Environmental & Social Impact Assessment

Tonga Climate Resilient Transport Project (TCRP)

Aviation Infrastructure

FINAL

August 2018

EXECUTIVE SUMMARY

The Government of Tonga is seeking funding from the World Bank for the Climate Resilient Transport Project to facilitate the safe, efficient and sustainable movement of goods and people in the Kingdom of Tonga, whilst strengthening climate resilience of the transport sector. The overall Project addresses rehabilitation of key road, maritime and airport infrastructure. The focus of this Report however, is the resurfacing of the runway at Salote Pilolevu Airport in Ha'apai.

An Environmental and Social Impact Assessment (ESIA) for the Project has been undertaken which assesses the environmental and socio-economic impacts arising from the Project and outlines measures to mitigate these impacts in accordance with Tongan legislation and World Bank safeguard policies.

Key stakeholders and villages in Ha'apai potentially impacted by the proposed Project were consulted including Koulo Village which is located directly adjacent to the runway and feedback has been incorporated in mitigation measures.

As the scope of proposed works are contained to the runway and immediate surrounding environs, key potential positive and negative impacts of the Project are limited to the following:

- Risks from invasive species in imported aggregate material.
- Runoff of hydrocarbons in stormwater from the newly laid surface into groundwater beneath the site.
- Lighting impacts on Kuolo Village if the construction area is floodlit during night-time works.

A range of positive impacts have also been identified including: employment opportunities due to the need for local labour; the potential for increased income to tourism activities in Ha'apai as a result of improved access; and provision of a runway that is more climate resilient and better able to withstand the effects of heavier aircraft arrivals in the event of future requirement for disaster relief.

Overall, all significant adverse impacts can be mitigated through adoption of the following key measures:

- Contractor to undertake all works in the dry to avoid potential egress of hydrocarbons into underlying groundwater. Works to be based on rain forecast.
- Contractor to take into account airport operations during runway works. This may require works to be undertaken at night.
- Implementation of a grievance redress mechanism to address any local community issues that may arise.

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1 Introduction

1.1 Background

The Government of Tonga is seeking funding from the World Bank for the Climate Resilient Transport Project (the Project), to facilitate the safe, efficient and sustainable movement of goods and people in the Kingdom of Tonga, whilst strengthening climate resilience of the transport sector.

The overall Project addresses rehabilitation of key roads, maritime and aviation sector infrastructure. This Report focusses on the aviation sector infrastructure-related Project.

The Ministry of Infrastructure (MOI) is the agency responsible for Project implementation.

Argo Environmental Ltd in association with Landcare Solutions Limited have been commissioned to assess the potential environmental impacts of the Project (see TOR Appendix 1).

1.2 Project Rationale

The Tonga Climate Resilient Transport (TCRT) Project aims to support the transport sector in Tonga by:

- Addressing the infrastructure maintenance backlog in the road, aviation and maritime sectors;
- Increasing the resilience of transport infrastructure to climate change and extreme weather events; and
- Ensuring safer and more reliable transport services.

In accordance with the TOR for the TCRT Project, an Environmental and Social Impact Assessment (ESIA) protocol has been adopted and an Environmental & Social Management Plan (ESMP) has been prepared to facilitate the various transport Projects proposed.

1.3 Project Categorisation

The World Bank requires the categorisation of Project under OP 4.01. Based on Project activities, the Project is considered to be Category B on the basis that the impacts will not be irreversible or unprecedented, and mitigation measures can be readily identified. The applicable safeguards policies which are triggered by the Project are OP 4.01 Environmental Assessment and OP 4.04 Natural Habitats.

OP4.12 Involuntary Resettlement is not triggered. There will be no land acquisition required for any project works. If any additional land is required, it will be subject to a negotiated lease arrangement with the land owner.

2 Project Description

2.1 Background

The domestic runway Salote Pilolevu Airport is located at Koulo, Ha'apai (see Figure 2.1). The runway pavement is about 300mm thick and comprises coral chip seal over coral base course. It was built 18 years ago by the Tonga Ministry of Works under Australian Supervision. The current chip seal is showing significant signs of distress and localised pavement repairs.

The Airport currently services domestic aircraft connecting generally with Tonga's hub located in Nuku'alofa, Tongatapu. Tonga Airports Limited (TAL) is the airport operator and manages HPA along with the other five airports in Tonga.

Key design features of the existing Airport are as follows:

- The runway measures 1200m x 29.5m wide, oriented southeast/northwest. The 18m wide stub taxiway and apron, measuring around 31.4 x 39.5m, is located about 800m from the southeast end and the runway has 15m x 34m wide turning nodes at each end. The strip is around 90m wide x 1400m long with the runway approximately central within the strip.
- A road crossing, located about 400m from the northeast end of the runway, has a manually controlled barrier arm on each side operated by security guards around the time of scheduled flights. At other times the barriers are open.
- The runway elevation rises from about 5m above sea level at the northwest end to about 9m above sea level at the southwest end.
- There are navigational aids but there is no airfield lighting and the airfield is operated in daylight hours only.
- A 2m high perimeter fence along the strip edge consists of a mixture of wire mesh, barbed wire, concrete posts and continuous concrete block wall reported to be mainly to prevent animals from wandering onto the airfield. The gates at the road crossing include cattle stops.

2.2 Proposed Methodology

Set out below is a summary of the proposed construction methodology for the runway upgrade at Ha'apai:

- Resurfacing (using a bitumen product and double coat chip seal) and localised pavement repairs to areas of the runway, taxiway and apron which are showing signs of distress.
- The likely equipment that will be required includes: a 20-ton excavator, loader, motor grader, vibration steel roller, dump trucks, water truck, miller, bobcat and assorted equipment (hand broom, shovels, bitumen kettle, 5-ton steel drum, trailer, jack hammer, compactor).
- The likely equipment that will be required for chip-sealing includes: a Bitumen Distributor, Chip spreader trucks, Rubber Tyre Roller, Mechanic Broom, Water Truck, Loader, Bitumen blower (Bitumen burner)
- All equipment and materials will be located in area within the boundary of the Airport which is Government-owned land.

The chipsealing process involves resurfacing of the existing sealed surface resulting in no material change in the key characteristics of the runway. Bitumen will be laid using a spreader and imported emulsion material with the chip material being laid over the top and rolled.

A workforce of approximately 22-26 people including locally-based labour (16 people), heavy plant operators and staff required to heat bitumen (see Table 2.1) is anticipated. Any non-resident individuals would be housed in existing accommodation on Ha'apai.

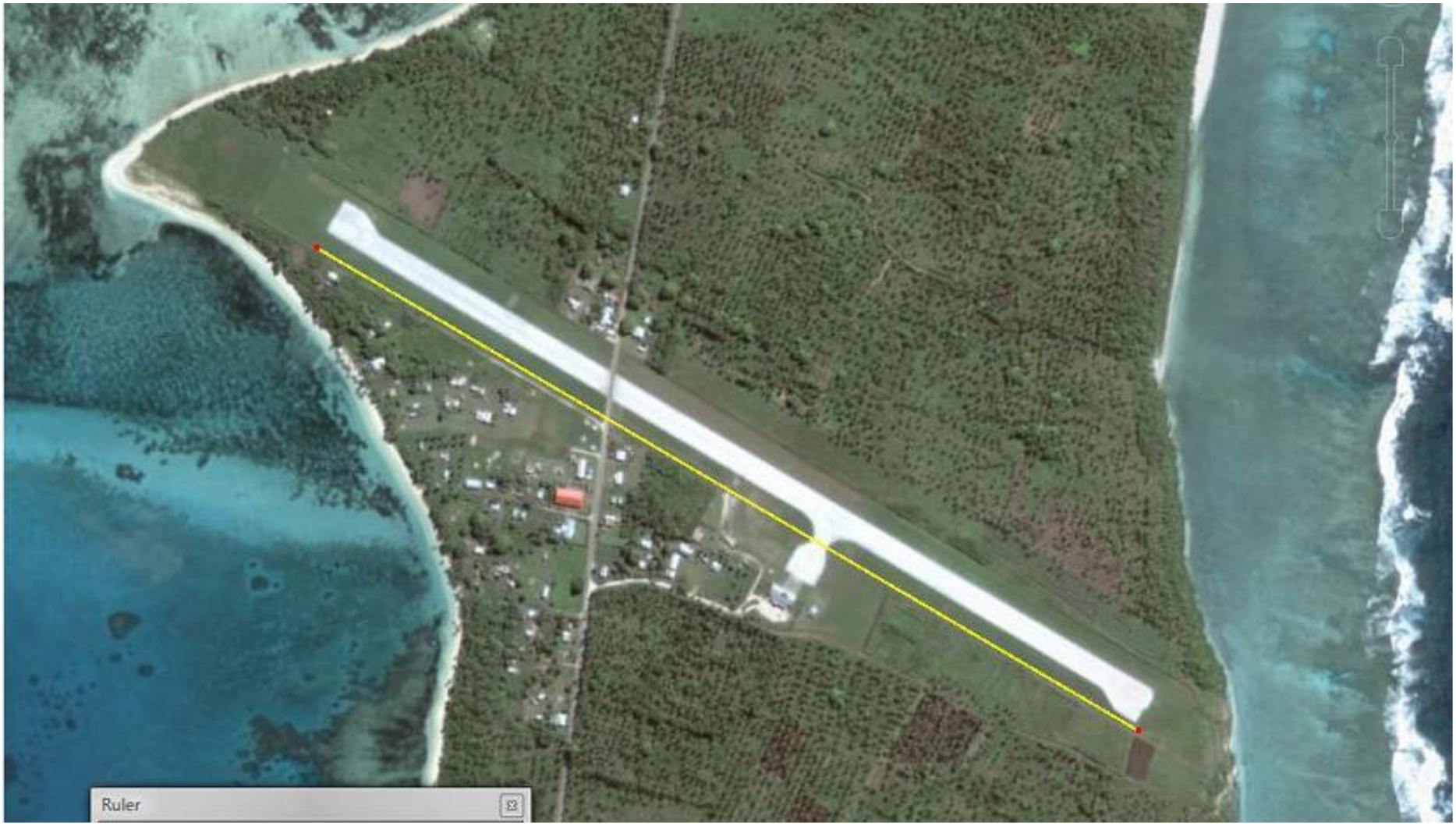

Figure 2.1: Google Earth image showing location of Salote Pilolevu Airport in Ha'apai with Koulo Village to the south

Table 2.1: Personnel requirements

Type	Roles	Number of Employees
Localised Pavement Maintenance Team	Heavy Plant Operator	6
	Labourers	16
Chip Sealing Team	Heavy Plant Operator	6
	Bitumen Heating	4
	Labourers	16

As the workers are likely to be mostly locally-based Tongan nationals with no requirement for contractor camps, there is little or no potential for interactions that may lead to culturally insensitive behaviour and relationships arising as a result of the Project, including those that are disrespectful of local customs and village bylaws, and others fostering and or directly resulting in gender-based violence (GBV), violence against children (VAC), sexual harassment etc. No inter-island issues were raised as part of consultation process and is typically not an issue that arises in Tonga.

The intent is to not interfere with the ordinary operation of the airport as far as practicable while physical works are undertaken.

MOI have indicated that only 'Ahononou Quarry in Tongatapu meets the minimum standards for chip seal works. The quarry located on Ha'apai does not have suitable aggregate. 'Ahononou Quarry was the main source of material for recent WB project on Tongatapu and was used in the Fua'amotu runway construction, extension and resurfacing Projects. It is likely that the required material will be barged from Tongatapu.

'Ahononou Quarry has the necessary environmental permits to operate having recently prepared an EIA to assess the impacts of operational activities.

2.3 Timing / Expected Duration of Works

Pavement repairs and resurfacing is expected to commence in early 2019 and take approximately 24 weeks to complete including mobilisation and testing.

Normal working hours are Monday to Friday, 7am to 6pm. Due to Airport operational activities night time works may be required. Works outside of daytime hours will require permission from MOI and notice to affected parties and the public at least one week prior to work commencing.

Work on a Sunday (Sabbath Day) is not permitted (as protected in the Constitution of Tonga) and any requirements to work on a Sunday (e.g. emergency works) will require special approvals.

2.4 Alternative Methodologies

The Airport runway is existing infrastructure which requires improvements to ensure continued operation.

The design approach and methodology proposed is based on industry best practice and is consistent with other runway upgrade projects. It is considered likely that this is the most cost effective and practical approach.

Overall, the preliminary designs and proposed construction methodology upon which this impact assessment is based, have been selected on the basis that they are the most effective use of natural resources and labour in order to minimise potential impacts on the local environment and community.

3 Environmental Policy, Legal & Administrative Framework

3.1 Environmental Regulatory Framework

Tonga has a well-established regulatory framework that provides measures to protect and preserve the environment from abuse, pollution and degradation, to manage the environment for sustainable development and to promote environmental awareness.

Legislation concerning the protection and preservation of the environment is found in a number of Acts and is the responsibility of a number of different Ministries according to their focus. Amongst these, are the following key legislations:

- Environmental Impact Assessment Act 2003 and Environmental Impact Assessment Regulations 2010
- Environmental Management Act 2010
- Marine Pollution Prevention Act 2002
- Parks and Reserves Act 1988
- Fisheries Management Act 2002
- Aquaculture Management Act 2003
- Birds and Fish Preservation Act 1988
- Public Health Act 1992

The Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC) is the principal agency responsible for the management of the environment, and in administering environmental-related legislation in Tonga. It provides environmental assessments, reports and recommendations to the responsible Ministry, as well as being mandated under the Environmental Impact Assessment Act 2003 and the EIA Regulations 2010 to require environmental impact assessments and impose conditions for development projects within Tonga.

