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Pacific Aviation Investment Program (PAIP)

Environmental & Social Management Plan - Fua'amotu International Airport (TBU) Final Draft

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Environmental & Social Management Plan - Fua'amotu International Airport (TBU) Final Draft

Client: Tonga Airports Limited

Co No.: N/A

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D	21-Nov-2013	Final	Craig Ridgley Aviation Director	
E	27-Oct-2015	Draft Update to Include ATCT	Bill Andrew Team Leader Aviation	

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Glossary and Abbreviations

ºC	Degrees Celsius
ACM	Asbestos Containing Material
ADS-B	Auto Dependent Surveillance – Broadcast
AGL	Aeronautical Ground Lighting System
ARFF	Airport Rescue and Fire Fighting
ATC (ATCT)	Air Traffic Control (Air Traffic Control Tower)
ATR	Twin-engine turboprop short-haul regional aircraft built by the French-Italian aircraft manufacturer ATR
AWS	Automatic Weather Station
CAD	Civil Aviation Directorate
Category B	World Bank categorised projects with potential limited adverse social or environmental impacts that are few in number, site-specific, largely reversible, and readily addressed through mitigation measures.
CLSM	Controlled Low Strength Material
DME	Distance Measuring Equipment
DVOR	Doppler VHF Omnidirectional Radar
EHS	Environmental, Health and Safety
ESMP	Environmental and Social Management Plan
FOD	Foreign Object Debris
GDP	Gross Domestic Product
GOT	Government of Tonga
HAT	Highest Astronomical Tide
HIV/ AIDS	Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome
IATA	International Air Transportation Association
ICAO	International Civil Aviation Organisation
IUCN	International Union for Conservation of Nature
km	kilometre
LED	Light Emitting Diode
m/ m^2/ m^3	Metre/ square metres (area)/ cubic metres (volume)
MECC	Ministry of Environment and Climate Change
MEWAC	Ministry of Education, Women's Affairs and Culture
MOH	Ministry of Health
MOI	Ministry of Infrastructure, an amalgamation of the Ministry of Transport (which in turn is the merger of the Ministry of Marine & Ports and Ministry of Civil Aviation), and Ministry of Works.
MOWP	Method of Works Plan
NGO	Non-Governmental Organisation

NZAid	New Zealand Government's Aid Programme
NZBC	New Zealand Building Code
NZCAA	New Zealand Civil Aviation Authority
OLS	Obstacle Limitation Surface
PAPI	Precision Approach Path Indicator
PAIP	Pacific Aviation Investment Program
PCN	Pavement Classification Number
PIB	Project Information Bulletin
PMU	Project Management Unit
PV	Photovoltaic
PVC	Polyvinyl Chloride (type of plastic)
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
SIT	Series Isolation Transformer
SPREP	South Pacific Regional Environmental Program
Stakeholder	Project stakeholders are all people directly or indirectly, negatively or positively impacted by the project; that are important to make the project successful, or that may oppose the project or that have a vested interest.
TAIP	Tonga Aviation Investment Project
TAL	Tonga Airports Limited
TANGO	Tonga Association of Non-Governmental Organisations
TBU	Fua'amotu International Airport
TFSU	Technical and Fiduciary Services Unit responsible for coordinating implementation across all activities for the PAIP. The TFSU is based at Tonga Airports Ltd and is comprised of fiduciary, procurement and technical staff. The TFSU leads the procurement activities on the PAIP, with inputs from the countries (Kiribati, Tonga and Tuvalu).
TMP	Traffic Management Plan
TOP	Tongan Pa'Anga (currency)
TOR	Terms of Reference
UHF/ VHF	Ultra-High Frequency/ Very High Frequency
WAL	Waste Authority Limited
WB	World Bank
WDI	Wind Direction Indicator

Executive Summary

The Tonga Aviation Investment Project (TAIP) was established to carry out the upgrade activities as identified in the Pacific Aviation Investment Program (PAIP) funding loan from the World Bank (WB). The TAIP aims to provide safe and secure air transport operations and environmentally sustainable and efficient airports in Tonga. All components of the TAIP are required to meet ICAO standards and recommended practices, as well as airline safety standards. This Environmental Management Plan (ESMP) has been prepared for the Fua'amotu International Airport (TBU) TAIP project components which are listed below and to meet with funding and Tongan legislative requirements.

