractor	<p>Storage area rehabilitated;</p> <p>River bank scour protection installed;</p> <p>No sediment runoff from stockpiles;</p>	<p>Monthly or as required after event;</p> <p>Check designs; Visual observation of culverts; Consultation with village leaders.</p>	LTA, CSC

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
		<p>No vehicles or machinery shall be washed in the river;</p> <p>If the contractor causes damage to the river bank or other structural parts of a river, the contractor is solely responsible for repairing the damage and/or paying compensation;</p> <p>Embankments and in-stream/river activities will be monitored during construction for signs of erosion;</p> <p>Re-vegetation with local fast-growing species, or other plants in consultation with the land owners and village chiefs, will be carried out incrementally and as quickly as possible after work within any river habitat has been completed;</p> <p>Spoils, rubbish or any material will not be disposed of within any river system including riverbed, banks or floodplain areas. Suitable disposal sites will be designated in consultation with land owners and village chiefs and approved by LTA.</p>		No cleaning of vehicles of dumping of materials in river beds.		
Sourcing of materials (gravels, aggregates etc.)	Sourcing of materials from unlicensed or unauthorized sources and quarries, leading to environmental degradation offsite.	<p>Contractor to identify all quarries to be used as sources of construction materials as part of a QMP included in the CEMP;</p> <p>Properly remove topsoil, overburden, and low-quality materials and stockpile near the site to be covered and preserved for site rehabilitation;</p> <p>Where possible use quarry with the highest ratio between extractive capacity (both in terms of quality) and loss of natural state.</p>	Contractor	Materials only obtained from licensed and approved quarries.	Quarries identified in CEMP, evidence of licensing is provided, quarry is approved by LTA.	LTA, CSC PUMA
Spoil disposal (mitigation measures also apply equally to discarded asphalt of macadam pavement surfaces)	Improper disposal impacts habitats and water courses	<p>contractor's CEMP to include section on spoil disposal</p> <p>Spoil will be reused as far as possible for bulk filling;</p> <p>Spoil shall not be stockpiled at the side of the road or dumped over the road edge or the crash barriers;</p> <p>Spoil will not be disposed-off in rivers and streams or other natural drainage path;</p> <p>Under no circumstances will spoil be dumped into any other watercourses (rivers, cliffs near the rivers, streams, drainage, irrigation canals, etc.);</p> <p>Under no circumstances will spoil be temporarily dumped into any other watercourses (rivers, streams, drainage, irrigation canals, etc.);</p> <p>Spoil disposal shall not cause sedimentation and obstruction of flow of watercourses, damage to agricultural land and densely vegetated areas;</p> <p>Spoil will not be disposed-off on fragile slopes, flood ways, wetland, farmland, forest, mangrove</p>	Contractor	<p>Disposal at designated sites;</p> <p>Proper compaction, erosion prevention and other measures to avoid impacts have been implemented.</p>	Daily, weekly - visual inspection; Review of disposal record; Landscaping and rehabilitation.	contractor; LTA

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
		and associated salt flats, beaches, religious or other culturally sensitive areas or areas where a livelihood is derived; Surplus spoil will be used where practicable for local repair works to fill eroded gullies and depression areas and degraded land in consultation with local community; Spoils shall only be disposed to areas approved by land owner, local authority, and LTA; Disposed spoil will be spread in 15 cm layers and compacted to optimum moisture content, covered with topsoil, landscaped and provided with drainage and vegetation to prevent erosion in line with best practice; The spoil disposal site shall be located at least 10m from the road works and 20m from surface water courses and shall be protected from erosion by avoiding formation of steep slopes and by grassing and other planting.				
Cut and fill activities, construction of embankments; Stockpile and staging areas lead to loss of land use.	Impacts on water quality (soil erosion and silt generation; sediment contamination of rivers, turbidity)	All required materials will be sourced in strict accordance with CSS, SPS and the EMP; Material stock-piles and borrow pits (if any) will only be located on unused land or non- agricultural land following consultation with LTA, land owners and village chiefs. All land will be rehabilitated to its original condition or better condition upon completion of the project works; Excavated material will be reused wherever possible; If the contractor causes damage to agricultural land, productive land or gardens, the contractor is solely responsible for repairing the damage and/or paying compensation based on the rates in the approved resettlement plan; Random and uncontrolled fly-tipping of spoil, or any material, will not be permitted. Suitable dump sites will be designated in consultation with land owners and Village chiefs. Dump sites will not be permitted within 50m of rivers or streams or on garden land or in areas used for livelihood production by Village residents; Obtaining all necessary permits or approvals for project from appropriate government agencies prior to works commencing.	Contractor	Reduced erosion; Damaged culverts replaced; Reduced flooding and overtopping; Vegetation clearance minimized; No garden or agricultural land used; No dump sites near waterways or coast	Monthly - visual inspection	LTA, CSC
Generation of wastes (solid and liquid)	Uncontrolled waste disposal operations can cause various impacts	Contractor's CEMP to include a waste management plan (WMP) part of the CEMP;	Contractor	Discharge of waste as per the WMP;	Approved WMP; Weekly, monthly - inspection of loads	LTA, CSC

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
		<p>Areas for disposal to be agreed with local authorities and checked and recorded and monitored by the LTA;</p> <p>Segregation of wastes shall be practiced. Cleared foliage, shrubs and grasses may be given to local farmers for fodder and fuel. Organic (biodegradables) shall be collected and disposed of on-site by composting;</p> <p>NO Burning. Waste associated with the project or the supporting activities is NOT allowed to be burned anywhere;</p> <p>Burning of construction and domestic wastes shall be prohibited;</p> <p>Materials shall be recycled when possible;</p> <p>Residual general wastes shall be disposed of in disposal sites approved by local authorities;</p> <p>Construction sites shall be provided with garbage bins;</p> <p>Disposal of solid wastes into flood ways, wetland, rivers, other watercourses, farmland, forest, mangrove and associated salt flats, beaches, places of worship or other culturally sensitive areas or areas where a livelihood is derived, canals, agricultural fields and public areas shall be strictly prohibited;</p> <p>There will be no site-specific landfills established by the contractors. All solid waste will be collected and removed from the construction sites and disposed in the local authority designated waste disposal sites;</p> <p>Waste disposal areas approved by local authorities shall be rehabilitated, monitored, catalogued, and marked if required.</p>		Occurrence of erosion.	to designated landfill/dump Observation/checks of rivers, streams and culverts	
Use of hazardous materials	Accidental spills of oil and other hazardous chemicals; Accidents placing people at risk.	<p>The contractor will prepare a hazardous materials management plan as part of the CEMP;</p> <p>Emergency Response Plan (ERP) shall be prepared as part of the CEMP by contractor to cover hazardous materials/oil storage, spills and accidents;</p> <p>Ensure that safe storage of fuel, other hazardous substances and bulk materials are agreed by LTA and have necessary approval/permit from local authorities;</p> <p>Wastes to be segregated and stored until disposal;</p> <p>Lubricants will be stored in containers / dedicated enclosures with a sealed floor >50m from water bodies;</p>	Contractor	<p>CEMP to include ERP;</p> <p>Ensure storage sites are using existing concrete base;</p> <p>Spills cleaned and area rehabilitated.</p>	Approved HMMP and ERP; As required – compliance with HMMP and ERP; Visual Inspection of storage facilities;	LTA, CSC

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
		<p>Fuel tanks 5000 litres or less will be stored in dedicated areas with a sealed floor >50m from water bodies;</p> <p>Fuel tanks greater than 5000 litres will be stored in a covered walled enclosure with a sealed floor and bunds >50m from water bodies including rivers and streams;</p> <p>Hydrocarbon and toxic materials will be stored in adequately protected sites consistent with national and local regulations to prevent soil and water contamination;</p> <p>Equipment/vehicle maintenance and re-fuelling areas will be confined to areas in construction sites designed to contain spilled lubricants and fuels. Such areas shall be provided with drainage leading to an oil-water separator that will be regularly skimmed of oil and maintained to ensure efficiency;</p> <p>Fuel and other hazardous substances shall be stored in areas provided with roof, impervious flooring and bund/containment wall to protect these from the elements and to readily contain spilled fuel/lubricant. All hazardous materials will be stored above flood level;</p> <p>Segregate hazardous wastes (oily wastes, used batteries, fuel drums) and ensure that storage, transport and disposal shall not cause pollution and shall be undertaken consistent with national and local regulations. Ensure all storage containers are in good condition with proper labelling in English and Samoan;</p> <p>Regularly check containers for leakage and undertake necessary repair or replacement;</p> <p>Discharge of oil contaminated water shall be prohibited and separated oil shall be disposed in an authorized facility off-site. Used oil and other residual toxic and hazardous materials shall not be poured on the ground. Used oil and other residual toxic and hazardous materials shall be disposed of in an authorized facility off-site;</p> <p>Adequate precautions will be taken to prevent oil/lubricant/ hydrocarbon contamination from mobile equipment of river channel beds;</p> <p>Ensure availability of spill-kit with materials (e.g., absorbent pads, etc.) specifically designed for petroleum products and other hazardous substances where such materials are being stored;</p>				

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
		Spillage, if any, will be immediately cleared with utmost caution using absorptive clean up materials to leave no traces. All spillage waste will be disposed at disposal sites approved by the LTA; and The contractors shall identify named personnel in their CEMP in-charge of storage of hazardous materials and ensure staff are properly trained to control access to these areas and entry will be allowed only under authorization.				
Construction activities	Impacts on Red List species	Prior to ground breaking on the 7 km of road passing through Apia Catchment KBA, a suitably qualified person is engaged to survey, and potentially relocate, any specimens of Samoa skink (<i>Emoia samoensis</i>), olive small-scaled Skink (<i>Emoia lawesi</i>) and gastropod snail (<i>Thaumatodon hystricelloides</i>) that might happen to be present beside the road. Specialist to identify suitable performance indicators, benchmark and undertake monitoring to verify effectiveness of measures and achievement of not net loss of biodiversity. The benchmarking and establishment of performance indicators will be reviewed and agreed with ADB and MNRE-DEC.	Specialist recruited (part of CSC)	Suitably qualified person will be engaged to survey, and potentially relocate, specimens of Samoa Skink (<i>Emoia samoensis</i>), Olive Small-Scaled Skink (<i>Emoia lawesi</i>) and Gastropod snail (<i>Thaumatodon hystricelloides</i>). No net loss of biodiversity	During activities through 7km passing through KBA - specialist monitoring reports	LTA, CSC, ADB, PUMA, DEC-MNRE
Encroachment into KBA terrestrial habitats, effects on flora and fauna	Impacts on terrestrial habitats; Workers poach animals for food or feathers etc.; Protected or sensitive areas affected.	Contractor will be responsible for providing adequate knowledge to construction workers in relation to existing laws and regulations regarding wildlife protection. Workers will be prohibited from poaching, hunting, trapping and/or killing wildlife. Invasive species shall not be introduced. During replanting/revegetation works, new alien plant species (i.e., species not currently established in the region of the project) shall not be used unless carried out with the existing regulatory framework for such introduction. All replanting and compensatory tree planting will be planned in full agreement with the relevant local authority. Contractor's site office, work yard, rock crushers, material storage, and quarries will all be approved by LTA and will not be permitted in any protected	Contractor	.	Spot inspections; - visual inspection of work sites; Relocation and monitoring reports prepared; Re-vegetation activities as per EMP; Consultations with villagers and workers	LTA, CSC

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
		<p>areas, ecologically important sites or areas valuable for conservation;</p> <p>Vegetation clearance during construction activities will be minimized;</p> <p>Contractors will not cut any trees within or outside the project at the request of the local land owners or village leaders without prior approval from LTA;</p> <p>Vegetative cover cleared from the roadside during rehabilitation activities will be kept for land protection and re-vegetation.</p> <p>Contractors will be responsible for re-vegetation in cleared areas.</p>				
Various activities	Other impacts on other elements of the biological environment including minor vegetation and tree removal from road-sides and potential water quality effects (aquatic flora and fauna impacts)	<p>The contractor will be responsible for providing adequate knowledge to construction workers in relation to existing laws and regulations regarding illegal logging. Contract documents and technical specifications will include clauses expressly prohibiting the felling of trees, not requiring to be cleared by the project, by construction workers for the term of the project;</p> <p>The contractor will be responsible for providing adequate knowledge to construction workers in respect of fauna. Contract documents and technical specifications will include clauses expressly prohibiting the poaching of fauna by construction workers and making the contractor responsible for imposing sanctions on any workers who are caught trapping, killing, poaching, or being in possession of or having poached fauna;</p> <p>The LTA will supervise and monitor a ban on use of forest timber and workers shall be prohibited from cutting trees and mangroves for firewood;</p> <p>Construction workers will be informed about general environmental protection and the need to avoid un-necessary felling of trees unless justified on engineering grounds and approved by LTA.</p> <p>Preparation of a plan identifying vegetation and tree to be removed, marking of trees and implementation and monitoring of the plan; and</p> <p>Preparation and implementation of ESCP, EMP and HMMP.</p>	Contractor	Check for poaching and unnecessary vegetation clearance; Training of workers in information related to sensitive habitats and flora/fauna in the area	Records of implementation and compliance with ESCP, WMP and HMMP; Spot inspections; - visual inspection of work sites;	LTA, CSC
Presence of construction workers	Various social impacts including: social disruption; possibility of conflicts or antagonism between residents and workers;	Contractor to prepare labor influx management plan and agree with chiefs and heads of women's committees in adjacent villages and villages along haul routes a code of conduct (social protocols) the workers will adhere to;	Contractor, Village Leaders, Approved service provider.	HIV/STIs awareness campaign implemented; ESO recruited;	As required; Monthly or after complaint; Project information disclosed; GRM register;	LTA, CSC