Accordingly, activities funded under the TSCP will follow the GOT's established procedures and associated guidelines established under the Environmental Assessment Act 2003, and environmental legislation of the relevant Ministry.

3.2 Environmental Approvals Framework

In broad terms, the environmental approval framework in Tonga involves:

- Land acquisition and lease approval (Ministry of Lands and Natural Resources "MLNR")
- Building Permit approval (MOI)
- Environmental approval (MEIDECC).

The application process is summarised Figure 3.1.

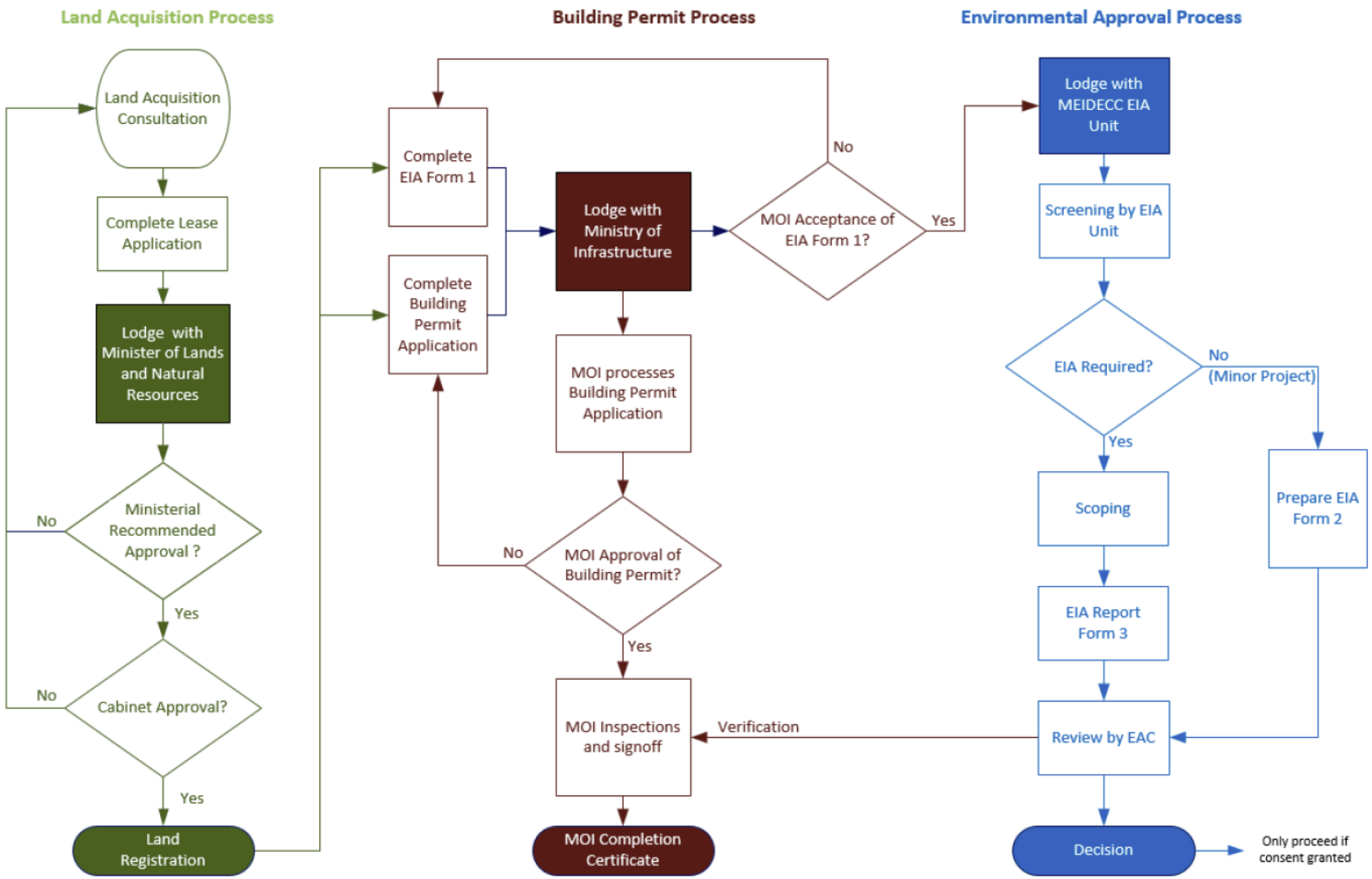

Figure 3.1: High level linkages between the three main environmental approval elements

3.3 Environmental Approvals Process

3.3.1 Introduction

Proposals for **all** development activities must be notified to the Minister of Environment, Information, Disaster Management, Energy and Climate Change for approval under the Environmental Impact Assessment Act 2003 and Environmental Impact Assessment Regulations 2010.

The Secretariat and the Minister determine whether the proposed development is a "minor" or a "major" project, and this determination is to be advised to the proponent within 30 days. Proponents of major projects are required to submit a full Environmental Impact Assessment for review by the Secretariat. If the Project is deemed to be a minor project, approval is granted with or without conditions and the Project may proceed.

The broad environmental approval process is summarised in Table 3.1 and Figure 3.5.

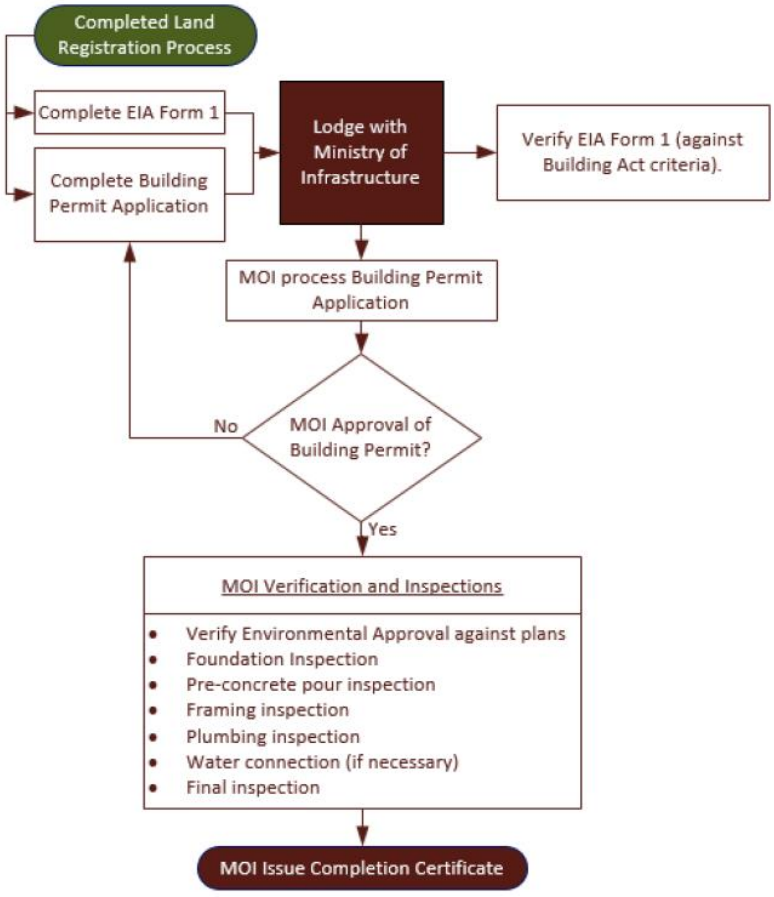

Figure 3.4: Ministry of Infrastructure overview of approval pathway

3.3.2 Application and Initial Evaluation Phase

Submission of Application to EIA Unit

Proposals for **all** development activities when notified to MEIDECC must include a completed "**Form 1**" as set out in Schedule 1 of the Regulations. The Secretariat and the Minister use Form 1 to determine whether the proposed development is a "minor" or a "major" project, and they are required to advise the proponent of this determination within 30 days.

If Proponents don't need any other permits the completed Form 1 may be delivered directly to the EIA Unit at the Environment Office of MEIDECC[1]. The EIA Unit will check that the correct form has been used.

However, most RE development activities would require a building permit from the Ministry

[1] Vuna Rd, Nuku'alofa, Tonga

of Infrastructure (MOI) in which case the Form 1 would also be lodged with MOI,

Delivering the application to the EIA Unit involves two steps.

1. Delivering the application to the EIA Unit at the Environment Office. The EIA Unit will check that a Form 1 is attached to the building permit application.
2. Paying the $10 registration fee to the EIA Unit at the Environment Office. They will issue a receipt, and keep a photocopy of the receipt for their records. MEIDECC will not process the application until the fee has been paid.

Initial Screening Phase – MEIDECC EIA Unit

An initial screening evaluation is undertaken during consideration of the completed Form 1 provided pursuant to Schedule 1 of the EIA Regulations 2010. The main purpose of Form 1 is to help the Minister determine whether a project should be dealt with as a Minor or Major Project.