- Runway pavement rehabilitation
- Upgraded terminal
- Upgraded runway lighting and navigational aids
- New Air Traffic Control Tower

Tonga Airports Limited (TAL) manage airport operations and are responsible for compliance with national and international civil aviation requirements.

This ESMP looks to outline the potential environmental and social impacts and the measures needed to prevent, minimise, or mitigate adverse impacts and improve environmental performance for the TAIP project components.

Overall the TAIP is a Category B project under WB environmental and social screening guidelines and requires development of the project ESMP. Category B projects have potentially limited adverse social or environmental impacts that are few in number, site specific, largely reversible, and readily addressed through mitigation measures. This ESMP is a dynamic document to be updated if there are changes to the project scope, detailed designs, or if further information becomes available as a result of consultation with stakeholders and the community. The objective of the ESMP is to provide a framework for managing the airport upgrade works in a manner that incorporates the principles of environment sustainability while minimising potential adverse effects on the local community and the environment.

This ESMP includes information on mitigation, monitoring, capacity development and training, and implementation costs (in accordance with WB Operational Policy 4.01 Environmental Assessment). The majority of potential adverse impacts will occur during the construction phase of the TAIP. However given that this primarily involves the rehabilitation of existing infrastructure, mitigation measures should be able to alleviate or lessen any potential negative impacts. The key potential impacts that are being mitigated are:

- Solid waste generation
- Soil erosion through vegetation clearing and excavation
- Hazardous materials handling and storage (potentially including asbestos and hydrocarbon contaminated soils)
- Noise and vibration disturbances from machinery and construction activities
- Air pollution from dust and equipment
- Traffic disruption during construction activities
- Transport of equipment and materials from the port and around Tongatapu
- Disposal of waste materials
- Safety hazards for workers and users of the facilities where upgrades are occurring
- Water demand management for freshwater resources
- Wastewater discharges
- Construction camp establishment and dis-establishment

This ESMP is designed to address these issues through:

- Implementation of this ESMP through the Contractor's ESMP.

- Regular supervision and monitoring of the implementation of the ESMP (refer ESMP monitoring plan).

1.0 Introduction

1.1 Background

The Pacific Aviation Investment Program (PAIP) is funded by the World Bank (WB) and has the development objective to (i) improve the safety, security, efficiency, management and environmental sustainability of airports, and (ii) improve regional harmonization of aviation safety standards. Phase I of the Program, for which this Environmental and Social Management Plan (ESMP) is prepared, includes Kiribati, Tonga and Tuvalu. This site specific ESMP has been developed for project work at Fua'amotu International Airport (TBU) on Tongatapu.

Tonga has a large expatriate community and the aviation sector provides the link between friends and relatives at home in Tonga and those living elsewhere. Some 40% of passengers are visiting friends and relatives. Tonga also plays a key role in search and rescue (SAR) covering the Cook Islands, Fiji, and Samoa. Tonga's geographical location within the region includes agreements with regional neighbours (e.g. Fiji, Niue, and New Zealand).

Under the Government of Tonga's Transport Sector Consolidation Project (TSCP), aviation investments and high priority safety and security requirements for selected airports were identified. Funding was requested from the WB under the PAIP. The aviation components are implemented under the Tonga Aviation Investment Project (TAIP). In February 2011 an overarching EMP (Tonga Airports Limited and Ministry of Public Enterprises, February 22, 2011. *Environmental Management Plan for Tonga Aviation Infrastructure Investment Project*) was published for all components of the TAIP. This overarching EMP is in compliance with WB Policy OP/BP 4.01 Environmental Assessment and Tongan national legislation. The overarching EMP provides a framework for mitigation of the projects impacts and development of specific ESMPs for the detailed design and construction stages. Consultation and public disclosure was undertaken during the project preparation phase with details of stakeholders and outcomes included in the overarching EMP. This ESMP builds on the overarching EMP, details environmental impacts and mitigation measures specifically for TBU and incorporates details of the final detailed designs.