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
	spread of communicable diseases including STIs and HIV/AIDS; children are potentially exposed to exploitation; impacts on community health and safety	<p>Induction of workers on requirements of the project's CCP and GRM and a code of conduct (socially and culturally appropriate protocols) established for any contact between local communities and contractor/workers;</p> <p>The contractor will engage an approved service provider to deliver a communicable disease awareness and prevention program targeting risk of spread of STIs and HIV. The training will be delivered to the communities and workers;</p> <p>The contractor will put up notice boards regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions;</p> <p>The facilities will be fenced and sign-posted and unauthorized access or entry by general public will be prohibited;</p> <p>Potable water, clean water for showers, hygienic sanitation facilities/toilets with sufficient water supply, worker canteen/rest area and first aid facilities will be provided onsite. Adequate toilet facilities shall be installed. Separate toilets shall be provided for male and female workers;</p> <p>For unskilled activities and labour, as many local people (including women) as possible will be recruited and trained;</p> <p>Standing and open water (including puddles, ponds, drains etc) within the camp or office/yard shall not be permitted to reduce possible disease vectors;</p> <p>To reduce risk of ground contamination, wastewater effluent from contractors' workshops (if any) will be passed through gravel/sand beds or an oil separator and all oil/grease contaminants will be removed before discharging into drainage channels. Oil and grease residues shall be stored, handled and disposed of as per the agreed WMP;</p> <p>The contractor's facilities area will be cleaned up to the satisfaction of SPA PMU and local community after use; and</p> <p>Post-construction, the area shall be fully rehabilitated, and all waste materials shall be removed and disposed to disposal sites approved by local authorities.</p>		<p>Training implemented;</p> <p>Provision of safety equipment;</p> <p>Signage and security to prevent unauthorized people entering work sites;</p> <p>Signage installed as required.</p>	<p>Training records;</p> <p>Staff records; Visual inspection;</p> <p>Consultations with villagers;</p> <p>Checking of complaints;</p> <p>Consultations with workers re: training</p>	
Operation of construction plant and	Noise in community;	Baseline data on noise levels shall be collected before commencement of civil works;	Contractor	Adherence to agreed schedule;	Baseline conducted and recorded;	LTA, CSC

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
equipment creating noise	Impacts on construction workers.	<p>Identification of specific measures for when/where EHSg criterion of Leq55dB(A)1-hour is exceeded; Rock crushers and asphalt plant to be located at least 500m from sensitive receivers;</p> <p>Requirements in the EMP and contract documents that all vehicle exhaust systems and noise generating equipment be acoustically insulated and maintained in good working order and that regular equipment maintenance will be undertaken;</p> <p>The contractor will prepare a schedule of operations that will be approved by village chiefs and LTA. The schedule will establish the days, including identifying days on which there should be no work, and hours of work for each construction activity and identify the types of equipment to be used;</p> <p>Workers will be provided with ear defenders and noise abatement equipment as may be required;</p> <p>Temporary noise barriers will be used if necessary as approved by the LTA;</p> <p>Any complaints regarding noise will be dealt with by the contractor in the first instance through the GRM.</p>		<p>Complaints (no. logged with resolution);</p> <p>Workers safety equipment.</p>	Monthly, or after complaint review schedule; Consultation (ensure schedule being adhered to) GRM register.	
<p>Presence of vehicles and equipment in villages;</p> <p>Use of people's land for access to construction site;</p> <p>Traffic and safety issues.</p>	<p>Traffic and access disrupted during construction;</p> <p>Traffic safety affected.</p>	<p>The contractor will prepare, and submit to LTA, a traffic management plan (TMP) detailing diversions and management measures;</p> <p>Signs and other appropriate safety features will be used to indicate construction works are being undertaken;</p> <p>Contract clause specifying that care must be taken during the construction period to ensure that disruptions to access and traffic are minimized and that access to villages along the project road is maintained always;</p> <p>Provincial Works and village officials will be consulted if access to a village must be disrupted for any time and temporary access arrangements made;</p> <p>Construction vehicles will use local access roads, or negotiate access with land owners, rather than drive across vegetation or agricultural land, to obtain access to material extraction sites. Where local roads are used, they will be reinstated to their original condition after the completion of work;</p> <p>The road will be kept free of debris, spoil, and any other material always;</p>	Contractor	<p>CEMP to include TMP;</p> <p>No. of accidents or events;</p> <p>Maintenance of access;</p> <p>Signage; Road free of materials and debris;</p> <p>Haulage routes rehabilitated.</p>	Visual inspection; Consultations; Review of TMP.	LTA, CSC

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
		<p>Disposal sites and haul routes will be identified and coordinated with local officials;</p> <p>Provision of adequate protection to the public near the work site, including notice of commencement of works, installing safety barriers if required by villagers, and signage or marking of the work areas;</p> <p>Provision of safe access across the works site to people whose villages and access are temporarily affected during road re-sheeting activities.</p>				
Construction activities, use of plant and vehicles, working at height in trenches etc	Health and safety risks to workers	<p>The contractor will prepare a health and safety plan (HSP) covering both workers and community as part of the CEMP;</p> <p>The contractors will demonstrate to the LTA they are properly resourced by identifying a qualified/experienced ESO in the bid and subsequently in the CEMP;</p> <p>Establishment of safety measures as required by law and by good engineering practice and provision of first aid facilities at work sites, in vehicles and establishment of a first aid/health post at the work site will be at the core of the CEMP;</p> <p>The contractor will conduct regular training for all workers on safety and environmental hygiene at no cost to the employees. The contractor will instruct workers in health and safety matters as required by law and by good engineering practice and provide first aid facilities;</p> <p>Instruction and induction of all workers shall be carried out for all operatives before they start work in health and safety matters, including road safety;</p> <p>The contractor will instruct and induct all workers in health and safety matters (induction course) including construction site rules and site agents will follow up with toolbox talks on a weekly basis.</p> <p>Workforce training for all workers starting on site will include safety and environmental hygiene;</p> <p>Workers shall be provided with appropriate personal protection equipment (PPE) and safety equipment appropriate to their tasks. PPE will include safety boots, helmets, reflector vest, gloves, protective clothes, dust mask, goggles, and ear protection at no cost to the workers;</p> <p>Fencing will be installed on all areas of excavation greater than 1m deep and sides of temporary works;</p>	Contractor; Approved service provider	CEMP includes HSP; Knowledge of workers; Use of PPE; Signage; Approved service provider recruited and training delivered	Approved HSP; Training records; PPE and safety equipment provided and used; Accident register;	LTA, CSC

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
		<p>Reversing signals (visual and audible) shall be installed on all construction vehicles and plant;</p> <p>Provision of potable water supply shall be maintained at all times in all work locations sufficient for each worker to receive at least 2 liters per day;</p> <p>Scheduling of regular (e.g. weekly tool box talks) to orientate the workers on health and safety issues related to their activities as well as on proper use of PPE;</p> <p>Where worker exposure to traffic cannot be eliminated, protective barriers and warning signs shall be provided to shield workers from passing vehicles. Another acceptable measure is to install channelling devices (e.g., traffic cones and barrels) to delineate the work zone and trained flag men at each end of the current working zone;</p> <p>Work sites shall be provided with men and women's toilets/sanitation facilities in accordance with local regulations to prevent any hazard to public health or contamination of land, surface or groundwater. These facilities shall be well maintained and cleaned regularly to encourage use and allow effective operation and emptied regularly so as never to overflow; and</p> <p>The contractor will maintain an accidents and incidents register which will include documentation of near misses. All accidents will be fully documented to the LTA and CSC within 24 hours and a follow up report after investigation has been completed within 3 days of the accident.</p>				
Construction activities, use of plant and vehicles, trenches and excavations, work sites, etc	Health and safety risks to community	<p>The HSP to be prepared and implemented as part of the approved CEMP will cover health and safety risks to the community;</p> <p>The contractor will appoint an ESO to address health and safety concerns and liaise with the LTA and village leaders within the project area;</p> <p>Barriers (e.g., temporary fence), and signs shall be installed at construction areas to deter pedestrian access to the roadway except at designated crossing points;</p> <p>Adequate signage and security will be provided at the site office and works yard and prevention of unauthorized people (including children) entering work areas. Warning signs will be provided at the</p>	Contractor; Approved service provider	CEMP includes HSP; Knowledge of workers; Use of PPE; Signage;	Approved HSP; Training records; PPE and safety equipment provided and used; Accident register; GRM register; Approved service provider recruited and training delivered	LTA, CSC

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
		<p>periphery of the site warning the public not to enter;</p> <p>The public/residents shall not be allowed in high-risk areas, e.g., excavation sites and areas where heavy equipment is in operation;</p> <p>Speed restrictions shall be imposed on project vehicles and equipment traveling within 50m of villages, schools and other sensitive receptors (e.g. residential, places of worship, etc.);</p> <p>Provisions will be made for site security; safety barriers and signs will be erected outside trenches deeper than 1m and covers will be placed over other holes. Other safety measures will be installed as necessary;</p> <p>Drivers will be educated on safe driving practices to minimize accidents and to prevent spill of spoil, hazardous substances (fuel and oil) and other construction materials during transport;</p> <p>Contractors will ensure that no wastewater is discharged to local rivers, streams, lakes and irrigation channels and any other water bodies;</p> <p>Measures to prevent proliferation of mosquitoes shall be implemented (e.g., provision of insecticide treated mosquito nets to workers, installation of proper drainage to avoid formation of stagnant water. Standing water will not be allowed to accumulate in the temporary drainage facilities or along the roadside);</p> <p>The contractor will engage an approved service provider to deliver the communicable diseases awareness and prevention program. The contractor will ensure that all workers attend the training. The training will commence prior to contractor mobilization for the communities and during initial mobilization of the contractor's workforce prior to commencement of any civil works and will continue throughout the project implementation; and</p> <p>The contractor will agree a code of conduct with village leaders. Workers will be required to comply with the agreed code of conduct. Workers will also undergo training on gender-based violence in the workplace and construction site.</p>				
Construction activities causing accidental damage to existing services	Interference with existing irrigation, infrastructure; water supply contaminated, and power and telecommunications	Consult with service providers to minimize physical impacts on public infrastructure and disruption to services;	Contractor	Services damaged and rehabilitated/reinstated;	As required - visual inspection, consultation with service providers	LTA, CSC, Utility providers

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
	supplies disrupted through knocking over poles or breaking of pipelines or exposing water table during works.	Reconfirm power, water supply, telecommunications and irrigation systems likely to be interrupted by the works and any additional trees to be cut near utilities; Contact all relevant local authorities for utilities and local village groups to plan re-provisioning of power, water supply, telecommunications and irrigation systems; Relocate and reconnect utilities well ahead of commencement of construction works and coordinate with the relevant utility company at the district and district levels for relocation and reconnection well before works commence and include for compensatory planting for trees; Inform affected communities well in advance; Arrange reconnection of utilities and irrigation channels in the shortest practicable time before construction commences; If utilities or irrigation channels are accidentally damaged during construction it shall be reported to LTA and utility authority and repairs arranged immediately at the contractor's expense.		Services re-routed; Service disruptions.		
Excavations and other construction activities accidentally encroaching into historical / cultural sites	Impacts on cultural resources, sites and/or assets or cultural property sites.	Contractor's CEMP to include a chance finds procedure which will include/detail: <ul style="list-style-type: none"> Stop the construction activities in the area of the chance find; Delineate the discovered site or area; Secure the site to prevent any damage or loss of removable objects. Notify the Engineer who in turn will notify the responsible local authorities; Responsible local authorities (including the Centre for Samoan Studies of the National University of Samoa) will be in charge of protecting and preserving the asset/site before deciding on subsequent appropriate procedures; Decisions on how to handle the finding shall be taken by the responsible authorities and the relevant local authority. This could include changes in the layout (such as when finding an irremovable remain of cultural or archaeological importance) conservation, preservation, restoration and salvage; Implementation for the authority decision concerning the management of the finding 	Contractor; Centre for Samoan Studies of the National University of Samoa	CEMP to include chance finds procedure; Sites and/or resources discovered and the protection measures being put in place.	Stop work order issued; Site/resources dealt with in accordance with procedures	LTA, CSC Centre for Samoan Studies of the National University of Samoa