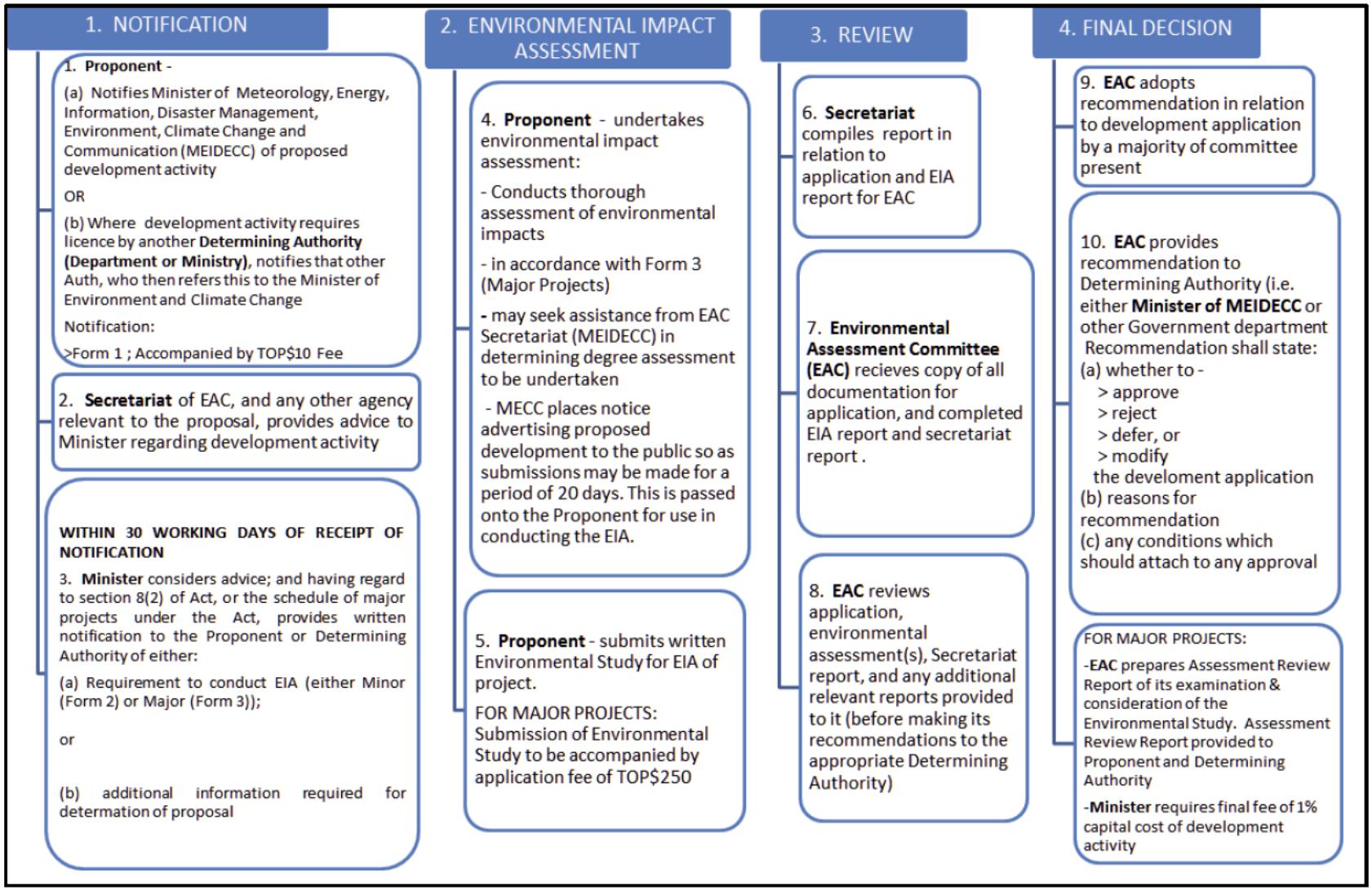

Table 3.1: Environmental Approval Process Detailed Overview

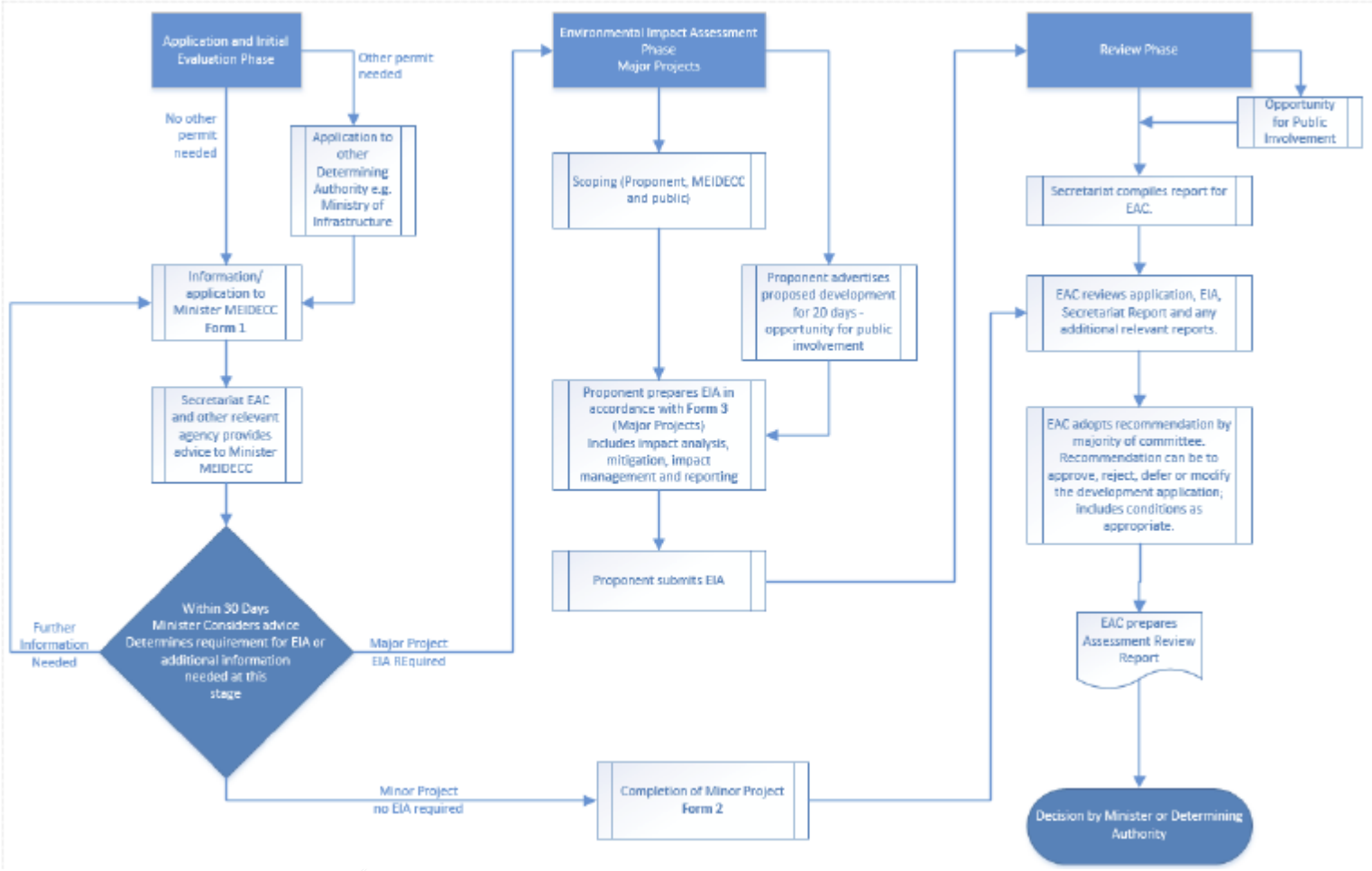

Figure 3.5: Environmental Approval Process Detailed Flowchart

3.3.3 Determination of Major or Minor Project Status

Once the EIA Unit has received the completed Form 1 it is assessed against the criteria in the EIA Act and EIA Regulations to determine whether the development activity is a minor or major project.

The Schedule in the EIA Act classifies a range of transport-related activities as Major Projects including:

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

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

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

If the project is a Major Project, MEIDECC will issue a Form 3 and explain the next steps of the EIA process to the Proponent. If it is a minor project, the Minister will issue a Form 2.

For a major project, the proponent is required to submit a full Environmental Impact Assessment for review. The Minister subsequently issues an approval (with or without conditions), a request for further information, or a rejection.

For a minor project, approval is granted with or without conditions and the Project may proceed, usually under the provisions of an Environmental Management Plan ("**EMP**") which is binding on the Proponent. The EMP will address environmental management and protection measures and will be specific to the development under consideration.

3.3.4 EIA Preparation Phase - Major Projects

If the Project is defined as a Major Project or if the Minister otherwise so directs based on a risk assessment, the proponent will need to conduct an EIA in accordance with Form 3 (Major Projects) of the Regulations. The purpose of the EIA is to assess potential significant environmental issues associated with a project, and to develop appropriate methods to resolve those issues.

Preparation of the EIA is the responsibility of the Project Proponent.

The EIA element of the process involves a Scoping Phase and a Preparation phase both undertaken by the proponent in collaboration with regulators and other parties as necessary. The comprehensive initial screening undertaken during preparation of the Form 1 appraisal will inform this Scoping exercise and will greatly streamline this stage of the process.

Scoping identifies existing sources of data, key individual contacts and important areas of field study. It increases local, regional and national awareness of the project, its environmental concerns and facilitates rapaid data collection and analysis.

The findings of the scoping exercise (i.e. information recorded in the scoping checklist) provide a list of potential environmental issues, which should be considered and assessed in detail in the subsequent EIA.

EIA Regulation 12 sets out factors to be taken into account by the Minister and the Secretariat when considering the likely impact of an activity upon the environment, including provision of an environmental management plan.

Minor Projects – Environmental Management Plan

Minor projects are not required to provide an EIA, and are approved with or without conditions.

Major Projects – Environmental Management Plan

This ESIA incorporates an Environmental and Social Management Plan (ESMP) for each component in partial fulfilment of the requirements of the Act.

3.4 Other Applicable Legislation

3.4.1 Bird and Fish Preservation Act 1988

This Act defines species of birds and fish (including turtles) that are protected from being killed, shot, captured, taken or destroyed within their defined protected time period. The Act also defines protected areas within which it is prohibited to:

- Discharge or cause to be discharged into the protected area any effluent or noxious or toxic liquid or substance.
- Erect any harbour, wharf, pier, jetty or other building works, temporary or permanent.
- Cut, damage, remove or destroy any mangrove.
- Erect any fish-fence, or set any fish trap; or trawl for fish (including shellfish) or engage in fishing for commercial purposes.
- Carry out any boring, drilling or dredging operations.

The Tongatapu Lagoon is the only defined protect area within the Act and does not fall within the PIA for this assessment. The listed protected species are not recorded as occurring within the PIA and therefore compliance is assured.

3.4.2 Marine Pollution Prevention Act 2002

This Act provides for the prevention of and response to marine pollution and the dumping of wastes and other matter and to give effect to international marine pollution conventions. The Act, as a whole provides, for marine pollution prevention, marine pollution response, marine casualties, liability and compensation for oil pollution damage and regulates dumping and incineration of waste at sea.

This Act also lists a number of pollutants and identifies eight international conventions to which Tonga is a party. Within the listed conventions, the following have relevance to this project and are described later in this chapter: SPREP convention, London Convention, MARPOL, CLC, HNS Convention, OPRC Convention, FUND and the Intervention Convention.

3.4.3 Parks and Reserves Acts 1988 (CAP 89)

This Act provides for the establishment of a Parks and Reserves Authority and for the establishment, preservation and administration of parks and reserves. It enables the Parks and Reserves Authority to seek permission to declare any area or land or sea to be a protected area. The attached schedules to this Act define five marine reserves: Hakaumama'o Reef, Pangaimotu Reef, Monuafe Island Park and Reef, Ha'atafu Beach and Malinoa Island. The Parks and Reserves Declaration Amendment (1992) established the 'Eua National Park on 'Eua Island.

None of the parks are within the PIA of the Project.

3.5 World Bank Safeguards Policies

3.5.1 Introduction

This ESIA is based on the following World Bank ["WB"] Operational Policies ["OPs"][2]. The WB Environmental and Social Framework 2017[3] has not been applied as it is not yet in force.

Environmental and Social Policies

OP 4.01 Environmental Assessment

OP 4.04 Natural Habitats

OP 4.10 Indigenous Peoples does not apply to this Project – indigenous peoples are broadly defined as "*distinct, vulnerable, social and cultural group attached to geographically distinct habitats or historical territories, with separate culture than the project area, and usually different language*". This definition does not apply to the Tongan situation.

[2] https://policies.worldbank.org/sites/ppf3/Pages/Manuals/Operational%20Manual.aspx
[3] http://documents.worldbank.org/curated/en/383011492423734099/pdf/114278-WP-REVISED-PUBLIC-Environmental-and-Social-Framework.pdf

OP 4.11 Physical Cultural Resources (PCR)* does not apply as the Project involves works to existing infrastructure

OP4.12 Involuntary Resettlement does not apply.

The relevant WB Policies OP 4.01 and OP 4.04. These policies are addressed further below.

3.5.2 Operational Policy 4.01 – *Environmental Assessment*

The WB requires an Environmental Assessment (EA) of Projects proposed for WB financing to ensure they are environmentally sound and sustainable, thereby improving decision-making.

OP 4.01 classifies the proposed project into one of four categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts:

Category	Status
A	Likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented.
B	Potential adverse environmental impacts on human populations or environmentally important areas--including wetlands, forests, grasslands, and other natural habitats--are less adverse than those of Category A projects.
C	Likely to have minimal or no adverse environmental impacts. Beyond screening, no further EA action is required for a Category C project.
FI	Involves investment of Bank funds through a financial intermediary, in subprojects that may result in adverse environmental impacts.

The Project, assessed as a Category B Project, with this ESIA presenting information on the following matters identified in OP 4.01:

- measures to prevent, minimise, mitigate or compensate adverse impacts (Section 6),
- public consultation and disclosure as part of the EA process (Section 5) and
- an Environmental and Social Management Plan (ESMP) (Section 7).

3.5.3 Operational Policy 4.04 – *Natural Habitats*

OP 4.04 Natural Habitats requires the conservation of natural habitats and specifically prohibits the support of projects that involve significant conversion or degradation of critical habitats, as defined by the policy. No such significant habitat effects are identified in relation to the Project, but there remains the possibility of low to medium level adverse impacts on the environment and therefore consideration is given to the requirements of OP 4.04.

The policy requires the EA to identify impacts on biodiversity and species; to determine project impacts on these species; and to propose acceptable mitigation and monitoring measures. These matters are addressed in Section 6.2 of this ESIA.

4 Description of the Environment

4.1 Introduction

This section provides information on the physical, biological and socio-economic elements of the environment, which forms the baseline dataset that can be used as benchmarks for any potential future monitoring requirements.

The area considered for assessment of baseline conditions (the "Project Influence area" or "PIA") consists of the marine environment in and immediately adjacent to the proposed dredging works.

The PIA is defined through consideration of the project footprint including all ancillary project components and potential impacts on environmental, economic and social resources.

Table 4.1 outlines the guidelines that have been followed to determine the PIA for the Project which is based around a precautionary approach. All data was obtained by desktop study and a field survey conducted in May and June 2018.

Table 4.1: Project influence areas delineations and conditions

Environment	PIA
Important Species Habitat	The runway and immediate surrounds

4.2 Location & Setting

Tonga is an archipelago located directly south of Samoa and about two-thirds of the way from Hawaii to New Zealand. Consisting of 169 islands, 36 of them inhabited, Tonga is divided into three main groups Tongatapu, Vava'u and Ha'apai which lie approximately 800 km north to south (see Figure 4.1).

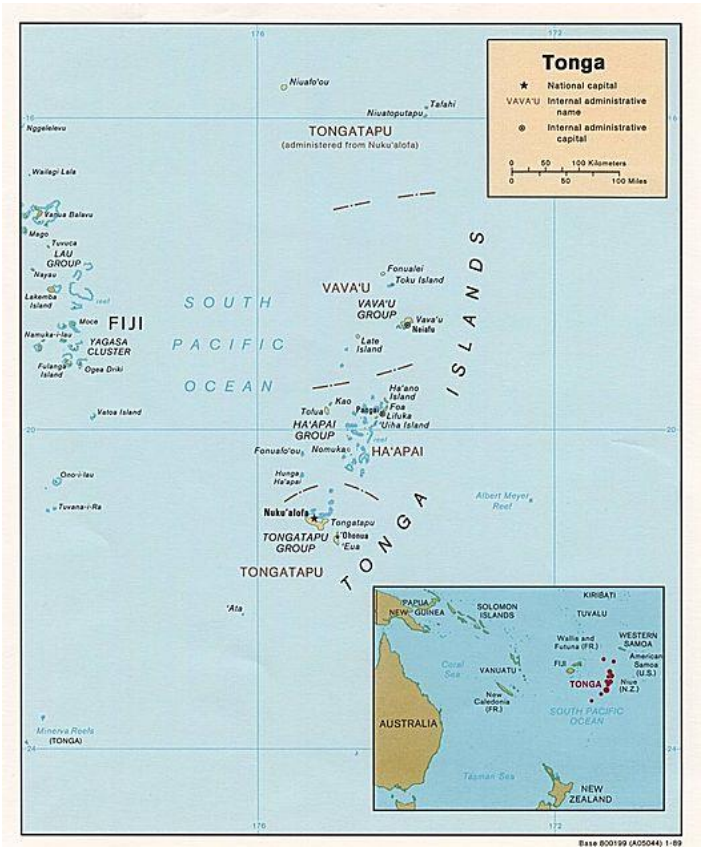

Figure 4.1: Location of Tonga and island groups in the Kingdom of Tonga.