Tonga Airports Limited (TAL) is responsible for all airport operations, compliance and infrastructure at TBU.

1.2 TAIP Objective

The TAIP project objective is to provide safe and secure air transport operations and environmentally sustainable and efficient airports which is aligned to the PAIP development objectives.

1.3 Environmental and Social Management Plan Objectives and Scope

The TAIP is a Category B project requiring development of a site specific ESMP. The WB involuntary resettlement policy OP/BP4.12 is not triggered by the components of the TAIP.

This ESMP is a dynamic document to be updated if there are changes to the project scope, detailed designs, or if further information becomes available as a result of consultation with stakeholders and the general public. The objective of the ESMP is to provide a framework for managing the airport upgrade works in a manner that incorporates the principles of environment sustainability while minimising adverse effects on the local community and environment.

To achieve this objective the ESMP outlines the mitigation measures required for avoiding or minimising the potential impacts of the works and provides a monitoring program to confirm effectiveness of the required mitigation measures. Roles and responsibilities are clearly defined for all stages of the project works and their execution. The ESMP also provides the details of how the community and stakeholders are to be engaged and the mechanisms for ongoing consultation and communication.

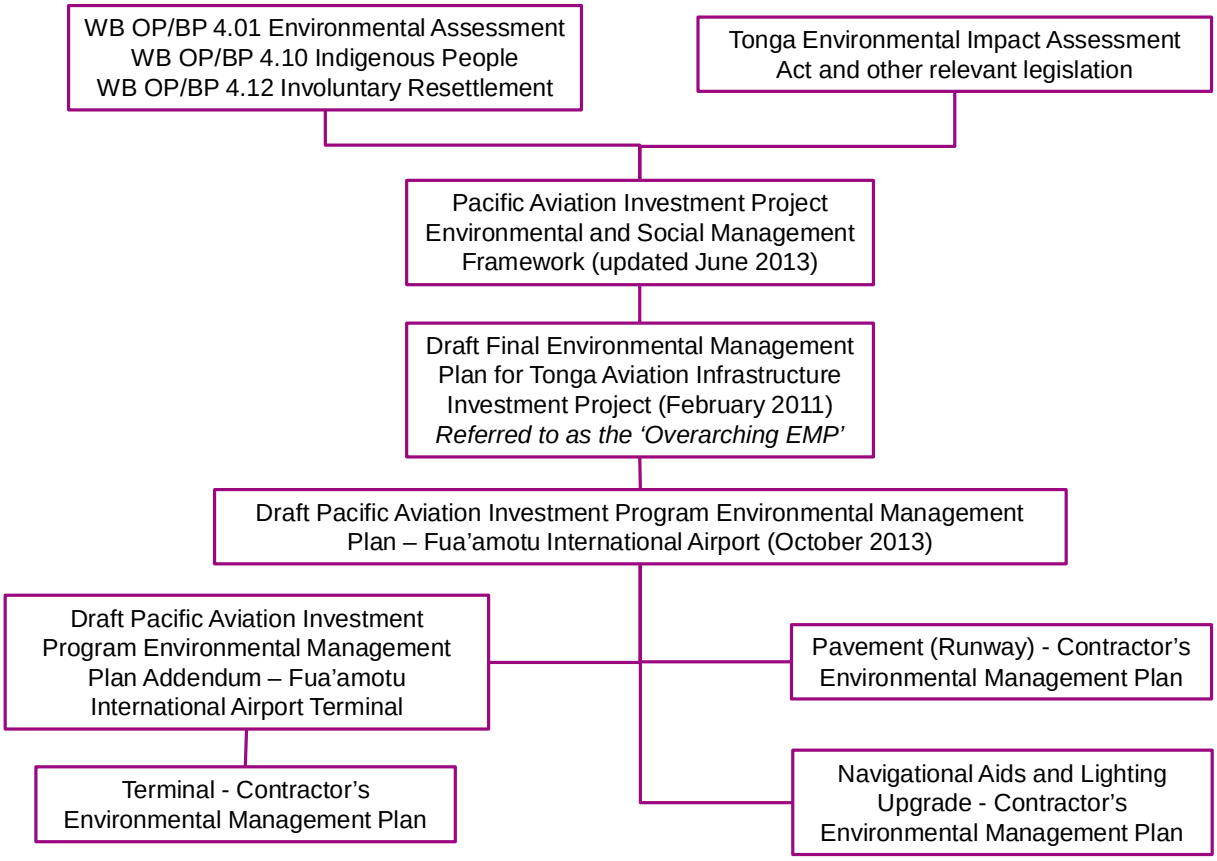
This ESMP is limited to the scope of works as described in Section 2 of this document and addresses impacts and mitigation measures identified at each stage of the project's execution, namely detailed design, construction and operation. This ESMP builds on the impacts and mitigation measures as identified in the overarching EMP which included outcomes of the consultation undertaken to date. This ESMP will be included in the bidding documents for construction contractors and form the basis of the Contractor's ESMP. The mitigation measures identified in this ESMP form the minimum requirement for reducing impacts on the environment as a result of works associated with the project.