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
		<p>shall be communicated in writing by the relevant local authority; and</p> <p>Construction work should resume only after permission is given from the responsible local authorities and the relevant local authority concerning safeguard of the heritage.</p> <p>Site agents will be instructed to keep a watching brief for relics in excavations; Should any potential items be located, the LTA will immediately be contacted and work will be temporarily stopped in that area.</p> <p>The contractor with the assistance of the LTA will determine if that item is of potential significance and pass the information to Centre for Samoan Studies of the National University of Samoa (and others as required) who will be invited to inspect the site and work will be stopped to allow time for inspection.</p>				
Proposed works and possibly temporary restrictions in access and/or parking opportunities	Temporary loss of business	<p>CEMP will include a TMP which will include provisions for minimizing such disruptions to local businesses;</p> <p>New structure built further back from right-of-way with car parks a safe distance from the road;</p> <p>As already discussed and agreed relocation of car park of selected businesses.</p>	Contractor	Relocation; No. of days of restrictions; No. of concerns raised and resolution	Approved TMP; Consultations with villages; GRM; CCP implementation	LTA, CSC
Site office and works yard and use of water and electricity supplies.	Stress on resources and existing infrastructure.	<p>Site office and works yard located, if possible, in areas better supplied with infrastructure and services;</p> <p>contractor to supply temporary facilities i.e. health post, accommodation, water and electricity, telecommunications, and sanitation.</p>	Contractor	No. of concerns raised and resolution; Service supply to site and office.	Consultations with villages; GRM; CCP implementation	LTA, CSC
Operation phase						
Operation of vehicles creating emissions	Hydrocarbons, Carbon Monoxide, Nitrous compounds, Sulphur Dioxide and particulate matter increase through increased traffic.	<p>Forecasts of traffic growth indicate that emissions will be low and not have a noticeable effect on air quality;</p> <p>Landscaping along roadside to reduce dust impacts.</p>	LTA Maintenance contractor	Air quality; Particulates and smoke; No of complaints; Incidents logged with resolution.	Monthly or as required; Consultation and visual observations; Complaints.	Maintenance contractor; LTA
Routine and ongoing maintenance	<p>Constriction of water flows through structures blocking water flow;</p> <p>The need for gravel for on-going road maintenance leads</p>	<p>Maintenance of structures to ensure debris does not collect and result in damage to culverts and drainage structures, or land through altered flow patterns;</p> <p>LTA will negotiate with resource owners and prepare an MOU acceptable to all parties;</p>	LTA Maintenance contractor	Satisfaction with MOUs; Condition of road.	As required or as per MOUs; Routine maintenance records; Visual inspection.	Maintenance contractor; LTA.

MITIGATION				MONITORING		
Project activity	Environmental impact	Mitigation measures	Responsibility	Parameter	Frequency / means of verification	Responsibility
	to acquisition of new source areas affecting properties; Standing water degrades road and surrounding environment.	Drain and fill areas where water can pool as part of ongoing maintenance activities.				
River flow and drainage	Alterations to river flow; Restriction of natural meandering of streams; Restriction of natural flood cycles by temporary storage of floodwaters and restricted flood plain movements.	Proper maintenance of structures to ensure river debris does not collect and result in damage to banks and land; Scour protection at storm water outlets; Frequency of maintenance is increased and that storm drains and highway drainage systems are periodically cleared to maintain clear drainage to allow rapid dispersal of storm water flow. An adequate system of monitoring, reporting and maintenance will be developed.	LTA; Maintenance contractor	Erosion; Flooding patterns; Culverts and drainage structures cleared of debris.	2 times a year; Post- event monitoring; Visual assessment; Review of flooding patterns/ records.	LTA
Run-off from road	Use of the road results in problems with runoff, loss of soils and other forms of erosion; Water quality in rivers is affected by use of the new roads (e.g. debris laden run-off and silts etc.).	Maintenance of erosion control structures, preventing debris build-up and ensuring good vegetation cover; Roads will be well compacted, covered and provided with culverts and drains; Awareness of the value of maintaining vegetation cover will be undertaken.	LTA Maintenance contractor	Water quality in streams and rivers; Suspended solids from road or areas of erosion, if identified	2 times a year; Post- event monitoring; Visual assessment; Consultations or complaints.	LTA
Increased traffic	Increases in noise nuisance for residents; Increased traffic volumes and higher speeds leads to accidents.	Low traffic forecasts and the low population density means that ambient noise levels will not significantly increase; General safety will be improved through providing a pedestrian pathway (in some sections), shoulder and widening within right-of-way; Installation of road safety signage; Work with police to carry out enforcement of traffic regulations once road is upgraded; Awareness raising through village meetings will be needed to create road safety programs; Ongoing community awareness ascertain village concerns regarding traffic calming and management.	LTA Local police	Accidents and collisions; Safety issues discussed in schools; Effectiveness of traffic calming measures.	2 times a year; Post- event monitoring; Visual assessment; Consultations or complaints; Collect road accident data.	LTA
	Roadkill of Red List Species	Speed limits and speed reduction measures throughout 7km of road passing through the KBA	LTA Local police	Data collected on fauna roadkill	As specified in specialist report	LTA, MNRE-DEC
Spread of communicable diseases	Roads act as pathway for spread of communicable diseases such as HIV and STIs.	At expected traffic volumes, risk of spread of such diseases are not expected	LTA Approved service provider or NGO.	Health statistics of the area; Number of new cases of STI, HIV/AIDS.	Annual; Consultations with villagers; Review of health records.	LTA
Any other	Unintended or unanticipated impacts	As required to avoid or reduce effects or impacts	LTA	TBA	As above, as required	LTA

7.4 Grievance Redress Mechanism

7.4.1 Overview

Each ADB financed project is required to implement a grievance redress mechanism (GRM) to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the project's performance, including environmental and social impacts and issues. The GRM will be established as early as possible following project approval.

Objectives. The GRM is for people seeking satisfactory resolution of their complaints about, including about the environmental and social performance, the project. The mechanism ensures that: (i) the rights and interests of any person affected by the project, including by poor environmental performance or social management, are protected; and (ii) their concerns during the design, construction and operation phases of the project will be addressed effectively and timely. The GRM has the following objectives:

- Establish a prompt, easy to understand, consistent and respectful mechanism appropriate for the Samoan context to support LTA in receiving, investigating and responding to complaints from community stakeholders;
- Ensure proper documentation of complaints and any corrective actions taken; and
- Contribute to continuous improvement in performance through the analysis of trends and lessons learned.

Legislation. The grievance procedures defined by the Taking of Lands Act 1964 are only utilized as a last resort. It is more common for any differences to be settled by negotiation and consensus reached between the government and the village or villagers involved and this is usually the first step in the resolution of any grievances.

Institutional arrangements. The GRM will be project-wide. A grievance and complaints logging system has been developed by LTA to help ensure that road projects are implemented in accordance with appropriate environmental and social practices. One of the keys to ensuring this is through proper engagement with civil society. The system is a key part of the GRM that helps record, assess, and resolve grievances and complaints during the implementation of a project in as efficient, effective, and transparent manner as possible, and to inform the Government and donors of design and implementation changes that can be used to improve the systems.

The LTA, with support from the CSC, will be responsible for managing grievances including updating the grievance database to track the progress of grievances for the duration of the project. The LTA, through the Public Relations Officer, will administer the grievance database. Nominated LTA staff will regularly update the grievance database in consultation with key agencies as relevant depending on the nature of the complaint received (i.e. MNRE, PUMA, and Land Board). All project-related grievances should be captured in the database regardless of the agency they were raised with. LTA should be involved in the resolution of all project-related grievances that sit within their key functions and shall support MNRE and other key agencies with adequate resources and staffing as necessary to ensure grievances are effectively resolved.

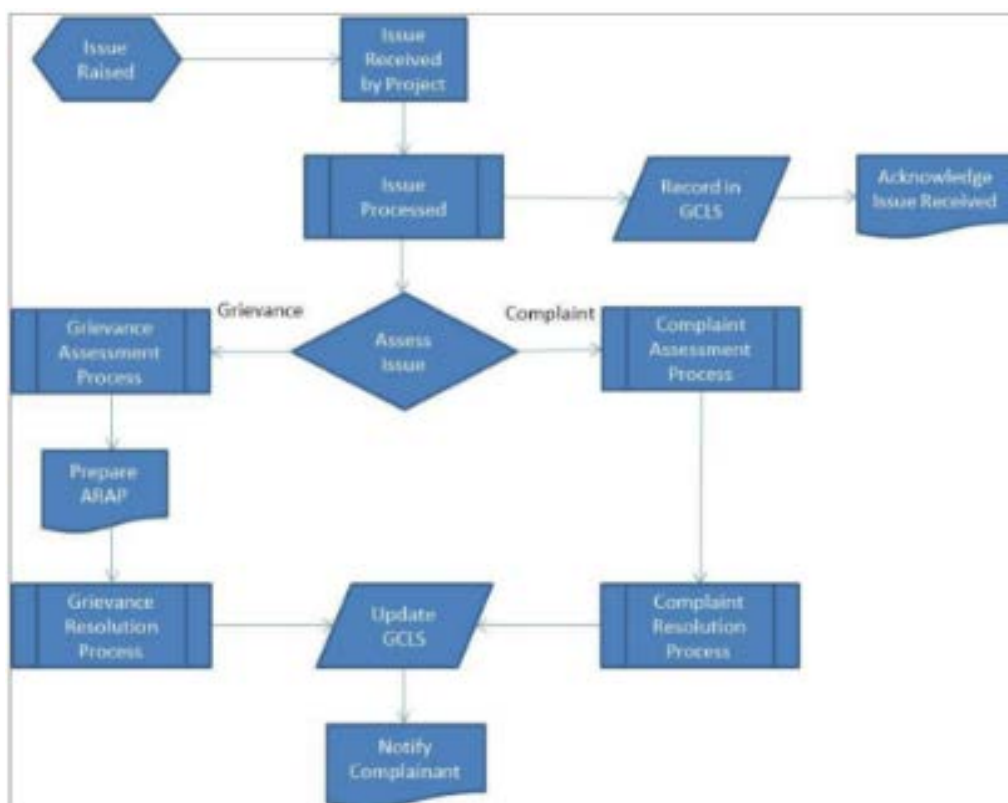
7.4.2 Grievance Redress Process

The GRM is based upon the premise that it imposes no cost to those raising the grievances that concerns arising from project implementation are adequately addressed in a timely manner; and that participation in the grievance process does not preclude pursuit of legal remedies under Samoan law. Local communities and other interested stakeholders may raise a grievance at any time to the LTA. The GRM presented here outlines a process for documenting and addressing project grievances (complaints) that may be raised by affected persons or community members regarding specific project activities.

The grievance process is based upon the premise that stakeholders are free to raise their concerns to relevant representatives at no cost or threat of any negative repercussions; that concerns arising from project implementation are adequately addressed in a timely and respectful manner; and that participation in the grievance process does not preclude pursuit of legal remedies under the laws of the country.

LTA will manage the GRM, utilising formal, informal and traditional grievance procedures suitable to the Samoan context. Generally, complaints and disputes will be resolved at the community level as much as possible. The statutory rights of the Complainant to undertake legal proceedings remain unaffected by participation in this process (Figure 7.2).

Figure 7.2: Stages in the grievance resolution process



7.4.3 Grievance Procedure

Below describes the scope and procedural steps and specifies roles and responsibilities of the parties involved. The GRM is subject to revision based on experience and feedback from stakeholders.

Grievances may be firstly referred to customary conflict mediation arrangements where appropriate, so long as they are not directly affiliated with traditional leaders who are party. If the issue cannot be resolved at this level, it will be raised to the next level and so on. LTA will aim to address all complaints received, regardless of whether they arise from real or perceived issues. Any stakeholder who considers themselves affected by LTA's activities will have access to this Procedure at no cost or threat of any negative repercussions.

During the design phase, the LTA, MNRE, the CSC and the contractor will be responsible for the coordination of community consultation and addressing key concerns and advising community members on how to access the GRM.