Ha'apai is a group of islands, islets, reefs and shoals with an area of 109.3 km2 located in the central part of the Kingdom of Tonga, with the Tongatapu group lying to the south and the Vava'u group to the north. Geologically the Tongan islands consist of two types: most have a limestone base formed from uplifted coral formations; others consist of limestone overlaying a volcanic base.

The runway in Ha'apai, located on Lifuka Island, is a low-lying uplifted coral island.

4.3 Physical Environment

4.3.1 Geology & Groundwater

Previous analysis[4] of the geology of Lifuka Island indicates that the majority of the runway is located on raised limestone with coastal sands towards the western end (see Figure 4.2).

Groundwater is an important water source for Lifuka. Water sourced from private wells and the Tonga Water Board supplies 80% of Lifuka's freshwater needs. The Tonga Water Board (TWB) has a number of wells constructed and equipped to abstract groundwater with several sites in Pangai located to the south of the runway.

A groundwater resource assessment[5] captured information on the extent and thickness of Lifuka's fresh water lens, and assessed the impact on the lens from the sudden increase in sea level related to subsidence from the 2006 earthquake, groundwater contamination threats and impacts, and the potential exposure to inundation of the freshwater lens and abstraction infrastructure.

The investigations were restricted to the thicker unconsolidated sediments found on the western side of Lifuka, where geological conditions provide the greatest potential for fresh groundwater resources and where monitoring bores near the TWB production wells are currently located.

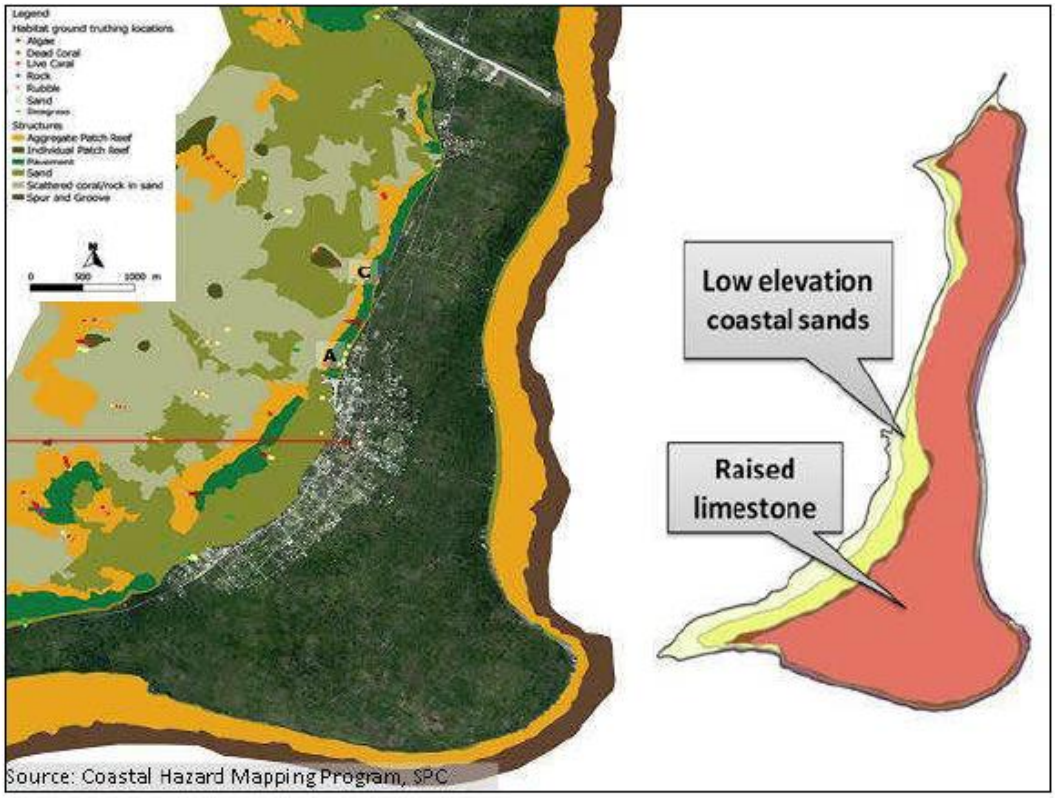

Figure 4.2: Substrate map for Lifuka Island. The runway is located in the Northern part of the Map (from Kruger 2013)

[4] Kruger, J. 2012. Adaptations for a managed retreat. PASAP Assessing Vulnerability and adaptation to sea level rise, Lifuka Island, Ha'apai, Tonga. SOPAC.

[5] SPC 2014. Assessing vulnerability and adaptation to sea-level rise: Lifuka Island.

A conceptual diagram of groundwater resources for Lifuka indicates lens thickness and the processes (Figure 4.3). The lens is essentially a thin wedge found within the unconsolidated sand sediments and overlying brackish water.

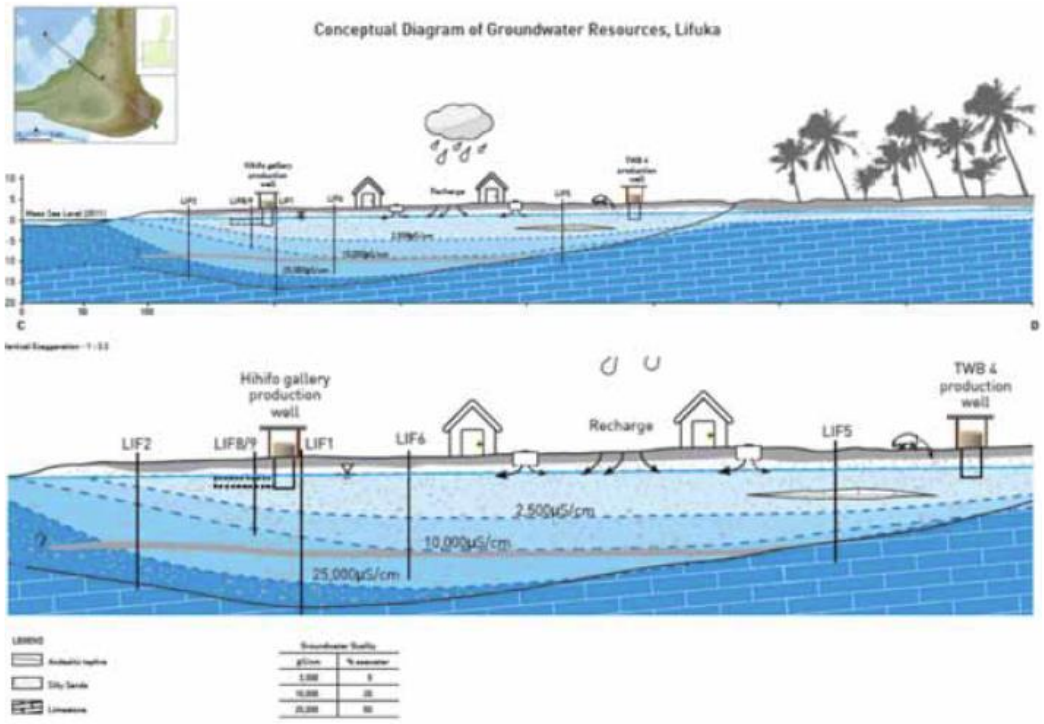

Figure 4.3: Conceptual diagram of groundwater resources, Likuka (from SOPAC 2014)

Key findings of the investigation are as follows:

- The freshwater lens in Lifuka is naturally dynamic and fragile. It is very responsive to rainfall events and begins to thin within a few months of little or no rainfall.
- Subsidence observed due to the 2006 earthquake and the associated rise in sea level in Lifuka has impacted on the fresh groundwater lens, where the lens has been 'lifted' by an observed 0.5 m in monitoring bores. In some cases, this appears to have increased the thickness of the freshwater lens and storage capacity.

4.3.2 Climate

The climate is tropical with a distinct warm period (December–April), during which the temperatures rise above 32°C and a cooler period (May–November), with temperatures rarely rising above 27 C. Between Tongatapu in the south and the more northerly islands closer to the Equator, temperatures increase from 23 to 27 C and the annual rainfall from 1,700 to 2,970 millimetres. The average wettest period is around March with on average 263 mm.

Rainfall in the islands of the Ha'apai Group averages about 1,706 mm per year. Lifuka has the lowest average rainfall and correspondingly some of the lowest monthly averages in Tonga over a thirty-year period, indicating that it lies in a rain shadow relative to other locations.

Wind

Winds in Tonga are dominated by the south east trades which generally blow between 12-15 knots although wind speeds tends to be stronger from May to October. Figure 4.4 presents the annual wind rose showing predominant wind direction in Tonga.

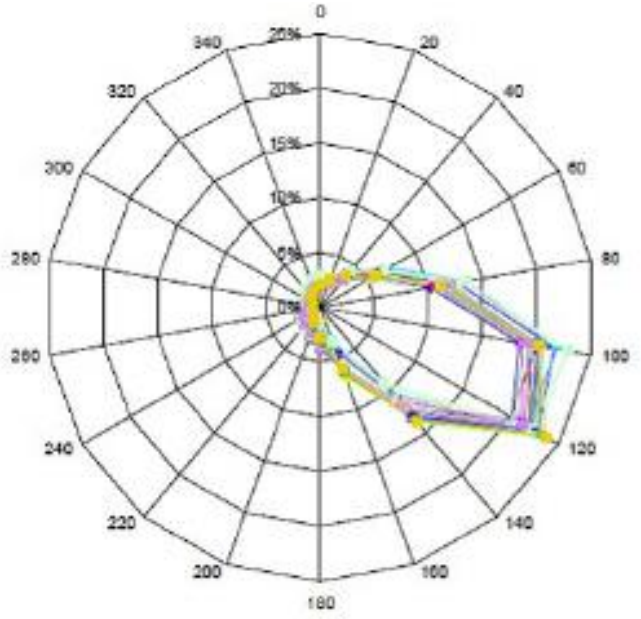

Figure 4.4: Annual wind rose showing predominant wind direction in Tonga.

Cyclones

Cyclone season is from November to April. In the 25 year period between 1989 and 2014, 19 cyclones tracked through the Tonga group of islands with 13 of those making landfall: 10 in Ha'apai, two in Vava'u and one in Tongatapu. Typically, the paths of cyclones are from the northwest, moving in a south-easterly direction (Figure 4.5).

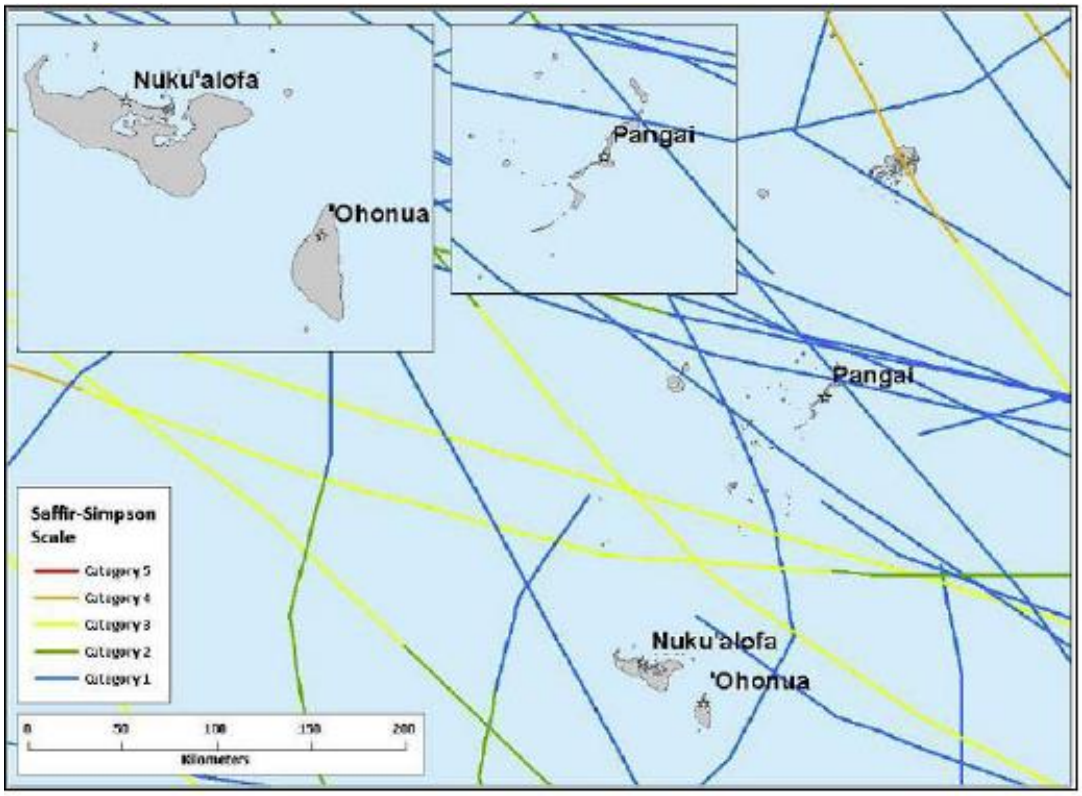

Figure 4.5: Category 3 and higher cyclone activity in Tonga 1945 – 2008[6]

[6]World Bank 2008. Pacific Catastrophe Risk Financing Initiative, Country Risk Profile: Tonga . Boston, MA: Air Worldwide on behalf of World Bank, SOPAC and GFDRR.