1.3.1 Environmental Safeguards Document Hierarchy and Development

The PAIP has an Environmental and Social Management Framework (ESMF) which outlines the key steps and procedures in screening and assessment of environmental and social issues related to the PAIP (generally). The ESMF sets out the principles, rules, guidelines and procedures to assess the environmental and social impacts. It contains measures and plans to reduce, mitigate and/or offset adverse impacts and enhance positive impacts, provisions for estimating and budgeting the costs of such measures, and information on the agency or agencies responsible for addressing project impacts. It defines roles and responsibilities, and provides guidance for the Implementing Agency (IA), Executing Agencies (EA) (respective country's ministries) and the respective countries Civil Aviation Authorities for developing the environmental and social safeguards documents in compliance with respective WB operational policies (namely OP/BP4.01, OP/BP4.12, OP/BP4.10) and respective country environmental requirements

The ESMP is a dynamic document which is updated as and when project scope, detailed designs or further information becomes available, thus creating a hierarchy of documents as the project progresses. The diagram below shows the hierarchy and development of these documents culminating in the development of the contractor's ESMP which specifically details how the contractor will implement requirements of the ESMP. Issues, impacts and mitigation measures identified in superseded ESMPs are incorporated into subsequent versions unless they have been addressed through design or other means, in which case this is identified in the ESMP. Only those documents in the diagram below showing a date have been drafted, all others are either in progress or are yet to start. This ESMP supersedes the overarching EMP and identifies the impacts and mitigation measures that must be implemented in order to manage the identified impacts. The contractors are required to comply with this ESMP and use it to identify what mitigation measures need to be implemented. The contractors ESMPs will document implementation and specific measures that will be used based on their construction methodology (if different from that identified in Section 2.0).

Figure 1 Environmental safeguard document hierarchy



In order to finalise this ESMP for inclusion with the pavement (runway), and navigational aids and lighting contractor procurement bid documents for the TAIP, the information pertaining to the terminal has been left at the draft detailed design stage. An addendum to this ESMP specifically addressing the final detailed design of the terminal will follow when the detailed design phase is finalised and confirmed by TAL.