During the construction phase, the contractor's EHSO will log complaints and report these to LTA on a regular basis. Where possible, the contractor will liaise with affected parties, matai and other relevant parties to resolve any disputes on site. Complaints outside the scope of the contractor's responsibilities will be referred to LTA or MNRE to resolve as appropriate. The issue should be responded to within 48 hours and closed out within 30 days.

All issues are logged and tracked in the GRM register and reviewed as part of the compliance monitoring systems. Once the issue has been satisfactorily resolved with the member of the public who initiated the complaint (the 'complainant'), then the complaint will be closed. The complainant will be notified in accordance with the procedures as documented in the GRM, and this will be recorded in the register. The GRM allows: (i) full auditing of the process by which a complaint was addressed; (ii) supervisors to review and comment on all grievances; and, (iii) monitoring of service standards for resolving complaints

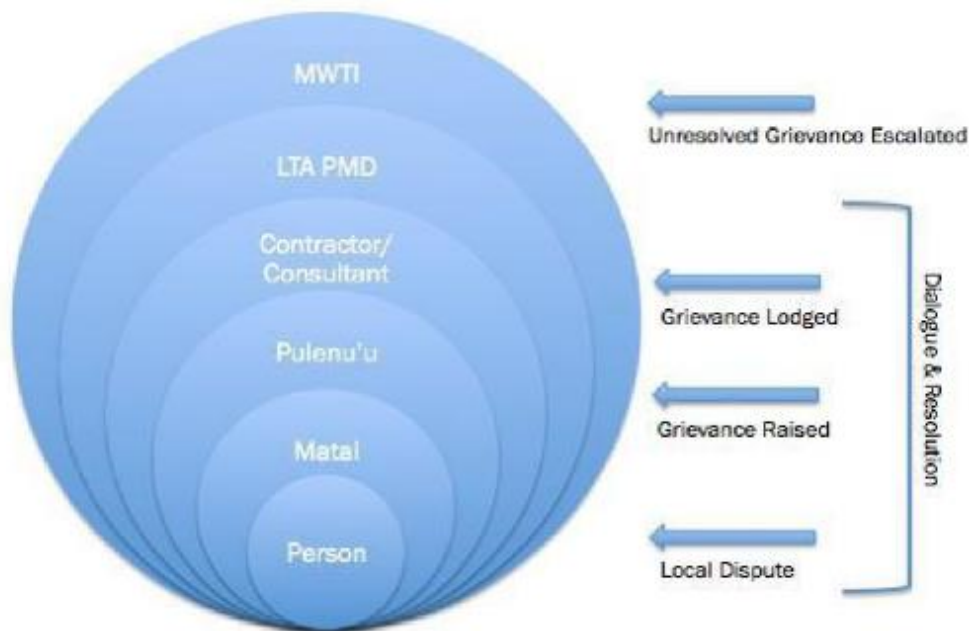
The monitoring of GRM implementation will include statistics on number of and types of complaints, time taken to resolve, etc. These statistics can be easily published to a public website or included in reports. Complaints may be lodged through a website, by SMS, in person, by telephone, e-mail, or letter. Website complaints are automatically logged in the system, while other forms are manually entered by the person designated by the LTA.

Some project related grievances experienced by villagers can be dealt with effectively at the village level and need not be referred to the Project Manager/LTA unless village level redress mechanisms fail. Common among such grievances are local disputes over land boundaries, claims of ownership over crops and compensation distribution. Other common disputes involve contractors such as where non-land assets such as soil and rocks are used without prior consent of landowners; or where contractors fail to deliver on agreed terms for their use.

The traditional mechanism for grievance redress requires the aggrieved party to take his/her grievance to his/her extended family matai, who will assume responsibility for a resolution on their behalf. The aggrieved party's matai may seek redress directly with the contractor or the other/opposing party and would do his/her utmost to secure a satisfactory outcome. Failing this, the 'matai' will then take the grievance to the Fono, through the Puleuu/Sui o le Malo. Usually this is discussed during the monthly meeting of the Fono. The Fono will decide on how best to address the grievance including conveying the concern to the contractor on behalf of the aggrieved party, or alternatively recommending that the aggrieved party seek a resolution directly with the LTA and failing that, seeking redress with the court.

In the case of local disputes over customary land boundaries, and ownership and use of non-land assets, the Fono's decisions are final with the disputing parties aware of the risk of noncompliance. Such decisions of the Fono are now recognized by the courts through the Village Fono Act 2000.

Upon construction completion, LTA and MNRE will continue to work to resolving grievances resulting from the project if necessary. Figure 7.3 outlines the levels of traditional and government authority that are involved in grievance resolution, depending on the severity of the grievance.

Figure 7.3: Levels of grievance redress

Contractor's responsibilities. The contractor is responsible for community consultation regarding construction activities and recording complaints as per provisions contracts.

At the inception of the project, all employees of the contractor should be briefed on the GRM and informed they are required to report any grievance to the site manager. The contractor/consultant shall nominate a staff member for community consultation who will manage grievances, i.e., the Site Manager. The site manager will work in cooperation with LTA and the Public Relations Officer on a regular basis. A phone number will need to be established and be made publicly available on project signage and public relations materials readily accessible and visible to the affected persons and communities.

During construction phase, a suggestion box and complaint forms will be located at the site office. The site manager will receive grievances on site and respond within 48 hours of the grievance being received. The response should confirm the nature of the grievance and indicative timeframe for resolution. The Site Manager shall record the grievance in a logbook or register then provide a copy of the grievance to LTA within two working days of the complaint being made. This logbook will be maintained throughout the construction or contract period.

7.4.4 Awareness of the GRM

Training on the GRM will be provided to LTA staff, contractors and key agencies. LTA (and contractors) will communicate the GRM in an understandable manner to affected stakeholder groups. Confidentiality will be respected, and LTA will take all reasonable steps to protect parties from retaliation. Communities and affected persons should be advised of the GRM in the early stages of engagement, and be made aware of:

- How to access the GRM (i.e. key people, complaint forms and website and who to speak to and lodge a complaint);
- The timeframes for each stage of the process;
- The process, including registration of complaints, will be confidential, responsive and transparent; and
- Alternative avenues where conflicts of interest exist.

7.5 Monitoring and Reporting

Environmental monitoring is a very important aspect of environmental management during construction and operation stages of the project to safeguard the environment. In response to the impacts identified during the feasibility study, an environmental monitoring plan has been developed and is presented in Table 7.2. The contract documents will contain a list of all required mitigation measures, the EMP and a time-frame for the compliance monitoring of these activities as per Table 7.2. The monitoring will comprise: (i) specialist monitoring for biodiversity as noted in Section 6 and Table 7.2; and (ii) surveillance to check that the contractor is meeting the provisions of the approved CEMP and all other contractual obligations during construction.

The SO and IES/NES will supervise the monitoring of implementation of mitigation measures during the construction stage and compliance with the CEMP. The LTA during project implementation will be required to:

- Develop an environmental monitoring protocol for the construction period, and formulate a detailed plan including inputs by the biodiversity specialist to be recruited by the CSC;
- With assistance from the Engineer, conduct regular environmental monitoring, including review of daily and weekly site inspections undertaken by the contractor and items recorded in the ESO's site diary (the main parameters to be monitored are outlined in Table 7.2);
- Prepare and submit specialist biodiversity benchmarking and monitoring reports;
- Prepare environmental monitoring reports covering the above and prepare and submit inputs for periodic progress reports; and
- Prepare and submit semi-annual monitoring reports to MNRE and ADB.

To inform reporting by the LTA the contractor will be required to provide monthly reports to the LTA on the following: (i) non-compliances with the requirements of the EMP; (ii) safety and other issues that have arisen; and, (iii) complaints or grievances lodged directly with the contractor.

Responsibilities for the implementation of the environmental monitoring requirements of this PEAR are shown in Table 7.1. Implementation of mitigation measures during the construction stage will be the responsibility of the contractor in compliance with the bid documents, contract clauses and technical specifications. The monitoring plan is incorporated into the EMP and is presented in Table 7.2.

The main reports include: (i) contractor's monthly reports including compliance with approved CEMP, project disclosures/information notices and grievances; (ii) CSC quarterly progress reports including a section on safeguards implementation and summarizing main results of contractor's reports; (iii) specialist biodiversity benchmarking and monitoring reports; and (iv) semi-annual safeguards monitoring reports prepared by the LTA and submitted to MOF and ADB.

8 Findings, Conclusions and Recommendations

8.1 Findings

The proposed upgrade of the 19.7 km section of the Central Cross Island Road has been identified by the government as a priority infrastructure project for strengthening resilience. The proposed works will mostly be contained within the existing corridor and whereas there may be some small areas of land will be required where there is a need to improve the road geometry, these areas are very limited as the right-of-way road corridor width will be confined to 16 m. Due diligence has been prepared and a land acquisition review concluded and there may be compensation needed for affected people for lost assets. The background information provided by the LTA, PUMA and the design consultants has been reviewed and the policy, legal, and administrative framework has been described.

The anticipated environmental construction impacts have been described in the design, construction, and operational phases and they should be very predictable and manageable, and with appropriate mitigation, few residual impacts are likely.

The road is an existing piece of infrastructure that traverses the Apia Catchments KBA which contains critical habitat for two endangered bird species (one is critically endangered). A critical habitat assessment for the project (limits of works area) concluded that while the road traverses the KBA, the road itself is within a corridor of degraded habitat and biodiversity value and the proposed works: (i) will not negatively impact critical habitat; and (ii) with implementation and monitoring of identified measures the project can meet the thresholds required for a project to go ahead in an area of critical habitat i.e. (a) there are no measurable adverse impacts on the critical habitat that could impair its ability to function, (b) there is no reduction in the population of any recognized endangered or critically endangered species, and (c) any lesser impacts are mitigated.

The project will not impact any known cultural or heritage sites and will not create conflicts with natural resource allocation.

The EMP includes the measures to manage and mitigate risks and impacts to the environment during the pre-construction, construction and operations stages. The EMP sets out the measures to be integrated into the contractor's CEMP, based on their proposed approach and methodology, to ensure that construction activities will minimize negative impacts to acceptable levels. To ensure that these mitigation measures are implemented, and negative impacts minimised, the measures will be included in the contract specification. contractors' conformity with contract procedures and specifications and implementation of the approved CEMP during construction will be carefully monitored. The contractor will be required to follow standard construction practices and comply with a series of contractual requirements which will be monitored and supervised by LTA/PUMA. Environmental monitoring of the project will be undertaken regularly throughout the entire construction phase and in to the operational phase to ensure that the measures are being implemented properly.

Resources will be allocated to LTA and MWTI to properly implement environmental safeguards and include capacity development for ongoing improvement of environmental capability of the responsible agencies and to progress and achieve necessary statutory compliance and environmental clearance and the associated activities that also require and environmental permits under the environmental laws of Samoa.

The contractor's compliance with development consent conditions and contract specifications and implementation of the approved CEMP during construction will be carefully monitored. The contractor will be required to follow standard construction practices and comply with a series of contractual requirements which will be monitored and supervised by LTA (supported by the CSC) and PUMA. Environmental monitoring of the project will be undertaken regularly throughout the construction phase and in to the operational phase to ensure that the measures are being implemented properly.

The project will have an overall beneficial impact, improving access and road safety, reducing erosion, reducing dust, reducing travel time and travel costs, while improving socio-economic conditions. The project will have some negative impacts that will be confined to the project corridor and nevertheless will be adequately mitigated and carefully monitored.

Information has been disclosed, participation of stakeholders has been encouraged and there has been consultation with the public, local authorities and persons affected by the project. There is generally good public support for the project. A GRM, based on procedures working well under other projects, is proposed to deal with complaints during implementation. The GRM will be implemented by the LTA and contractor and the process will be elaborated in the CEMP.

8.2 Conclusions

Due to the lack of potential impact pathways linking project related activities (largely because all activities will be confined to the existing road corridor) to the critical habitat located beyond the right-of-way in the wider KBA, additional field studies are not deemed necessary at this stage as the potential for impact to critical habitat—for the identified criteria—is assessed to be negligible. If required, the project will recruit a suitable specialist to (i) identify and relocate any of the two skink and one snail species found within the works areas; and (ii) establish a monitoring program.

Implementation of appropriate mitigation measures during the design, construction, and operation phases, as described in the EMP, will minimize negative impacts to acceptable levels.

The project will have an overall beneficial impact, improving access, reducing erosion, reducing dust, reducing travel time and improving road safety. It will have insignificant negative impacts that will nevertheless be carefully monitored and adequately mitigated.

The project complies with environmental categorization B, and therefore, the completion of this PEAR fully meets CSS and ADB requirements and no further environmental study is required.