4.3.3 Climate Change

The IPCC Fifth Assessment Report[7] provides broad scale climate change projections for the Pacific region. A more detailed assessment of past and potential future climate change was carried out for the region[8]. The key points are as follows:

- Surface air temperature and sea surface temperature are projected to continue to increase (very high confidence). Annual mean surface temperatures are expected to be between 0.5° to 1°C higher by 2030 relative to 1990 and by 1°C to 2°C depending on emission scenario by 2055.
- The intensity and frequency of days of extreme heat are projected to increase (very high confidence).
- Annual and seasonal mean rainfall is projected to increase (high confidence). Increases in annual mean rainfall are projected to be most prominent near the SPCZ, with widespread increases in the number of heavy rain days (20-50 mm).

A number of projections however, suggest that islands located near the eastern edge of the SPCZ, such as Tonga, may become drier in the wet season as the trade winds in the south-east Pacific become stronger. There is also some suggestion of a shift towards the equator of the SPCZ in the dry season (May to October), which could increase mean rainfall during these months. In addition:

- The intensity and frequency of days of extreme rainfall are projected to increase (high confidence), for example rainfall events that occur on average once every 20 years are generally simulated to occur four times per year by 2055 (high emission scenario).
- Tropical cyclone numbers are projected to decline in the south Pacific sub-basin but with an increase in the proportion of more intense storms by the late 21st century. The occurrence of tropical cyclones will still be closely linked to the occurrence of periods of El Niño which will have a much more dominant influence on the cyclone occurrence than potential gradual changes in long-term average cyclone activity due to climate change.

Sea-level Rise

The rate of rise of sea levels across the globe is far from uniform. In some places, notably the western Pacific, sea levels have been rising rapidly (> 10 mm a year in some places), in others it has fallen. Since 1993 these regional differences have been measured by satellite (Figure 4.6). Tonga is on the edge of the area in the western Pacific that has experienced large rates of sea-level rise over the period of satellite recording period.

Over the longer term it is expected that sea-level rise over this last century around Tonga will have been close to the global average of about 0.19 m between 1901 and 2010.

Sea levels will continue to rise primarily because of thermal expansion within the oceans and loss of ice sheets and glaciers on land. Even if greenhouse gas emissions were stabilised today, sea levels would continue to rise. Sea levels to about 2050 are relatively insensitive to changes in emissions over this timeframe because of the time it takes the oceans to respond to changes in carbon dioxide and atmospheric temperatures, but future changes and trends in emissions become increasingly important in determining the magnitude of sea level rise beyond 2050.

The rate of global mean sea level rise during the 21st century is expected to exceed the rate observed during 1971–2010 due to increased ocean warming and loss of mass from glaciers and ice sheets[10]. For the period 2081–2100, compared to 1986–2005, global mean sea level is likely to be between 0.26–0.54 m for the lowest emission scenario considered (Representative Concentration Pathway scenario, RCP2.6) to between 0.45–0.81 m for the highest emission scenario (RCP8.5) (Figure 4.7).

[7] IPCC, 2013. Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.
[8] Australian Bureau of Meteorology & CSIRO, 2011. Climate change in the Pacific. Scientific assessment and new research. Volume 1: Regional overview.

High tides and extreme sea levels are likely to increase close to the same rate as mean sea-level rise. There is nothing obvious to suggest that storm surge has increased in magnitude or frequency or will do so within the next one to two generations (30 - 50 years).

Long-term sea-level rise will continue to push sea levels higher resulting in high tide levels increasingly exceeding what may be presently considered extreme or king- tide level.

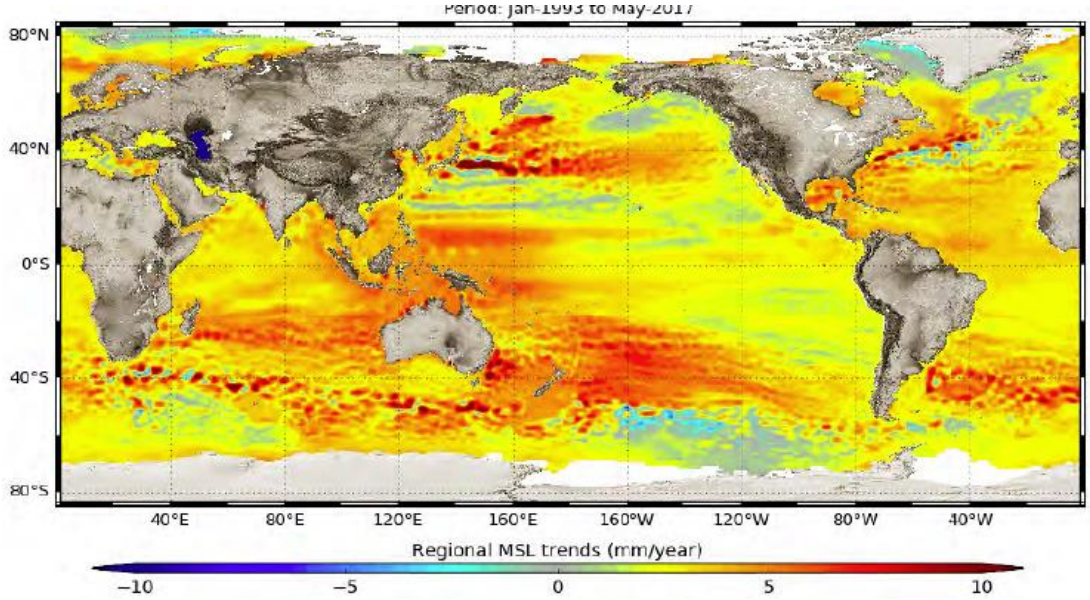

Figure 4.6: Global distribution of the rate of absolute sea-level rise between January 1993 and May2017 from satellite altimeter data. Source: https://www.aviso.altimetry.fr/en/data/products/ocean-indicators-products/mean-sea-level.html

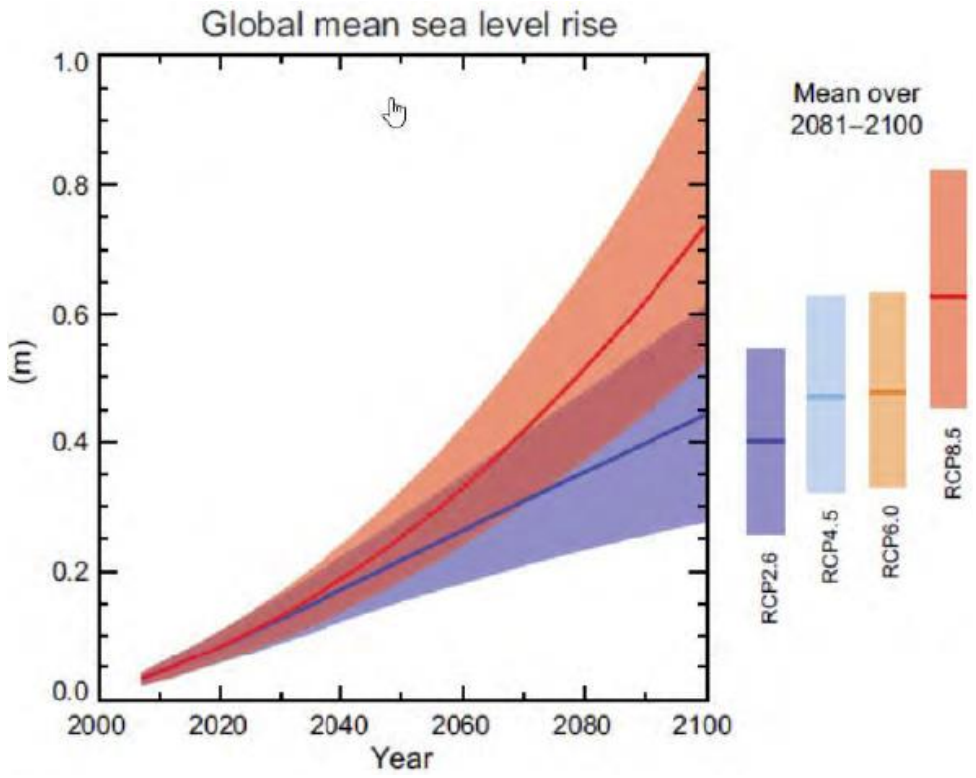

Figure 4.7: Projected global mean sea-level rise to 2100 relative to the average mean sea level between 1986 to 2005 for the four future scenarios presented in the Intergovernmental Panel for Climate Change Fifth Assessment Report (IPCC, 2013).

4.3.4 Coastal Hazards

Tides

The astronomical tide is a mixed, dominant semi-diurnal type with high water levels alternately higher and lower than the average (high water level). Mean spring tide range is around 1.1 m, maximum spring tide range approximately 1.5 m, and mean neap range around 0.6 m.

Tide ranges and high tide levels vary over different timeframes (e.g. daily, two weekly Spring-Neap tide, 7 month perigean-spring cycle). Longer-term cycles also influence tide range and magnitude of the highest tide. Of particular relevance is the 8.85 year complete cycle of the lunar perigee which influences high tides on a 4.4 year cycle.

Tide levels (and hence the level of the sea observed at any one time) can be also be elevated (or lowered) by other factors, the most significant in the Pacific is the ENSO cycle: During El Niño phases sea levels are pushed down (resulting in lower high tide levels), and conversely during La Niña phases sea levels are pushed up (resulting in higher high tide levels). However, the influence of ENSO on mean sea level variability is not as pronounced as in the Pacific Islands further west with variability in mean sea levels tending to be less than 0.15 m.

Any changes in tide levels as the results of changing climate could potentially affect the groundwater levels beneath the runway in Lifuka (see Section below) thus having a potential impact on the longevity of the new runway surface.

Tsunami

A tsunami is a series of water waves caused by the displacement of a large volume of water. Tsunamis have a small wave height offshore and a very long wavelength, which is why they generally pass unnoticed at sea. They grow in height when they reach shallower water in a wave shoaling process.

A tsunami in 2009, the most recent to affect the Tongan archipelago, was generated by an 8.1 magnitude earthquake located within the Samoan Islands which sent three 6m high waves towards Tonga (Figure 4.8). The majority of the damage in Tonga was to the northernmost islands of Niuatoputapu located 500km to the north of Nuku'alofa.

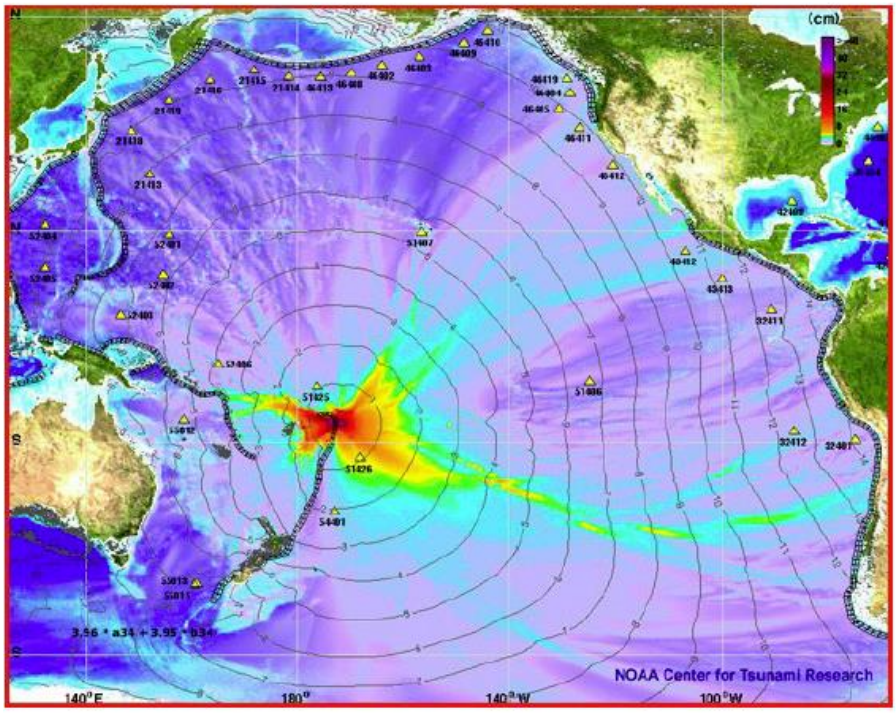

Figure 4.8: 2009 tsunami wave height and travel time[9].

Coastal Inundation

Potential storm surge associated with a tropical cyclone with a one-in-one-hundred years

[9] NOAA Centre for Tsunami Research.

return frequency (1:100 year event) has been modelled[5]. Such an event — equivalent to a tropical cyclone category 5 - could be highly damaging to the lives and livelihoods of the Lifuka community.

The extent of damage would depend on a number of factors, including location on stable or unstable (erosive) land, proximity to the foreshore, the speed of waves, the elevation of the houses, depth of flooding, etc

Based on the modelling conducted, several key zones have now been identified around Lifuka (Table 4.1). Figure 4.9 shows the hazard zones that take into account both slow-onset hazards such as sea-level rise and erosion, and rapid-onset hazards such as extreme storm tides and inundation.

Table 4.1: Key zones around Lifuka

Null zone	Areas around Lifuka island that would not be susceptible to inundation in a 1:100 year tropical cyclone event
Hazard zone	Areas that would be inundated during a 1:100 year event and that could be subject to wave action of waves <1 m in height
High hazard zone	Areas that would be inundated as a result of a 1:100 year event and that would be subject to damaging waves of =>1 m in height
Coastal setback zone	Area that is subject to long-term coastal erosion

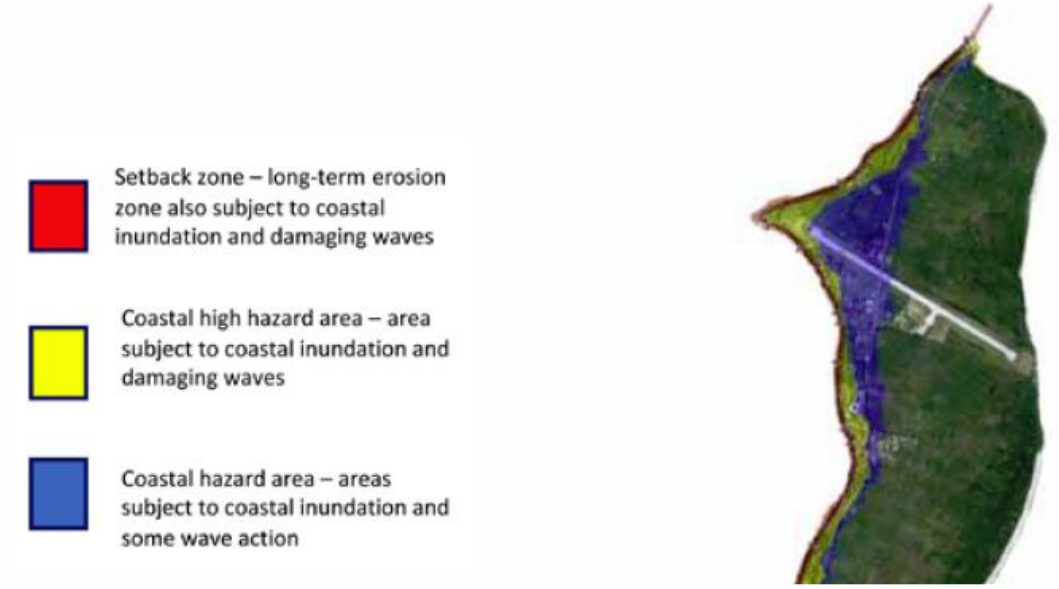

Figure 4.9: Hazardous zones adjacent to the runway for a 1:100 year storm event

Figure 4.10 presents a snapshot of the modelling output which shows an intermediate–high sea-level rise (1.2 m by 2100), coupled with a cyclone in 2100, which would affect the western part of the runway. The dark red area depicts the coastal high hazard area subject to inundation and damaging waves. The light red area refers to coastal areas that are subject to inundation and some wave action. The contours show depth of inundation including wave effects in metres above ground level. By 2100 the western part of the runway could potentially be affected by a 1m inundation.

Figure 4.10: Year 2100 flood depths (m) based on an intermediate–high sea-level rise scenario and severe tropical cyclone conditions

Coastal Erosion

A shoreline assessment looking at the issue of coastal erosion in Lifuka was undertaken in 2014[10]. Topographical and beach profile mapping was undertaken at a number of sites adjacent to Lifuka which included a site adjacent to Koulo Village just south of the runway (Benchmark 6 site). Over the 5 surveys this site (Figure 4.11) showed some minor changes observed on the third survey. Large amounts of sand were piled up on the beach face likely to be a result of TC Cyril. In later parts of the survey, this location normalised and beach size remained consistent, and minimal changes in the beach morphology were noted. This indicates the coastal area adjacent to the western end of the runway does not appear to have significant coastal erosion issues.

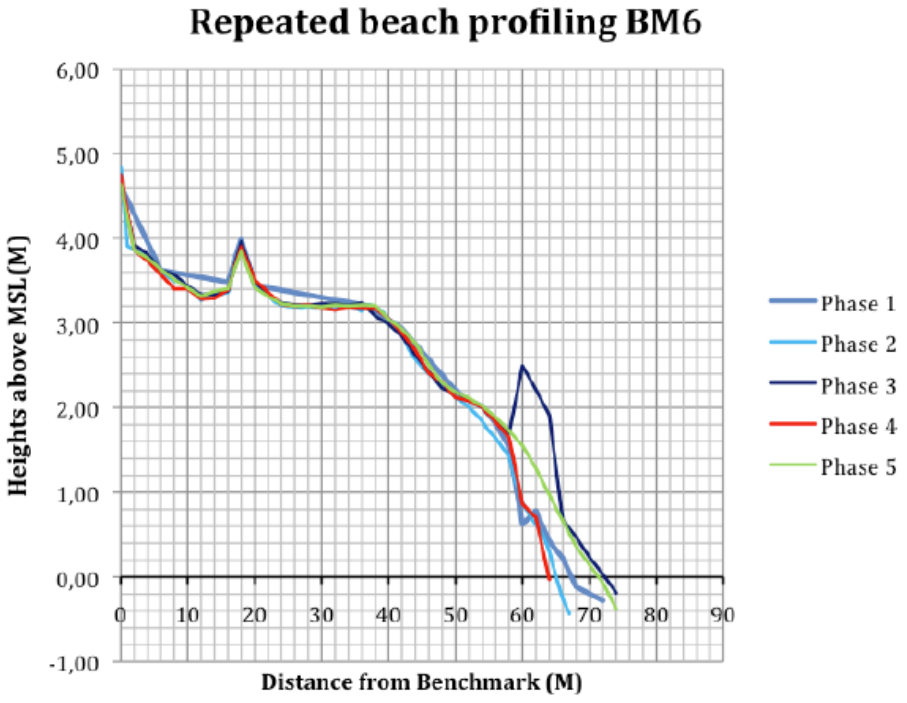

Figure 4.11: Beach profile plot for the five repeated surveys at Benchmark 6 site

[10]Begg, Z., Kruger, J. 2014. Assessing vulnerability and adaptation to sea-level rise: Lifuka Island. Physical resources, shoreline assessment. SOPAC

4.4 Ecology

The key ecological resource potentially impacted as a result airport operational activities are birds. Note that following works to the runway the risk to birds will be no different to the current situation. Seabirds, for which there is Tonga-wide data available, are described below for completeness. No Ha'apai-specific data is available. TAL has bird strike data for Fua'amotu Airport in Tongatapu, but no data is available for Pilolevu Airport.

There are 15 species of seabirds with a known presence in Tonga according to the IUCN and Birdlife International.[11] A recent checklist reported as many as 41 species[12], including the wandering albatross, one giant petrel, several additional petrel and storm-petrel species, four shearwater species, three species of skuas, and many more tern species (Table 4.2). As many as twenty three of these species, such as black noddies, brown noddies and white terns, may also breed in Tonga.

A number of the islands in the Tongan group (such as Maninita, 'Ata, Late Hunga Ha'apai, and Fonualei Islands) provide nesting or breeding habitat for these bird species. Given the Project involves works to existing infrastructure it is unlikely that there will be any impact on nesting or breeding habitat and the potential impacts are not considered further.

Table 4.2: Seabird species in Tonga and their IUCN conservation status

Common Name	Scientific Name	Status
Herald Petrel	*Pterodroma heraldic*	LC
Wedge tailed Shearwater	*Puffinus pacificus*	LC
White-tailed Tropicbird	*Phaethon lepturus*	LC
Lesser Frigatebird	*Fregata ariel*	LC
Masked Booby	*Sula daactylatra*	LC
Red-footed Booby	*Sula sula*	LC
Brown Booby	*Sula leucogaster*	LC
Great Crested Tern	*Sterna bergii*	LC
Black-naped Tern	*Sterna sumatrana*	LC
Sooty Tern	*Sterna fuscata*	LC
Brown Noddy	*Anous stolidus*	LC
Black Noddy	*Anous minutus*	LC
Blue Noddy	*Procelsterna cerulea*	LC
Common White Tern	*Gygis alba*	LC
Phoenix Petrel	*Pterodroma alba*	EN

Notes: LC = least concern. EN = Endangered.

4.5 Social Environment

The Airport is an important strategic asset providing key access to and from Ha'apai for international and national visitors and locals alike. Tourism is an important and growing contributor to the local economy; Ha'apai has a total of 83 rooms of which the two largest properties are Lindsay Guest House and Sandy Beach Resort. A key attraction is the whale-watching with approximately 6 operators currently operating during the peak season between July and October.

Real Tonga, Tonga's national airline currently has 10 flights per week to Ha'apai; this amounts to approximately 200-250 people arriving weekly during the peak tourism season.

Koulo Village is the key village potentially impacted by airport operations as it is located directly adjacent to the south and consists of 38 households comprising a population of 206 people[13]. The total population of Lifuka, on which the Airport is located, is 2,205 spread

[11] www.birdlife.org
[12] Environment Consultants Fiji 2001. Summary list of the Birds of Tonga. Pacific Birds. Suva Fiji Islands.
[13] Tonga Statistics Department 2016. Census of population and housing. Tonga 2016

across five main villages. The total population of Ha'apai at the 2016 Census was 6,125, a 7% decrease or approximately 500 since 2011. The economically active labour force is 2,828 or 46% of the population consisting of 918 subsistence workers (or 15% of the working population).

Families in Ha'apai rely on subsistence agriculture (root crops, fruits and green vegetables), fishing, pigs and some goats for food security, although there is limited production of fresh vegetables[5]. Some of the small islands have very little fertile soil for agriculture. A few villages have horses for transportation. Gender roles are quite defined, with men doing fishing, ploughing, planting and harvesting of crops, and preparation of the umu (earth oven). Women do the day-to-day food preparation, treating pandanus and weaving.

The Airport also provides an important access for disaster relief activities most recently evidenced through the support and supply of provisions that arrived following Cyclone Ian in 2014.

5 Consultation & Stakeholder Engagement

5.1 Background and Approach

As required by WB Safeguard Policies consultation and disclosure of Category B projects must be undertaken with project affected groups (stakeholders) and non-government organisations (NGO).

The potential environmental and social impacts of the project require the opportunity for discussion and review during the environmental assessment/ESMP process to inform detailed design and mitigation measures.

The ESMP remains a draft until public disclosure and consultation has been completed. This will allow for the ESMP to be updated with details of consultation and disclosure as and when this is completed. Disclosure and consultation will be the responsibility of MOI.

5.2 Outcome of Consultation

Table 5.1 presents a summary of the public consultation meetings held on Ha'apai. A total of 2 meetings with Government officials and 6 public consultation meetings were held with key villages located across the main Island of Lifuka including Koulo Village, considered to be potentially the most affected by construction and operational activities of the Airport, and a women's weaving group. A total of 79 people attending the meetings with a fairly even gender split.

Table 5.1: Summary of the meetings held in Ha'apai

Date	Village/Government	Gender	
		Male	Female
06.06.18	Ha'apai Governor & Town Officers	6	-
	Weaving Women's Group	-	3
	Ha'ateihosi'i	4	9
	Faleloa	6	9
	Koulo	9	4
	Pangai	8	3
07.06.18	Vahe Foa	12	5
	TAL	1	

Appendix 6 presents the Land Due Diligence Report which details the outcome of the public consultation process. The only village where a comment was made on the Project was at Koulo Village located directly adjacent where it was stated that they understood that there was an urgent need for the Project. They were advised that work would commence as soon as approvals and funds were in place. No gender-specific issues were raised.

In several of the other village meetings it was mentioned that they were in support of the overall Project including the Road and Ports Projects.

No issues were raised that needed to be addressed by way of mitigation measures.

5.3 Disclosure

Disclosure is about transparency and accountability through release of information about the project and does not equate to consultation (and vice versa). This ESIA / ESMP document will be made available on the WB Infoshop website and in hard copy at Government offices and community centres on Tonga (most applicable and accessible).

6 Assessment of Potential Impacts, Risk & Mitigation Measures

6.1 Introduction

The TCRT Project has the potential to create a variety of impacts. These potential impacts are either positive or negative depending on the receptors involved. The impact of this project on the social, ecological and physical environment has been assessed using methodology described in this chapter.

The impact assessment process initially involves identification of the project's activities and potential environmental and social impacts resulting from each activity during the project phases. A project activity could include site preparation, construction, reinstatement, operation and maintenance.

This ESIA document defines an impact as "*any change to the physical, biological or social environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services*".

This section provides an assessment of the potential construction and operational impacts of the proposed TCRT Project on the physical and ecological and socio-economic resources on and adjacent to the site. Potential impacts have been identified and evaluated as to whether they are adverse, positive, or have a negligible or neutral impact. These issues are discussed in the following sections in relation to proposed Project activities.

6.2 Construction Impacts

Potential biophysical impacts during construction include the following:

- Risks from invasive species in imported aggregate material.
- Risks to marine environment if barged aggregate is landed anywhere else other than the existing Port facility.