8.3 Recommendations

The recommendations of the environmental assessment are:

- The PEAR be accepted by ADB and PUMA as the statement of project's environmental impacts and how they will be mitigated, managed and monitored;
- The contractor will prepare a CEMP based on the pre-construction and construction parts of the EMP included in this PEAR and detailing their specific construction methodologies and submit to LTA (and CSC) for review and approval and to PUMA and AD for review and comment; and,
- The project impacts and mitigation thereof, be monitored as per the monitoring plan.

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Annex 1: International Agreements and Treaties

Date	Convention, Treaty, Agreement
1951	International Plant Protection
1956	Plant Protection Agreement for the South East Asia & Pacific Region
1971	Convention on Wetlands of International Importance
1972	Convention concerning the Protection of the World Cultural and Natural Heritage
1973	Convention on International Trade in Endangered Species of Wild Fauna
1976	Convention on the Conservation of Nature in the South Pacific
1979	Convention of Migratory Species
1985	Vienna Convention for the Protection of the Ozone Layer
1986	Convention for the Protection of the Natural Resources and Environment of the South Pacific Region
1987	Montreal Protocol on Substances that Deplete the Ozone Layer
1989	Basel Convention on Control of Trans-boundary Movements of Hazardous Wastes and their Disposal
1990	Protocol for the Prevention of Pollution of the South Pacific Region by Dumping
1990	Protocol concerning Cooperation in combating Pollution Emergencies in the South Pacific Region
1992	United Nations Framework Convention on Climate Change
1992	Convention on Biological Diversity
1993	Agreement establishing the South Pacific Regional Environment Program (SPREP)
1994	United Nations Convention to Combat Desertification
1998	Convention on Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade
2001	Convention on Persistent Organic Pollutants
2001	International Treaty on Plant and Genetic Resources for Food and Agriculture
2003	Protocol concerning Cooperation in combating Pollution Emergencies in the South Pacific Region
2003	Carthagena Protocol on Biosafety to the convention of Biological Diversity
2003	Convention for the Safeguarding of the Intangible Cultural Heritage
2005	Convention on the Protection and Promotion of the Diversity of Cultural Expressions
2005	Kyoto Protocol to the Framework Convention on Climate Change
2007	Strategic Approach to International Chemicals Management

Annex 2: Flora and Fauna of the Apia Catchment KBA

Table A2.1: List of trees found in the Apia Catchment KBA

Common name	Scientific name	Family	Use	Ecological status	IUCN status	Notes
Akoge	-	-	-	-	Unknown	Fruit liked by pigeons
Aoa	<i>Ficus obliqua</i>	<i>Moraceae</i>	-	-	Not Assessed	Fruit liked by pigeons
Asi	<i>Syzygium sp.</i>	<i>Myrtaceae</i>	-	-	Unknown	Fruit liked by pigeons
Fau	<i>Hibiscus tiliaceus</i>	<i>Malvaceae</i>	local construction	indigenous secondary	Not Assessed	-
Fetau	-	<i>Calophyllum inophyllum</i>	medicinal	-	LR/LC	-
Fue Lautetele	-	-	-	-	Unknown	-
Ifilele	<i>Intsia bijuga</i>	<i>Caesal pinaceae</i>	handicraft	indigenous primary	VU	-
Lauau Fualu	-	-	-	-	Unknown	Manumea seen on this tree (shot)
Lopa	<i>Adenanthera pavonina</i>	<i>Fabaceae</i>	edible fruits	indigenous secondary	Not Assessed	-
Ma'ali	<i>Canarium samoense/vitiense</i>	<i>Burseraceae</i>	no known use	indigenous primary	Not Assessed	Fruit liked by pigeons
Maalili	<i>Terminalia richii</i>	<i>Combretaceae</i>	-	indigenous primary	Not Assessed	-
Mamalava	<i>Planchonella torricellensis</i>	<i>Sapotaceae</i>	no known	indigenous primary	Not Assessed	-
Mamalupe	-	-	-	-	Unknown	-
Maota	<i>Dysoxylum maota</i>	<i>Meliaceae</i>	no known use	indigenous primary	Not Assessed	Fruit liked by pigeons
Mosooi	<i>Canaga odorata</i>	<i>Anacardiaceae</i>	decoration	indigenous secondary	Not Assessed	Fruit liked by pigeons, fruits June-Aug
Native passion fruit?	-	-	-	-	Unknown	-
Pasio	-	-	-	-	Unknown	-
Paululu	<i>Fagraea berteroana</i>	<i>Loganiaceae</i>	-	indigenous primary	Not Assessed	-
Pipi	<i>Hernandia moerenhoutiana</i>	<i>Hernandiaceae</i>	-	-	Not Assessed	Fruit liked by pigeons X 2
Puluvao	-	-	-	-	Unknown	Occurs on ridges

Common name	Scientific name	Family	Use	Ecological status	IUCN status	Notes
Pualulu	<i>Fagraea berteriana</i>	-	-	-	Not Assessed	Fruit liked by pigeons, medicinal plant
Tamaligi	<i>Albizia sp.</i>	<i>Fabaceae</i>	-	Introduced	Unknown	IAS
Tamagu	-	-	-	-	Unknown	Lupe loves it, fruit every year in Sept
Tamanu	<i>Calophyllum neo-samoense</i>	<i>Clusiaceae</i>	medicinal	indigenous primary	Not Assessed	Used to make canoe
Tava	<i>Pometia pinnata</i>	<i>Sapindaceae</i>	fire wood	indigenous primary	Not Assessed	Fruits liked by pigeons
Tavai	<i>Rhus taitensis</i>	<i>Anacardiaceae</i>	-	indigenous secondary	Not Assessed	-
Tufaso	<i>Dysoxylum samoense</i>	<i>Meliaceae</i>	-	indigenous primary	Not Assessed	Fruit liked by pigeons

Table A2.2: List of medicinal plants found in the Apia Catchment KBA

Common name	Scientific name	IUCN Status	Notes
Aoa	<i>Ficus obliqua</i>	Not Assessed	roots used for kidney stones
Avaava aitu	<i>Macropiper graeffei</i>	Not Assessed	sore knees and bones; stomach ache in babies; cancer
Avaava aitu sosolo	-	Unknown	-
Cogu/Nonu	-	Unknown	-
Fuefuesina	<i>Vigna marina?</i>	Not Assessed	cuts and injuries; epilepsy; children's illnesses
Fuemanogi orn'ava 'ava aitu soloso /Fue or Fua Mainogi	<i>Pipea graeffei</i>	Not Assessed	cystitis, against supernatural powers, cough, kids throat; medicine for children
Gava'ago	-	Unknown	-
Laumafiafia	<i>Hoya australis</i>	Not Assessed	vine used for stomach-ache for children
Maota mamala	<i>Dysoxylum samoense</i>	Not Assessed	High sugar, stomach ache; roots used; pain on neck and pain on neck and
Pualulu	-	Unknown	Bark used for sprains and for internal bleeding; breastfeeding mums or back-related illnesses or To'ala (problem in info collection); even requested by Fiji. Found along rivers, not on ridges
Ti vao	-	Unknown	Headache, shown the use

Table A2.3: List of birds found in the Apia Catchment KBA

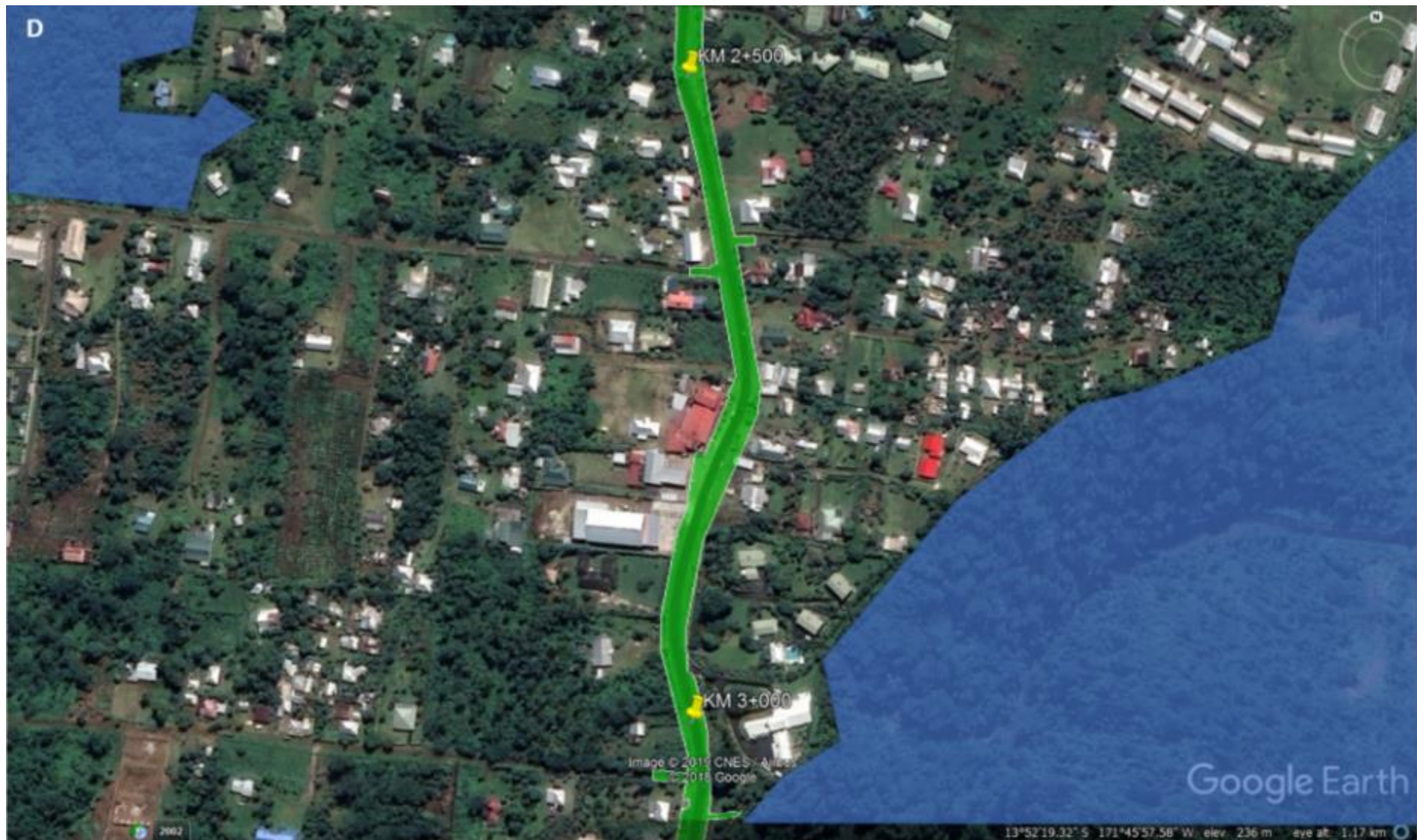
Common name	Scientific name	IUCN status	Notes
White-tailed Tropicbird	<i>Phaethon lepturus</i>	LC	Seen Magiagi as well; possibly breeding in Malololelei
Brown Noddy	<i>Anous stolidus</i>	LC	Possibly breeding in Malololelei
White Tern	<i>Gygis alba</i>	LC	Possibly breeding in Malololelei
Junglefowl	<i>Gallus gallus</i>	LC	Invasive Alien Species (IAS)
Banded Rail	<i>Gallirallus philippensis</i>	LC	Common around villages and edge of forests
White-browed Crake	<i>Porzana cinereus</i>) <i>Amaurornis cinerea</i>)	LC	Extremely secretive, found two dead individuals
Purple Swampphen	<i>Porphyrio porphyrio</i>	LC	Typically at the edge of forests
White-throated Pigeon	<i>Columba vitiensis</i>	LC	Fairly common but not very visible
Pacific Pigeon	<i>Ducula pacifica</i>	LC	Common
Tooth-billed Pigeon	<i>Didunculus strigirostris</i>	CR	Endemic and listed as critically endangered in IUCN Red List; Recorded call with sound recorder in Malololelei, seen in forest + at Tiavi
Many-coloured Fruit-dove	<i>Ptilinopus perousii</i>	LC	Not easy to be seen
Samoa Fruit-dove,	<i>Ptilinopus fasciatus</i>	LC	Common
Blue-crowned Lory	<i>Vini australis</i>	LC	Common
Barn Owl	<i>Tyto alba</i>	LC	-
White-rumped Swiftlet	<i>Aerodramus spodiopygius</i>	LC	Common
Flat-billed Kingfisher	<i>Todirhamphus recurvirostris</i>	LC	Common
Polynesian Starling	<i>Aplonis tabuensis</i>	LC	Common at Malololelei
Samoa Starling	<i>Aplonis atrifusca</i>	LC	Endemic to Samoa; common
Scarlet Robin	<i>Petroica multicolor</i>	EN	-
Samoa Fantail	<i>Rhipidura nebulosa</i>	LC	-
Samoa Broadbill	<i>Myiagra albigentris</i>	NT	Endemic to Samoa.
Samoa Whistler	<i>Pachycephala flavifrons</i>	LC	Endemic to Samoa
Polynesian Triller	<i>Lalage maculosa</i>	LC	Common, especially at the edge of the forests and in the villages
Samoa Triller	<i>Lalage sharpei</i>	NT	-
Samoa Parrotfinch	<i>Erythrura cyaneovirens</i>	NT	-
Cardinal Honeyeater	<i>Foulehaio cardinalis</i> (<i>myzomela cardinalis</i>)	LC	Common