Key potential negative social & socio-economic impacts identified are as follows:

- Dust and noise impacts arising during Airport works in Koulo Village. Note that resurfacing is not an overly noisy or dusty process. The aircrafts that arrive daily are far noisier although potentially not as likely to create a disturbance due to the sporadic nature of flight arrivals. Of potentially more concern are the reversing sounds of operating machines, a Health & Safety requirement. Overall, the potential impact is considered significant. In addition, no adverse impacts to airport staff or passengers are anticipated given the short-term exposure to the operation and the fact the process is not inherently noisy or dusty.
- Vibration impacts are considered to be minimal as any underlying limestone layer, which could potentially convey vibrations, will not be disturbed during resurfacing.
- Runoff of hydrocarbons in stormwater from the newly laid surface. Potential impacts arising from this is considered minimal given resurfacing is typically completed in the dry and the surface hardens as the hydrocarbons in the mixture evaporates relatively quickly after the chip seal is laid minimising potential for runoff. In addition, the grass strip along the the edge of the runway has the potential to absorb small amounts of hydrocarbon runoff should it occur.
- Lighting impacts on Kuolo Village if the construction area is floodlit during night-time works undertaken to avoid Airport operational issues.
- Lack of locally available aggregate for chip sealing requiring material to be imported from Tongatapu.
- Management of any waste generated on site.
- OHS.

6.3 Operational Impacts

Potential biophysical impacts following completion of the proposed works are similar to that of the existing operational runway and as they will be unchanged as a result of the works are not considered further.

A range of potential positive social & socio-economic impacts can be identified as follows:

- Employment opportunities due to the need for local labour.
- Potential for increased income to tourism activities in Ha'apai as a result of improved access.
- Provision of an upgraded surface of a design life of 10 years that is resilient to the potential impacts of climate change such as increased rainfall and temperatures, elevated water table beneath the site, etc.
- A runway that is more resilient to the effects of heavier aircraft arrivals in the event of a future requirement for disaster relief.
- Improved public safety due to the provision of a new surface that is less likely to damage planes during take-off and landing.

6.4 Risk Assessment & Impact Identification Methodology

Risk Assessment is routinely undertaken as part of the ESIA process. In assessing a projects environmental risk, impacts are rated to determine the appropriate response or management actions that should be implemented to minimise potential impacts. The risk assessment methodology for the TCRT Project is described in this Section.

An EMP[14] has been prepared for the Transport Sector Consolidation Project which outlines an approach to assessment of risk that has been previously agreed with]MEIDECC. To ensure consistency the same approach to risk management has been adopted for the assessment of risk for this Project whereby the level of risk posed by the activities associated with the Project is assessed and is based on the following: the likelihood or probability of an event; and the consequences of the impacts of that event occurring (see Table 6.1).

Table 6.1: Qualitative risk analysis matrix

	Consequence				
	1	2	3	4	5
Likelihood	Severe	Major	Moderate	Minor	Negligible
A - Almost Certain	E	E	H	M	M
B – Likely	E	H	H	M	L
C- Possible	H	H	M	M	L
D – Unlikely	H	M	M	L	L
E - Rare	M	M	L	L	L

Risk Map Colour Code
E = Extreme
H = High
M = Moderate
L = Low

This is a conventional risk management framework and is considered applicable in the context of this assessment which has a focus on high level identification of biodiversity and ecosystem services risks. The ESIA process will provide detail on these risk areas as appropriate.

There are four main levels of risk after combining the 'likelihood' and 'consequences' factors (see Tables 6.2 & 6.3).

Table 6.2: Qualitative measures of likelihood

[14]MOI 2018. Environmental Management Plan. Transport Sector Consolidation Project, Additional Financing. Revised Version. Ministry of Infrastructure, Kingdom of Tonga. 18 January 2018.

Level	Descriptor	Example	Frequency
A	Almost certain	Is expected to occur in most circumstances	> Once per year
B	Likely	Will probably occur in most circumstances	Once per year
C	Possible	Could occur	Once every 5 years
D	Unlikely	Could occur but not expected	May happen within Project life
E	Rare	Occurs in only exceptional circumstances	Not likely to happen within Project life

Source: Modified from *Environmental Risk Management – Principles and Process. HB 203:2006* (Standards Australia/Standards New Zealand, 2006).

Each level has a response or management control action. The four 'Risk Levels' are:

- Extreme (E) Risk - those impacts that require immediate action at the highest level of management.
- High (H) Risk - those impacts requiring action at senior management level.
- Moderate (M) Risk - those that require policies in place to address impacts and monitoring programs.
- Low (L) Risk - those impacts that do not require any specific management actions but may be part of routine management and monitoring plans.

In cases of "E", "H" and "M" Risks, mitigation measures are identified to reduce the level of residual Project risk as shown in Table 6.3.

6.5 Outcome of Risk Assessment & Impact Identification

Table 6.4 presents the results of the risks associated with the proposed TRCT Project. Key points in relation to identified 'Extreme' and 'High' Risk Project activities are outlined in the following Sections of this Report.

Table 6.3: Qualitative measures of magnitude

Rating	Project Objectives	Financial	Safety	Environment	Compliance	Reputation
Severe	Failure to meet all three objectives with termination of project.	Cost over-run by 25% or financial loss greater than TOP1M.	Fatality or permanent significant disability, long term impairment or illness significantly affecting the quality of life for an employee, contractor or member of the public.	Permanent impacts to populations of significant flora or fauna (e.g. threatened), highly significant heritage items, complete removal of habitat or significant impairment of ecosystem function.	Claim or action could be brought in the Courts; and	Court, regulator or Government/ Cabinet inquiry concludes improper, corrupt or grossly negligent conduct.
					Regulators could bring prosecution and penalties (and potential imprisonment for individuals); and	Other action by MOI results in termination of Minister or CEO.
Major	Project substantially fails to meet one objective of the project	Cost over-run between 15-25% or financial loss between TOP500 and TOP1M.	Long term or permanent disability, impairment or illness not significantly affecting the quality of life for an employee, contractor or member of the public.	Medium-long term (>10 years) physical impacts likely to cause impacts to flora/fauna populations, or direct impacts to flora / fauna populations. Adverse impacts to significant heritage items.	Claim or action could be brought in the Courts; and	Action by MOI results in one or more Executives or senior managers being terminated.
	Project requires restructuring to meet revised project objectives				Regulator could bring prosecution for which the penalty (and potential imprisonment for individuals).	Government or Cabinet inquiry into our actions or operations.
						Prolonged and negative national media attention.
Moderate	Project does not meet the target(s) of at least one indicator for the project objectives	Cost over-run between 5% - 15% or financial loss between TOP100,000 - TOP500,000.	Hospitalisation with medical intervention of an employee, contractor or member of the public.	Medium term (3-10 years) impacts on populations of native flora / fauna including loss of individuals of threatened species, Significant impacts on physical environment.	Claim or action could be brought in the Courts; &	Short term negative national media attention.
	Project requires time extension to meet project objectives				Regulator could bring prosecution for which a penalty or fine for an individual.	Regulator conducts formal inquiry.
						Prolonged and negative media attention.
Minor	Project fails to meet intermediate results, but could with intervention, meet the project objectives	Cost over-run less than 5% or financial loss between TOP10,000 and TOP100,000.	Injury or illness requiring medical treatment of an employee, contractor or member of the public.	Short term (1-3 years) direct impacts on physical environment (water, soil, air) that may impact on flora or fauna. Loss of individuals of common native flora or fauna. May extend outside of work area.	Claim or action could be brought in the Court; and	Formal complaint made to a Regulator.
					Regulator could issue an enforcement or penalty notice.	Short term negative media attention.
Negligible	Intervention required to meet targets and results to achieve project objectives	Financial loss less than TOP10,000K.	Nil to first aid injury, low level short term inconvenience or symptoms for an employee, contractor or	Low-level direct impacts on physical environment (water, soil, air) within work area.	Offence is merely reportable; and/or	Negative comment about MOI at Cabinet level.
				Impacts easily remedied.	Regulator could issue a warning notice.	Formal complaint made to MOI.

Rating	Project Objectives	Financial	Safety	Environment	Compliance	Reputation
			member of the public.	No identifiable impact on flora or fauna.		

Table 6.4: Issues & risk assessment

Activity	Source of Risk	Description of Potential Impact	Assessment of Risk			Mitigation	Post-Mitigation Residual Impact
			C	L	Rating		
A. DESIGN							
1. Climate Resilience							
Runway resurfacing	Runway surface	Deterioration of runway surface as a result of change in climatic and groundwater conditions	3	A	H	Runway designed to withstand potential impacts of climate change such as increase in level of water table, increased rainfall and temperature impacts	M
		Ponding of surface water during heavy rainfall. Lack of adequate drainage exacerbates ponding issue	2	B	H	Ensure new runway surface is designed to minimize ponding water and adequate drainage is provided	M

Activity	Source of Risk	Description of Potential Impact	Assessment of Risk			Mitigation	Post-Mitigation Residual Impact
			C	L	Rating		
B. CONSTRUCTION							
1. Ecological							
Transport of coral aggregate for chip-sealing works from approved Tongatapu quarry	Existing terrestrial ecological community on Ha'apai	Risks from invasive species in imported material	3	B	H	Contractor to ensure quarried material is free of topsoil and weed species	L
	Existing terrestrial ecological community on Ha'apai	Risks to marine environment from barge landings	3	B	H	Contractor to ensure all material is unloaded at the existing port facility	L
2. Groundwater							
Resurfacing of runway	Groundwater lens beneath the site	Hydrocarbons migrating offsite into groundwater beneath the sites	1	A	E	Contractor to ensure all works undertaking during periods of fine weather. All work to cease if rain is forecast.	M
3. Lighting							
Lighting of work areas at night	Local community	Lighting impacts arising from night time works on local residents	3	A	H	Contractor to ensure directional lighting used to minimize potential light spillage when works are being undertaken close to residences	L

Activity	Source of Risk	Description of Potential Impact	Assessment of Risk			Mitigation	Post-Mitigation Residual Impact
			C	L	Rating		
B. CONSTRUCTION							
4. Waste Management							
Construction waste	Local community / environment	Potential impacts resulting from inappropriate disposal	3	A	H	Contractor to dispose of all material at a licensed facility	L
5. Continued Airport Operation							
Construction activity	Airport operational activities	Conflict between airport operation and construction activities	1	B	E	Contractor to take into account airport operations during runway works	M
6. Noise							
Construction activity creating highly localized noise disturbance	Contractors	Noise impacts on Contractors workers	3	A	H	Contractor to ensure workers provided with PPE including ear protection.	L
Construction activity at night creating highly localized noise disturbance	Local community	Noise disturbance to local community	3	A	H	Contractor in ensure night time works are in areas remote from local residences	L
A. OPERATION							
1. Climate Resilience							
Runway resurfacing	Runway surface	Deterioration of runway surface as a result of change in climatic conditions	2	B	H	Runway constructed to design standards to withstand potential impacts of climate change	M

6.6 Residual Risk Matters

All of the “Extreme“, “High“Risk matters identified in Section 6.5 of this ESIA are resolved to a “Low“ or “Medium“ Risk category by application of mitigation measures (which will be included in the ESMP set out in Section 7).

As a result all key Project risks are able to be mitigated.

6.7 Cumulative & Induced Impacts

Cumulative impacts are those that result from the successive, incremental and/or combined effects of an action, project of activity.

It is envisaged that the TCRT Project will not result in any long term adverse impacts to any identified environmental or social resources.

No adverse cumulative or induced impacts are expected for any phases of the various Projects.

7 Environmental & Social Management Plan

7.1 Introduction

The ESMP is outlined in Table 7.1 which identifies the mitigation measures that the Executing Agency (MOI) has committed to implement for the design construction and operational period of the project. This ESMP will inform the Contractor's ESMP to be prepared following detailed design.

7.2 Performance Indicators

Given that nearly all of the potential negative impacts would occur during the construction period, and that robust environmental contract clauses will be able to avoid all impacts, key performance indicators will be as follows:

i) Confirmation that the ESMP tasks are defined as specific individual or grouped environmental and social clauses in contract bid documents.

ii) Confirmation that environmental management criteria are included as part of the contractor selection process, including their experience preparing and implementing ESMPs, etc;

iii) Safeguards advisors retained by the Contractor and by the PMU to provide assistance with ESMP implementation, contractor briefing on habitat protection, contractor ESMP supervision (including observations during construction), and participation in community consultation;

iv) A written record of the briefing on safeguards according to tasks defined in the ESMP and contract specification as soon as contractors have been selected.

v) Compliance monitoring checklists prepared and being used by the contractor and safeguards consultant and due diligence notes, completed as defined in the ESMP, and making the notes available in an easily accessible file for the contractor, Technical Coordinator, PMU Project Manager and others to use.

vi) Preparation of a completion report, identifying mitigation measures defined in the ESMP, their implementation timing and any follow up actions; and,

vii) A written record of all interviews and consultations.

The safeguards advisor will be responsible for preparing a performance indicator report on behalf of the PMU, by listing the seven items above and provide a short text to indicate how these items were implemented and their success as of the start of the operating period of the project.

7.3 Implementation Arrangements

The Ministry of Finance and National Planning is the Executing Agency and the MOI is the Implementing Agency. The MOI is responsible for the management of all activities, including procurement, financial management, and reporting.

7.4 Institutional Capacity

The successful implementation of this project will depend on the management of the environmental and social impacts, in addition to the effective management of construction and operational processes. These roles and responsibilities fall under MOI and MEIDECC.

MOI will require environmental awareness training for monitoring the Contractors' implementation of the ESMP. Project management staff will have overall responsibility to ensure safeguard compliance in the preparatory and construction phase and will work in collaboration with the Government staff with regard to safeguard requirements.

An Environmental Assessment Committee (EAC) has been established in 2013 with the responsibility for enforcing the EIA Act. This committee has the responsibility of ensuring that all regulations are adhered to and is also responsible for managing the EIA application and reporting processes. The forming of the EAC shows a level of commitment from

MEECCDMMIC to ensuring that development in Tonga is done in consideration to the environment and while there are budgetary constraints to consider, the EAC team has already been active in enforcing regulations in the island groups.

The EAC is still very much dependent on self-regulation in adhering to the EIA regulations and processes. MOI has already committed itself to the correct EIA processes as outlined in Section 4 of this assessment and the EAC is aware of the project. The onus will be on MOI to ensure that they are following correct processes to obtain their environmental permit. The EAC will use this ESIA report to inform MOI of their conditions of permit and any monitoring requirements. It will then be the responsibility of MOI, as the proponent, to facilitate the EAC in their stipulated monitoring requirements which usually includes on-site inspections and monitoring parameters as per the EIA recommendations.

As MOI is committed to the EIA process, this will act as a capacity development tool for the new EAC and the MEECCDMMIC. No direct involvement is required from the Ministry as the project develops, so no additional capacity building is required.

A safeguards consultant will fill the gap in institutional safeguards capacity. The safeguards specialists will also assist to build capacity for implementation of safeguards instruments during supervision missions.

7.5 Mitigation Costs

The cost of a part time safeguards advisor to implement the ESMP and monitor the Contractor's ESMP is budgeted at $NZ50,000. This work would include all reporting and contractor briefing. Mitigation measures, where required to be implemented, are detailed in the ESMP.

Table 7.1: Environmental and Social Management Plan

PARAMETERS	POTENTIAL IMPACT	MITIGATION MEASURES	LOCATION	IMPLEMENTATION	SUPERVISION
1.0 Pre-Construction Period (Planning and design actions to prevent future impacts)					
1.1 Socio-Economic Environment					
General Grievances	Minor concerns/issues developing community/airport workers resentment due to unaddressed project related concerns	Establishment of grievance redress mechanism prior to commencement of civil works and making this known to villages before work begins. Contractor to install a comments box in the Airport to receive complaints, manage information and follow-up.	Koulo Village/Airport	Contractor	Safeguards advisor
Climate resilience	Deterioration of runway surface as a result of change in climatic and groundwater conditions	Runway designed to withstand potential impacts of climate change such as increase in level of water table, increased rainfall and temperature impacts	Ha'apai	Contractor	Safeguards advisor
Stakeholder engagement (SEP)	Information sharing throughout the life of the project Prepare stakeholder engagement plan to ensure information on the project is shared with all stakeholders.	Implement stakeholder engagement plan to ensure information on the project is shared with all stakeholders. Activities to continue throughout the life of the project.	All project locations	MOI Construction Contractor	Safeguards advisor
2.0 Construction Period (Impacts associated with the work)					
2.1 Bio-physical Environment					
Terrestrial ecology	Invasive species in aggregates	Contractor to ensure quarried material is free of topsoil and weed species	Tongatapu / Ha'apai	Contractor	Safeguards advisor
2.2 Socio-Economic Environment					
Aggregate transport	Marine ecological impacts from barge landings	Contractor to ensure barges carrying aggregate are unloaded at existing Port facilities	Ha'apai	Contractor	Safeguards advisor
Aggregate storage	Conflict arising as a result of inappropriate stockpiling of material	Contractor to ensure material is stored on Government property	Ha'apai	Contractor	Safeguards advisor
Noise	Impact on workers	Contractor to ensure workers provided with PPE including ear protection.	On site	Contractor	Safeguards advisor
	Impact on local community during works at night	Contractor in ensure night time works are in areas remote from local residences	On site	Contractor	Safeguards advisor

2.2 Socio-Economic Environment					
Lighting	Impact on local residents	Contractor to ensure directional lighting used to minimize potential light spillage when works are being undertaken close to residences	On site	Contractor	Safeguards advisor
Construction waste	Potential impacts resulting from inappropriate disposal	Contractor to dispose of all material at an licensed facility	Ha'apai	Contractor	Safeguards advisor
Groundwater	Pollution of groundwater used for drinking water purposes	Contractor to undertake all works in the dry to avoid potential egress of hydrocarbons into underlying groundwater. Works to be based on rain forecast.	Ha'apai	Contractor	Safeguards advisor
Construction activity	Conflict between airport operation and construction activities	Contractor to take into account airport operations during runway works	Ha'apai	Contractor	Safeguards advisor

2.0 Operational Period (Impacts associated following completion of the work)					
2.1 Bio-physical Environment					
Climate resilience	Deterioration of runway surface as a result of change in climatic and groundwater conditions	Runway constructed to designs which withstand potential impacts of climate change	Ha'apai	Contractor	Safeguards advisor

8 Grievance Redress Mechanism

8.1 Grievance Redress Process

A grievance redress mechanism (GRM) is presented below to ensure the Project's social and environmental safeguards performance. The purpose of the GRM is to record and address any complaints that may arise during the implementation phase of the project. The GRM is designed to address concerns and complaints promptly and transparently with no impacts (cost, discrimination) on project affected people (APs). The GRM works within existing legal and cultural frameworks, providing an additional opportunity to resolve grievances at the local, project level.

The key objectives of the GRM are:

- Record, categorize and prioritize the grievances;
- Settle the grievances via consultation with all stakeholders (and inform those stakeholders of the solutions)
- Forward any unresolved cases to the relevant authority.

As the GRM works within existing legal and cultural frameworks, the GRM will have community, project and RMI judiciary level redress mechanisms. Details of these components are described as follows.

8.2 Grievance Redress Mechanism

Many project related grievances are minor and site-specific. Often they revolve around nuisances generated during construction such as noise, dust, vibration, workers disputes etc. These grievances may be community-specific or may relate to airport workers and users of the Airport facility.

For Project activities in Ha'apai, the Project Contact Person (PCP) within the MOI PMU will receive, review, record and address project related complaints.

In practice not many complaints are expected with potential some complaints likely to be associated with construction impacts. Most will be received directly on site by the Contractor's Site Supervisor (CSS) who will endeavour to resolve them satisfactorily on site. To facilitate the complaints process is recommended that a 'comments' box be placed in Pilolevu Airport to facilitate the complaints receival process. The CSS will be responsible for administering this process.

The CSS will inform the MOI Contact Person who will relay to the PCP at MOI/PMU the complaints and outcomes, and of others not satisfactorily resolved. At this point the PCP should take over.

The PCPs will, on receipt of each complaint, note date, time, name and contact details of the complainant, and the nature of the complaint in the Complaints Register. The PCP will inform the complainant of when to expect a response. They will then address the complaint to the best of their abilities, as quickly as possible. Should the PCP not be able to resolve the complaint to the satisfaction of the affected persons, they will then refer the complaint directly to the MOI Project Manager (PM).

Complaints referred to the MOI PM will require him/her to take earnest action to reach a resolution. The aggrieved party will be informed of the course of action being taken, and when a result may be expected. Reporting back to the complainant will be undertaken within a period of two weeks from the date that the complaint was received.

If the complaint is not resolved to the satisfaction of the aggrieved party, the complaint will then be referred by the MOI Secretary to the National Steering Committee (NSC). The NSC will be required to address the concern within 1 month.

Should measures taken by the National Steering Committee fail to satisfy the complainant, the aggrieved party is free to take his/her grievance to the Ombudsman's Office, and the Ombudsman's decision will be final.

It is rare for a complaint to be unresolved after the Ombudsman's decision. However, the very last resort will be redress in the Courts.

Appropriate signage will be erected at works sites providing the public with updated project information, summarising the GRM process and including contact details of the PCP. In addition, a comments box should be placed in the Airport facility as an additional avenue to receive complaints. Anyone is able to lodge a complaint and the methods (forms, in person, telephone, forms written in Tongan) should not inhibit the lodgement of any complaint.

The Complaints Register will be maintained by the PCP, who will log:

i) details and nature of the complaint;

ii) the complainant name and their contact details;

iii) date;

iv) corrective actions taken in response to the complaint.

This information will be included in MOI's progress reports to the Bank.

Table 8.1 and Figure 8.1 outline the Project level grievance redress process.

8.3 Judiciary Level Grievance Redress Mechanism

The project level process will not impede affected persons access to the legal system. At any time, the complainant may take the matter to the appropriate legal or judicial authority as per the laws of Tonga.

Table 8.1: Grievance Redress Process – Project level

Stage	Process	Duration
1	The Aggrieved Party (AP) will take his/her grievance to Construction Site Supervisor (CSS) who will endeavor to resolve it immediately. Where AP is not satisfied, the CSS will refer the AP to the Project's Contact Person (PCP). For complaints that were satisfactorily resolved by the CSS, he/she will inform the PCP and the PCP will log the grievance and the actions that were taken.	Any time.
2	On receipt of the complaint, the Project PCP will endeavor to resolve it immediately. If unsuccessful, he/she then notify PMU Project Manager	Immediately after logging of grievance.
3	The PMU Project Manager will endeavor to address and resolve the complaint and inform the aggrieved party. The Project Manager will also refer to the MOI Project Manager other unresolved grievances for his/her action.	2 weeks.
If the matter remains unresolved, or complainant is not satisfied with the outcome at the project level		
4	The MOI Project Manager, will then refer matter to the National Steering Committee (NSC) for a resolution.	1 month.
5	If it remains unresolved or the complainant is dissatisfied with the outcome proposed by the NSC, he/she is free to refer the matter to the Ombudsman's Office.	Anytime.
7	If the issue remains unresolved through the Ombudsman's decision then the ultimate step will be for the Courts or Land Court respectively to deliberate. All decisions are final at this point.	

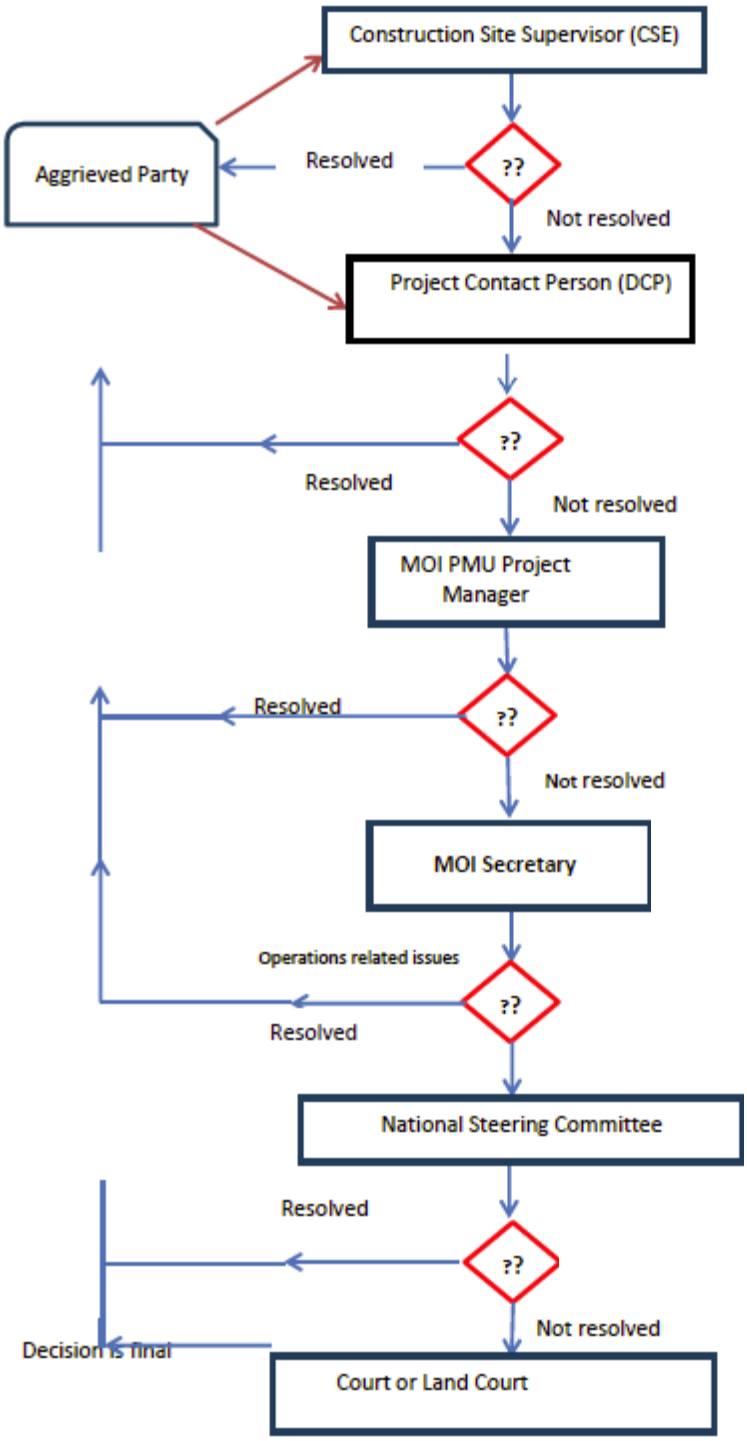

Figure 8.1: Flow Diagram showing Project level Grievance Redress Mechanism