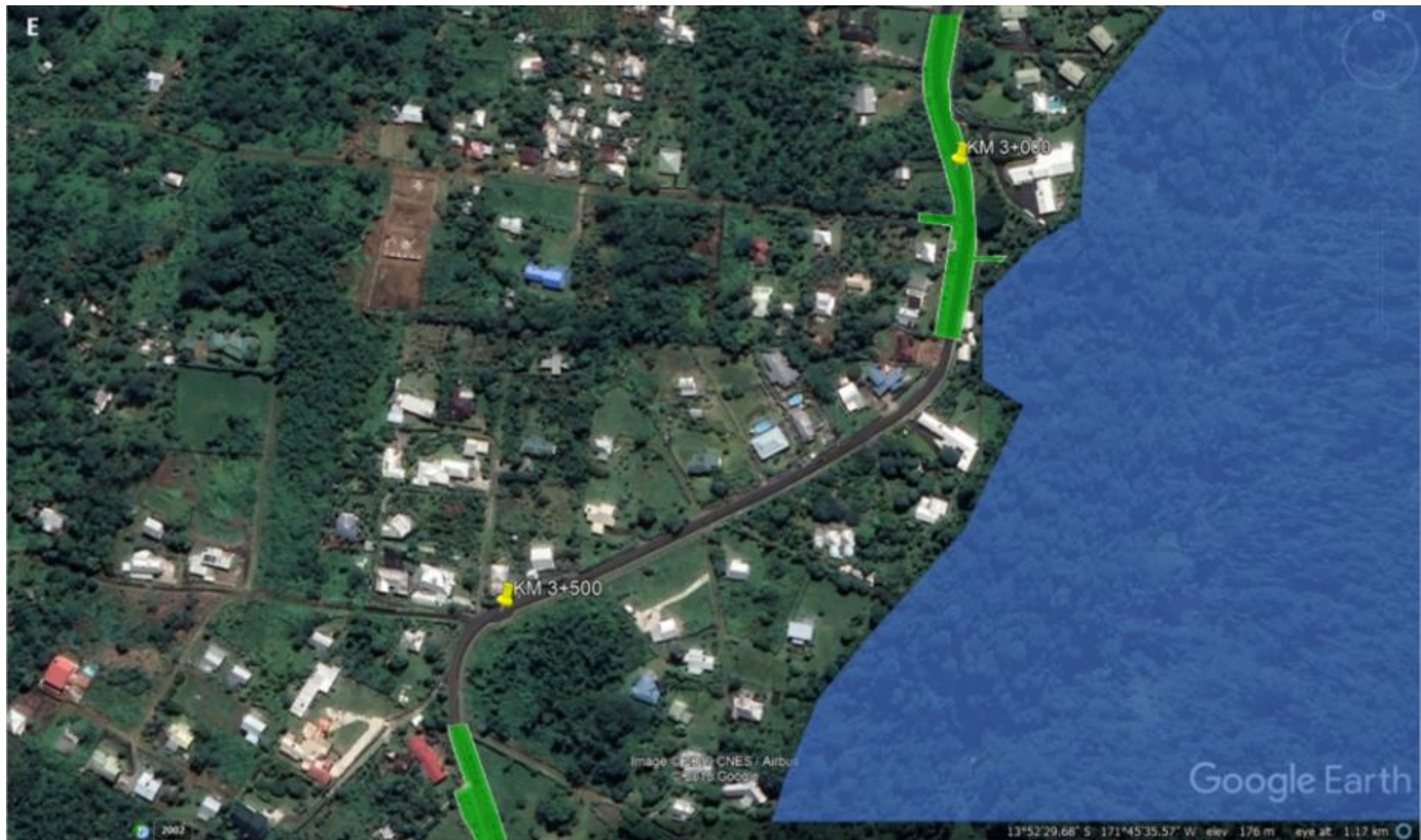
Common name	Scientific name	IUCN status	Notes
Wattled Honeyeater	<i>Foulehaio carunculatus</i>	LC	Abundant, most common bird in the forest (and also outside of it); very common
Mao	<i>Gymnomyza samoensis</i>	EN	Endemic and listed as endangered in IUCN Red List; breeding in Malololelei

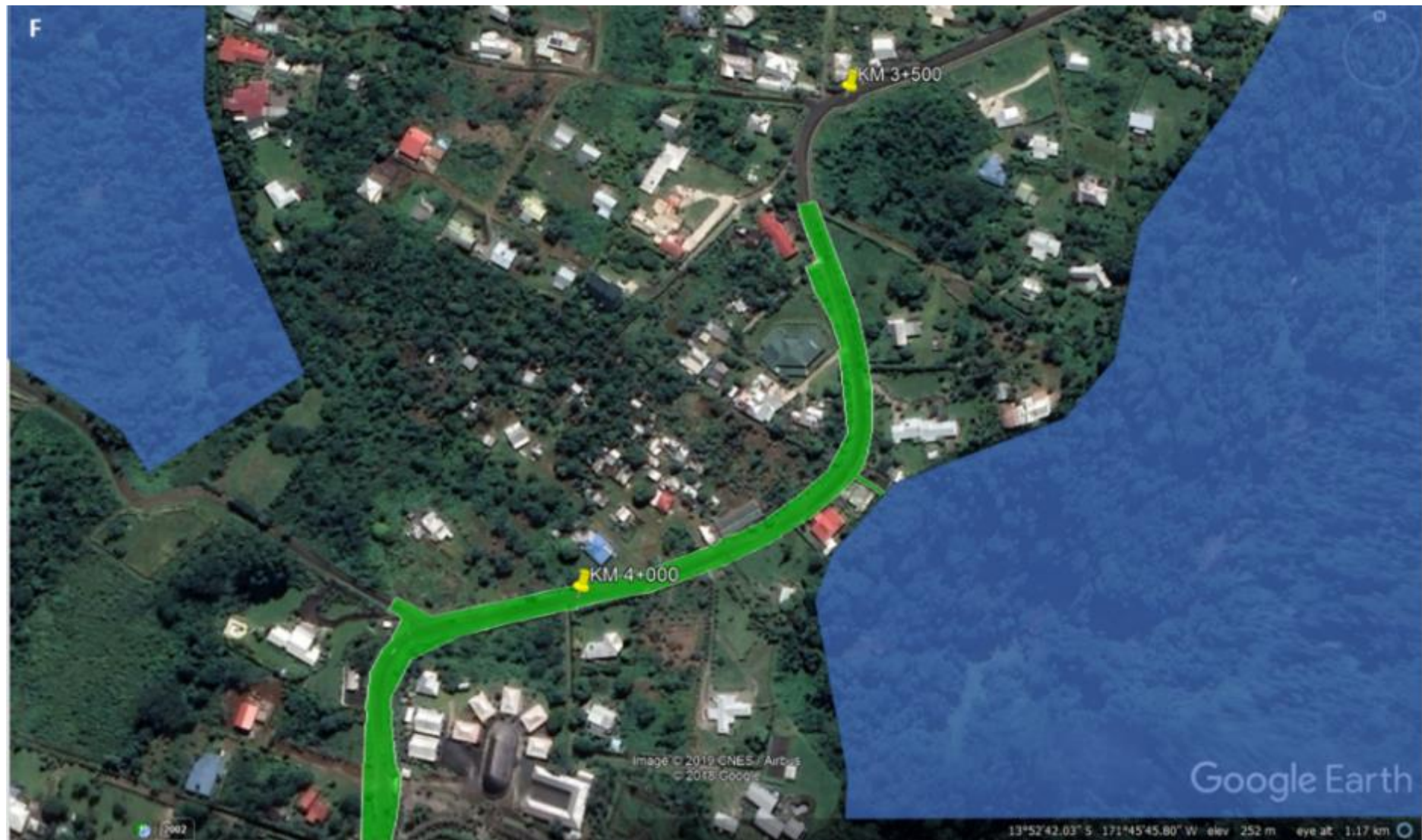
Annex 3: Maps showing critical habitat in Apia Catchment KBA in relation to project road



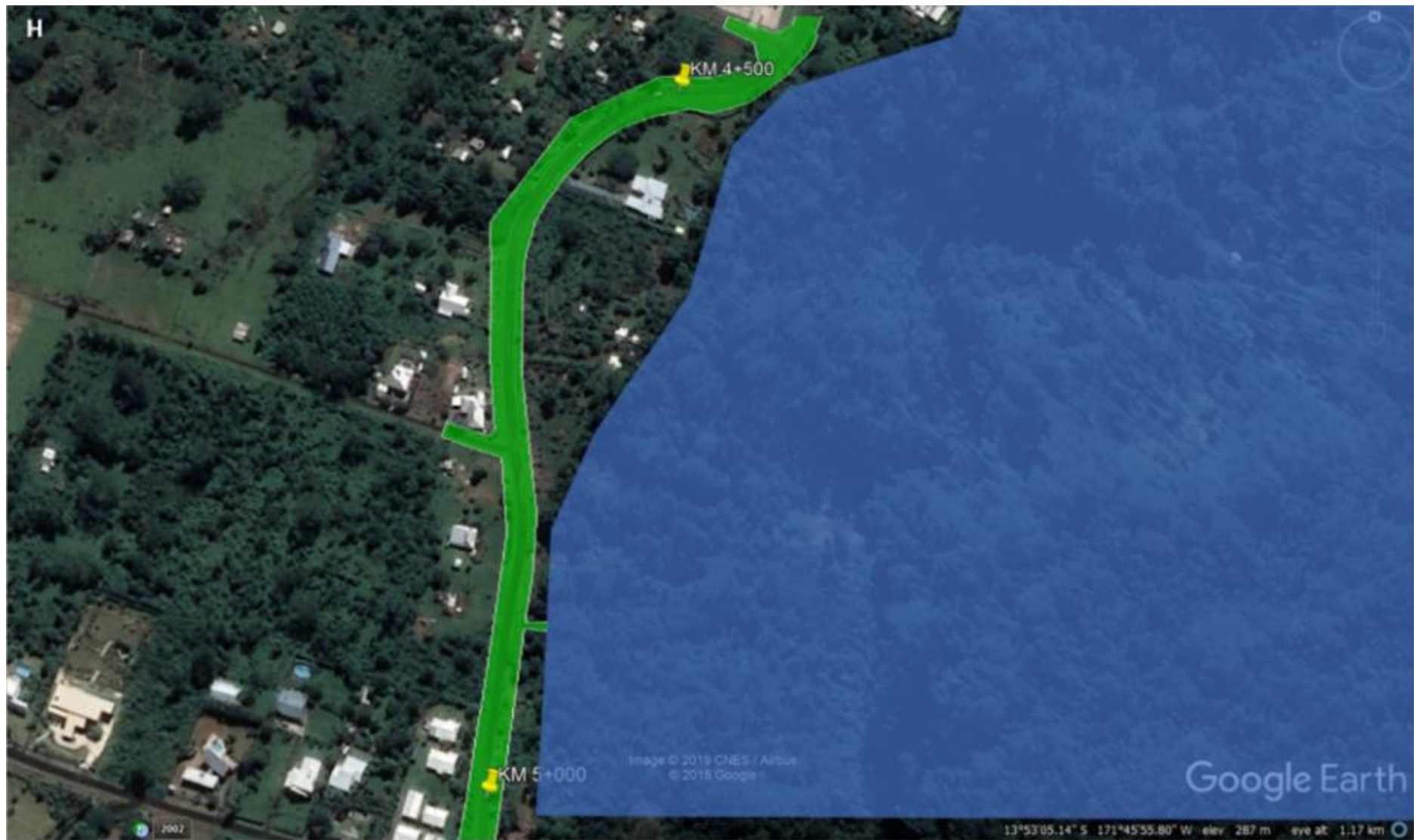










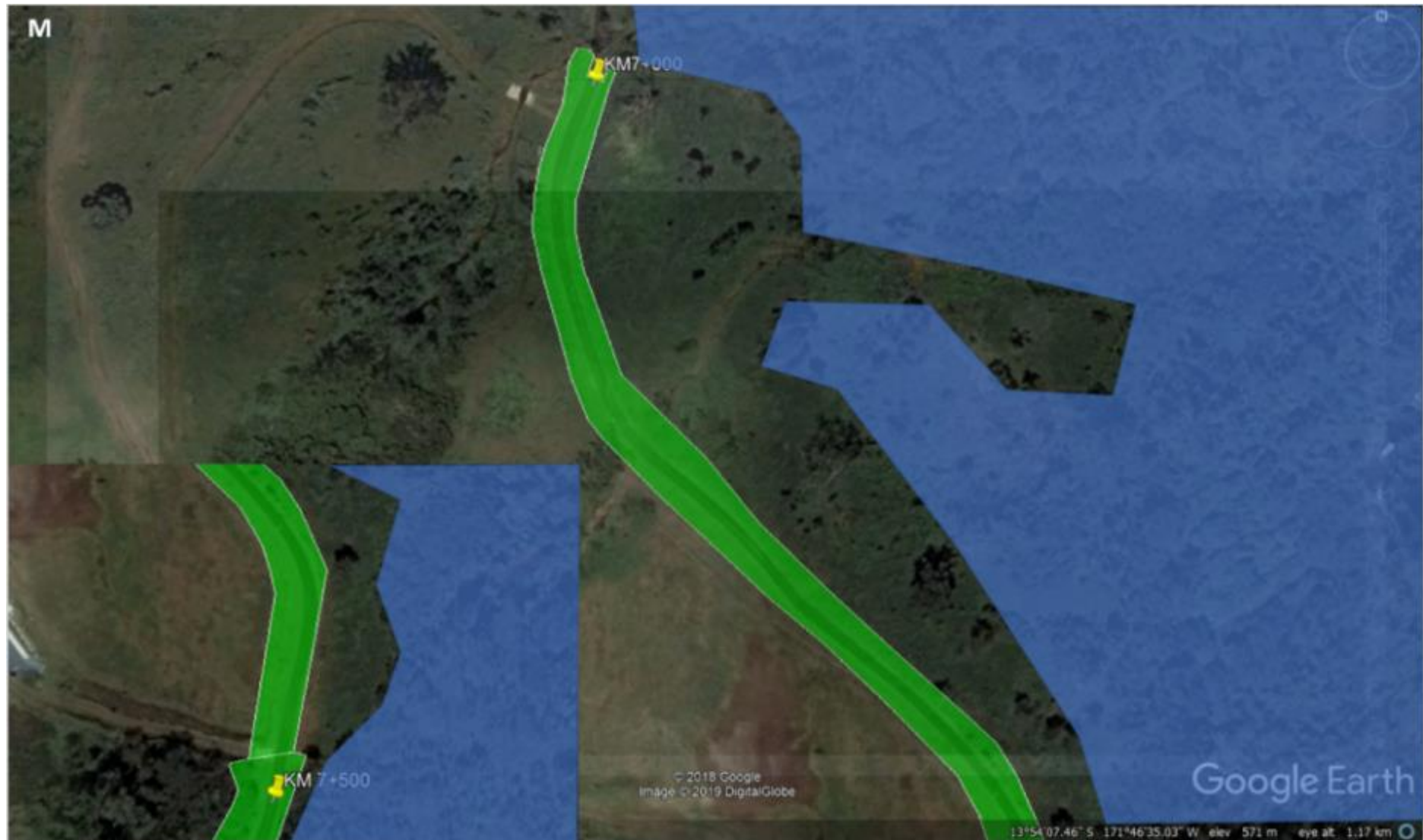


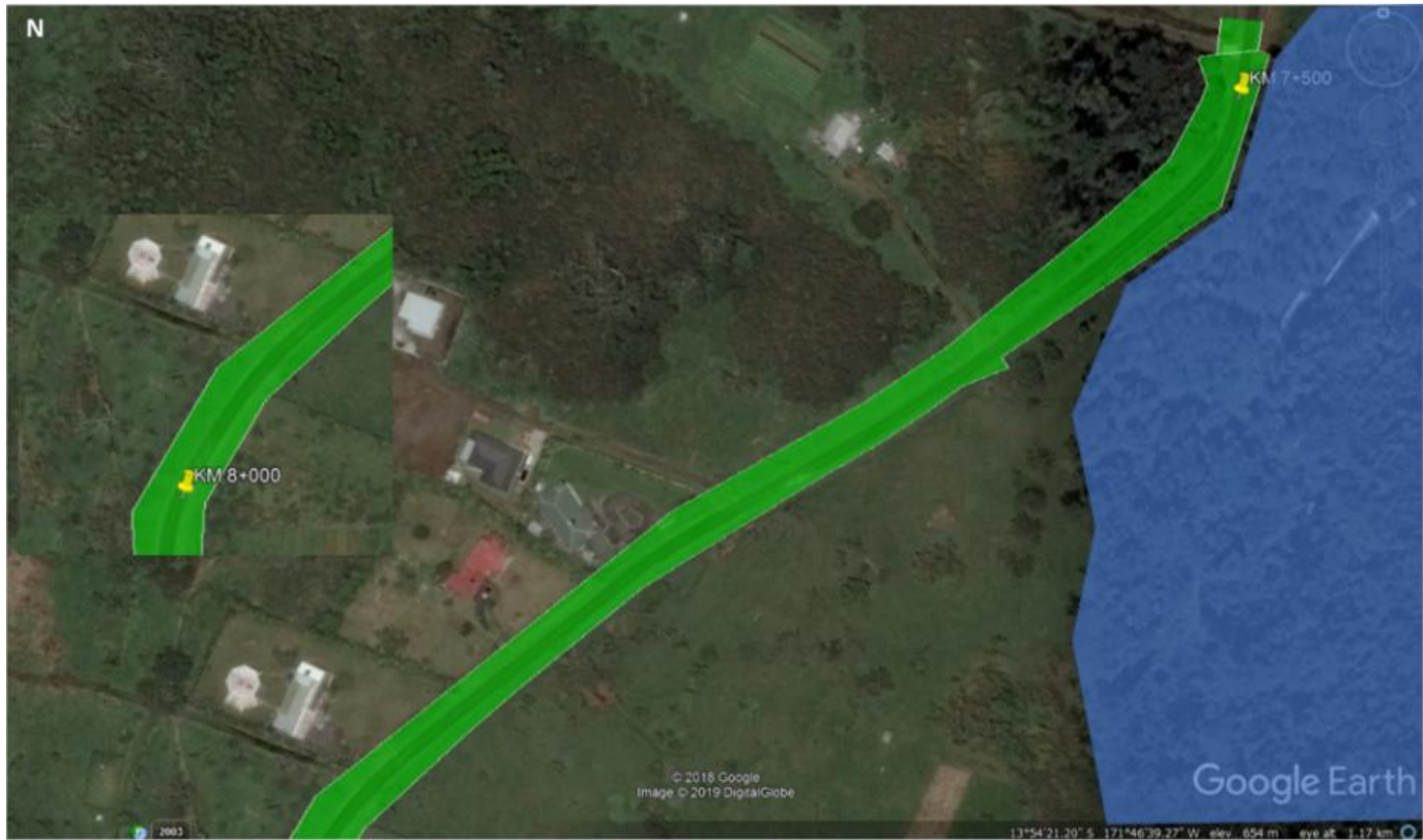




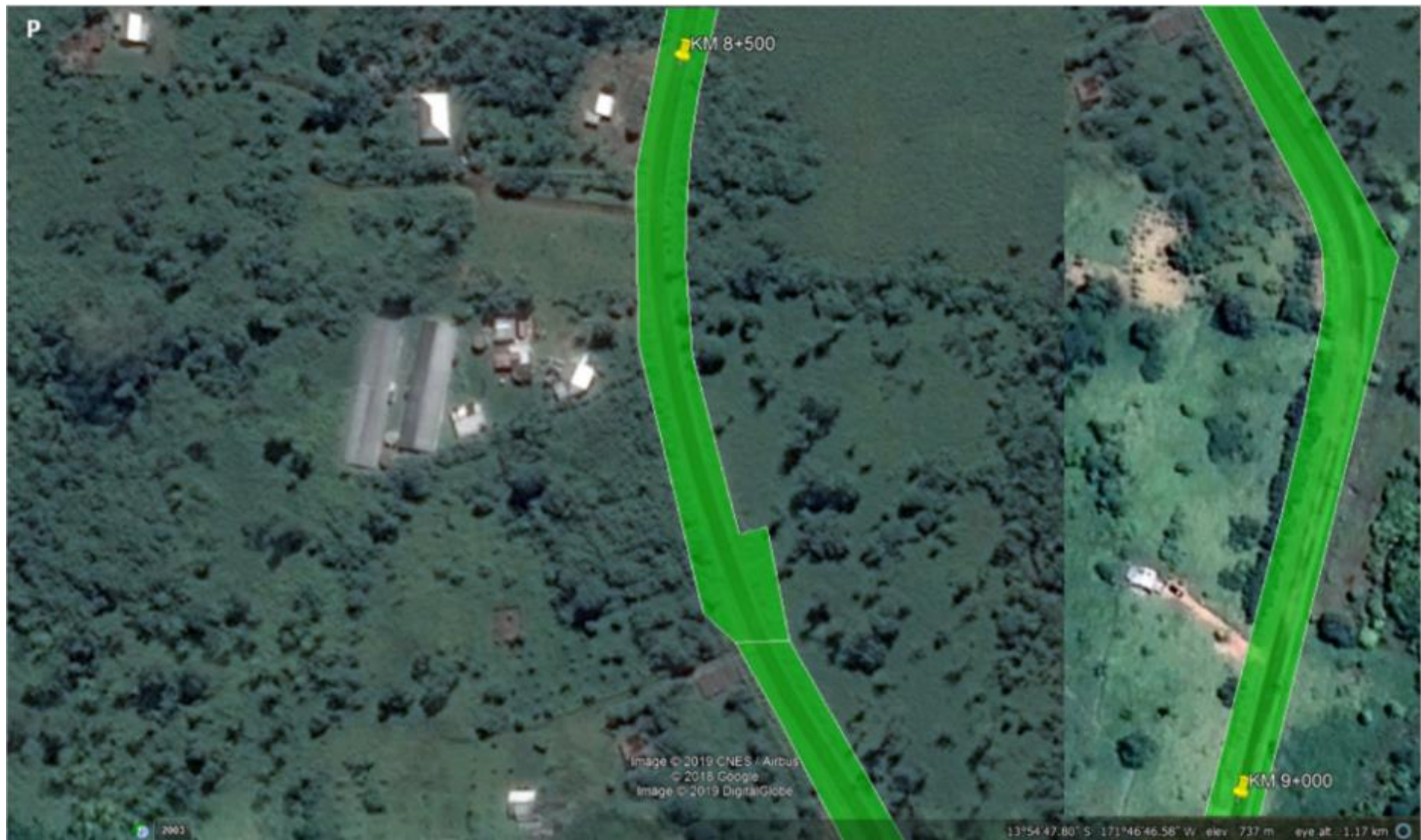












Annex 4: CEMP Guidance Notes

A. Waste Generation and Disposal

1. The Waste Disposal section of the CEMP should include methods for waste management and spoil disposal for handling, storage, treatment, transport and disposal of solid and liquid wastes, hazardous materials, hazardous wastes and excavation spoils. The CEMP should also provide details of a trip ticket system to ensure that contractor dispose excavation spoils in approved areas. Such system will be designed so that the LTA or PUMA could readily monitor the volume and disposal site of excavation spoils, and to ensure that the total volume of spoils disposed will not exceed the maximum capacity of disposal sites approved by local authorities.

2. The General Waste section of the CEMP will include method statements and consideration of all matters related to general solid and liquid waste disposal including: i) Expected types of waste and quantities of general waste arising; ii) Waste reduction, reuse and recycling methods to be employed; iii) Agreed reuse and recycling options and locations for disposal / endorsement; iv) Methods for treatment and disposal of non-hazardous solid and liquid wastes; v) Methods of transportation to minimize interference with normal traffic; vi) Establishment of complaints management system for duration of the works; vii) Programme for waste disposal at designated areas.

3. The Spoil Disposal section of the CEMP will include method statements and consideration of the following: i) Locations and quantities of spoil arising. ii) Agreed locations for disposal. iii) Methods of transportation to minimize interference with normal traffic. iv) Establishment of acceptable working hours and constraints. v) Agreement on time scale and programme for disposal and chain of custody. vi) Agreement on publicity/public consultation requirements and use of signed waiver (for disposal on private land and advance permission / signing etc.). vii) Details of a trip ticket system to ensure that contractor dispose excavation spoils in approved areas. Such system will be designed so that the LTA/PUMA could readily monitor the volume and disposal site of excavation spoils, and to ensure that the total volume of spoils disposed will not exceed the maximum capacity of disposal sites approved by local authorities. viii) Programming issues including the time of year and available resources. ix) Discussion of the LTA/PUMA inspection /monitoring role.

4. The Hazardous Waste section of the CEMP will include method statements and consideration of all matters related to hazardous solid and liquid waste disposal including: i) Methods for collection, handling, treatment and disposal of solid and liquid hazardous wastes. ii) Establishment of regular disposal schedule and constraints for hazardous waste. iii) Discussion of the LTA/PUMA inspection/monitoring role. iv) Programme for waste disposal at designated areas.

B. Quarries, borrow areas and construction materials management

5. In the preconstruction stage the contractor will review the requirements for provision of construction materials and include it in the Quarries, Borrow Areas and Construction Materials Management section of the CEMP. The CEMP will seek, as far as is reasonably practicable, to minimize the use of non-renewable resources and rock based materials and to balance cut and fill requirements and contribute to the minimization of impacts due to extraction of rock based materials. As a priority, where surplus materials arise from the removal of the existing surfaces these will be used elsewhere on the project or other projects for fill (if suitable) before additional rock, gravel or sand extraction is considered.

6. The Quarries, Borrow Areas and Construction Materials Management section of the CEMP will include method statements and details of arrangements to be made to facilitate the timely production and supply of construction materials to avoid impacts due to unnecessary stockpiling outside the project site and will be linked to the quarry management plan(s) prepared for each site as part of the development consent and other permits applications.

7. The CEMP will include as a minimum consideration of the following: i) Required volume of materials, potential sources and estimated quantities available. ii) Impacts to identified sources and availability. iii) Excavated slope material for reuse and recycling methods to be employed. iv) Required endorsements that should be obtained by the contractor from LTA, PUMA and local groups for use of legitimate sources. v) Measures to be employed to mitigate nuisances to local residents. vi) Methods of transportation to minimize interference with normal traffic. vii) Constraints of regular delivery schedule to reduce stockpiling on site. viii) Programme for reuse of slope excavated material for reuse ix) Programme for delivery of quarry and borrow materials. x) Discussion of the LTA/PUMA inspection/monitoring role. xi) Agreement on publicity/public consultation requirements.

C. Asphalt, hot mix plant, rock crushing and bitumen supply

8. The rock crushing activities will generate noise and dust and pavement works will generate gas and odour from the asphalt hot-mix plant and noise from the compaction of the pavement. The contractor shall include a section on Asphalt, hot mix plant, Rock crushing and Bitumen supply in the CEMP that will include method statements and consideration of the following matters: (i) Estimation of volumes of rock based material and asphalt required. (ii) Use of existing cement batching, aggregate and hot mixing plant or proposals for new installations. (iii) Locations of cement batching and aggregate mixing plant as far as possible from settlements and habitation. (iv) Locations of cement batching and aggregate mixing plant in agreement with the local town or municipality and to be approved by LTA/PUMA. (v) Licences for operation of plant and approval from the relevant local authority. (vi) Dust suppression equipment to be installed. (vii) Proposals for storage, handling, use and disposal of residual bitumen in line with the waste disposal section of the CEMP. (viii) Duration and timing of the proposed operation and cement batching and aggregate mixing plant. (ix) Discussion of the LTA/PUMA inspection/monitoring role.

D. Erosion control and runoff

9. Erosion Control section of the CEMP will include method statements to ensure that construction works will not cause excessive runoff and siltation of adjacent waterways within the project site. The Erosion Control section of the CEMP and slope stabilization measures in the detailed designs will be implemented and maintained by the contractor during construction to protect the works. The CEMP will have sufficient provisions to ensure stabilization of cut slopes and other erosion-prone areas, minimize hydrological impacts, flooding and erosion of river banks and adjacent areas and to protect the works under construction. The CEMP will include the following to control erosion and runoff: i) Climate and rainfall for the area and checking weather forecasts. ii) Terrain and typical locations particularly susceptible to erosion and runoff. iii) Protection of the works and potential impacts to the environment. iv) Erosion control methods to be employed, locations and installation timing. v) Limits to stockpiling on sites near waterways and irrigation channels. vi) Discussion of the LTA/PUMA inspection/monitoring role. vii) Agreement on publicity/public consultation requirements.

E. Water quality

10. Work near rivers and streams have the potential to cause water pollution. To prevent water contamination, the CEMP will include coverage of the following to be undertaken by the contractor: i) Disposal of solid waste from construction activities away from rivers. ii) Design of storage areas with sufficient lining for lubricants and other construction storage/stockpiles. iii) Handling of stockpiled materials to avoid leakage and prevent runoff. iv) Location of stockpiling or borrow sites and storage for hazardous substances. v) Responses to complaints, complaints monitoring and investigation of water quality. vi) Scheduled work duration in near rivers shall be as short as possible. vii) Immediate stabilization of slopes after works are completed. viii) Prohibition of washing of machinery and vehicles in surface waters.

F. Dust and noise minimization

11. Earthworks and rock crushing activities will cause dust impacts. All construction works will involve some noisy activities and it is good practice to control dusty materials and noisy activities at source so that nuisances do not occur. The Dust and Noise control section of the CEMP will include method statements

and minimize impacts to sensitive receptors (residential areas, schools, hospitals, etc.) due to construction works, sourcing and transport of construction materials, and other project-related activities. To prevent dust and noise nuisances the Dust and Noise control to section of the CEMP will include the following: i) Use and availability of water for damping down dust in wet and dry seasons. ii) Alternative use of dust barriers / segregation between the works and sensitive receivers. iii) Locations and timing of works within 500m of settlements including night works. iv) Reporting of complaints to LTA/PUMA in line with the grievance redress mechanism v) Compliance of heavy equipment and machinery with best practice on pollution. vi) Ban on smoke belching vehicles and equipment. vii) Covering vehicles transporting loose construction materials. viii) Speed limits on vehicles unpaved areas near works. ix) Methods to reduce the need for large stockpiles and planning of supplies of materials. x) Location of stockpiles and enclosing or covering when not in use. xi) Description of any monitoring proposed by contractor in addition to the LTA/PUMA monitoring role.

G. Tree Cutting and replanting

12. All areas either side of the project road are already disturbed. Near the settlements this is due to clearance for agriculture. In other places the natural vegetation inside and immediately outside the right-of-way for a few metres has been cut down to make way for power distribution poles that were set out in recent years. The habitats outside this corridor are vulnerable to further loss due to increasing pressure (limited extent and over-exploitation) for fuel, timber and food. This underscores the need for mitigation measures to protect the remaining habitats from exploitation during the project construction.

13. A tree removal drawing/survey and plan will be prepared and agreed with the LTA. The plan will for part of the CEMP, and will include method statements to ensure there is no indiscriminate tree-cutting by clearly defining areas where vegetation removal is necessary. Tree-cutting should be based on project requirements and that replanting or remuneration paid to local tree owners shall be completed after consultation with owner and compensation as per the Resettlement Plan. The Tree-cutting and Replanting section of the CEMP will include method statements in line with the agreed procedures for: i) Advance notice to LTA/PUMA on any trees that need to be cut to complete the detailed designs. ii) Confirmation and identification of trees to be cut and locations by chainage following the detailed designs. iii) Planning cutting and any replanting and compensatory planting with the local forest authority. iv) Ban use of wood as a fuel for the execution of any part of the project works. v) Avoiding asphalt mixing plants, material storage sites in forests, near springs, cultural sites or other previously identified sensitive areas. vi) Control of accidental fires and ban on burning of waste. vii) Prohibitions on workers entering forests for taking firewood. viii) Obtaining permissions from land owners, authorities, and permits for cutting. x) Methods for marking, protection of uncut cut trees and limitations to cutting. xi) Methods and timing for safe cutting to minimize interference with normal traffic. xii) Methods to remove trees, cut timber and avoid stockpiling cut brushwood on site. xiii) Methods to avoid under cutting adjacent tree lined slopes. xiv) Preliminary programme for cutting trees and enhancement planting (to be updated in progress reports). xv) Discussion of the LTA/PUMA inspection/monitoring role. xvi) Agreement on publicity/public consultation requirements.

H. Enhancement planting

14. Environmental enhancements such as roadside stabilisation/beautification planting or tree planting for long term soil stabilization will be identified in the CEMP by the contractor. The enhancement Planting section of the CEMP will include: i) Locations of enhancement planting required in detailed design. ii) Maintenance and monitoring for planted specimens as agreed with PMUA ii) Discussion of the LTA/PUMA inspection/monitoring role.

I. Power and utilities protection

15. The power and utilities protection and reprovisioning section of the CEMP will include method statements and to minimize interruption to power, water supply and telecommunications to protect them during the works. The requirements need to reassessed and reconfirmed by the contractor before works commence.

Therefore the contractor will include measures to protect power and utilities in the CEMP as follows: i) Consultation with LTA and EPA and utility providers to reconfirm power, water and telecommunications systems likely to be interrupted by the works and any additional trees to be cut to make room for replacement utilities. ii) Contact points in all relevant utilities, local authorities and local village groups to plan reprovisioning. iii) Approach to coordinating relocation of utilities ahead of construction works with the relevant utility company at the district and district levels and reconnection. iv) Information to be provided to affected communities should be timed well in advance. v) Emergency provisions and action plan for immediate repairs to utilities if accidentally damaged.

J. Drainage system, irrigation and water resources

16. The natural streams and drains, irrigation channels running close to works areas and water resources on surrounding lands may be affected by construction activities. Local water supplies will need to be tapped to meet construction requirements. This section of the CEMP will include method statements and to prevent ponding/flooding within the project site and other areas used for project-related activities and adjacent areas. The contractor will be required to implement drainage management and provide measures to mitigate adverse impacts on water resources and surface drainage patterns and describe them in the CEMP. The Drainage System, Irrigation and Water Resources section of the CEMP will include method statements covering the following: i) Provision of appropriate temporary drains and measures to keep storm drains and road drainage systems clear of construction debris. ii) Identification of any irrigation channels to be avoided or reprovisioned and timing for reprovisioning in advance of the commencement of road works to the satisfaction of LTA/PUMA and local community. iii) Availability of water for the works including consultation with the local authorities iv) Arrangements to bring in water by tanker without depleting local village supplies v) Guidelines to minimize the wasting of water during construction operations. vi) Preparations (in case of obstruction or damage due to the works) for immediate clearance or repairs to drainage channels, irrigation ditches and supply ponds. vii) Arrangements for close liaison with local communities to ensure that potential conflicts related to common resource utilization are resolved quickly.

K. Safety precautions - workers and public

17. Workers and Public Safety section of the CEMP will include method statements to identify safe working practices and interfaces between the works and public to ensure worker and public safety and prevent accidents due to the construction works. Workers and Public Safety section of the CEMP will include: i) Statutory requirements for worker occupational health and safety as governed by the labour codes of Samoa. ii) Method statement of how the contractor work practices will comply with statutory requirements. iii) Arrangements to protect public safety. The contractor will prepare a health and safety plan that demonstrate compliance with the World Bank Group Environmental Health and Safety Guidelines.

L. Traffic management

18. Arrangements for vehicles accessing the project area will be formulated to avoid community disturbance and severance and will at least retain a passing lane along all roads used during construction. A Traffic Management plan will be developed as part of the CEMP, and will include method statements designed to minimize disturbance of vehicular traffic and pedestrians during construction including consideration of the following: i) Lane availability and minimizing interference with traffic flows past the works site. ii) Establishment of acceptable working hours, constraints and public safety issues. iii) Agreement on time scale and establishment of traffic flow/delay requirements. iv) Programming issues including the time of year and available resources. v) Discussion of the LTA/PUMA inspection/monitoring role. vi) Establishment of complaints management system for duration of the works vii) Agreement on publicity/public consultation requirements (advance signing etc.). The contractor will prepare a traffic management plan.

M. Accidental discovery of archaeological assets, sites or resources.

19. The contractor will establish precautionary measures to be included in the CEMP implemented to avoid disturbance of any unexpected finding of archaeologically valuable artefacts. The contractor will prepare a chance finds procedure that will identify the steps to be taken and appropriate authorities to contact in the event of a chance find.

N. Decommissioning, rehabilitation, revegetation and recontouring of construction material processing and storage areas

20. Borrow areas and construction material processing areas should be decommissioned and rehabilitated toward the end of the construction activities. Borrow pits should be rehabilitated with suitable material while construction material processing areas be cleaned up from spoil, scarified materials, bituminous spill and other atypical materials. Recontouring should be pursued in areas that are severely impacted as not to create hazardous condition for local community. Cut slopes should be left in non-hazardous state with proper cut angle according to the type of material. Revegetation should be pursued on suitable locations with local fast-growing species or other species in consultation with land owner or village chiefs. Replanting should be conducted as early as possible to allow for sufficient early care needed for the plants to grow well.