1.4 ESMP Methodology

The methodology used to develop this ESMP is as follows:

- Review the ESMF and overarching EMP including consultation outcomes to inform the Design and Supervision team of specific issues or items for detailed design.
- Prepare for field survey and organise site visits, inclusive of specific requirements as identified in the overarching EMP and ESMF.
- Conduct field survey using the overarching EMP, ESMF and an environmental screening checklist as a basis for assessment.
- Liaise with the Design and Supervision teams regarding any findings which may influence detailed design.
- Draft the TBU ESMP based on overarching EMP framework and consultation outcomes and update with information obtained from the field survey and detailed designs.
- Submit to Technical and Fiduciary Services Unit (TFSU) and TAL/Ministry of Environment and Climate Change (MECC) for review prior to consultation. Update according to comments and feedback from TFSU and TAL/MECC.
- TAL to undertake consultation to be conducted at TBU, with this site specific ESMP available in hard copy and posted online. Incorporate outcomes as required from consultation into final TBU ESMP to be included in bidding documents.
- Submit to TFSU and TAL/MECC for final review.

A number of PAIP concept design, detailed design and supporting assessment reports have also been reviewed in compiling information regarding the scope of the project and identifying potential effects and mitigation measures. Some of these reports are still in draft form and changes may impact on the type and scale of potential effects and opportunities to avoid these impacts or potential mitigation measures that may need to be implemented. Any changes in these documents should prompt a review of this ESMP and be updated accordingly. The documents are listed as follows at the stage of development at the time of writing this version of the ESMP.

- Pacific Aviation Investment Program Airport PCN Study Report – Fua'amotu, 20 March 2013
- Coral Aggregate Testing Program, PAIP Tonga and Vava'u, 26 July 2013
- Pacific Aviation Investment Program (PAIP) Final Pavement Detailed Design Report – Fua'amotu (D-10) (Version B – with final amendments), 1 August 2013
- Pacific Aviation Investment Program (PAIP) – Tonga, Runway Lighting & Air Navigation Aids Final Detailed Design Report (D-12) (Version B – with final amendments), 5 August 2013
- Pacific Aviation Investment Program (PAIP – Tonga, Draft Final Design Report – Airport Terminals & Security (D-5), 7 August 2013
- Preliminary Conceptual Design for the New Tonga Airport Limited Control Tower. Fua'amotu International Airport Compound, Tongatapu, Prepared by Quality Design Ltd, October 2014

2.0 TBU Upgrade Description of Works

2.1 Overview of Works

The TAIP TBU consists of four primary tasks:

- Airport pavements
- Airport terminal and security
- Airport lighting and navigational aids
- Air Traffic Control Tower (ATCT)

2.1.1 Runway Pavement Upgrade

The runway pavement works at TBU will entail structural overlay on Runway 11-29 and international taxiway, surface enrichment spray treatment to selected areas of Runway 11-29, international and domestic apron and domestic taxiway, and installation of runway end turning bays. The runway 11 turn pad (northern end) will measure 6,400 m^2 and the 29 turn pad (southern end) will measure 4,800 m^2. The runway end turning bays have been sized to accommodate future Code E operations. Initial check at the concept design stage confirmed, whilst very tight, it is possible to turn around a B777 (Code E aircraft most likely to operate into TBU) on the apron noting that it will take out two of the current three parking gates to achieve this.

Fua'amotu airfield was originally built in 1942 by a civilian contractor for the US Army. The facility was intended as a WWII heavy bomber field, and had three coral-surfaced runways. Post WWII the facility was largely abandoned, with the main 11/29 runway subsequently developed for civilian operations in the 1960's.

In the late 1970s the runway was extended to permit jet aircraft operations and was last resurfaced in 1990. The runway surfacing is aged and requires a resurfacing overlay.

Fua'amotu is currently rated for Code 4D operations (B767), though operations are limited by the current runway reliable strength rating or PCN index of 42. The 11/29 Runway surfacing is aged, now 23 years old with clear signs of extensive oxidation of the asphaltic bitumen.

The main 11/29 runway and international apron structural overlay will be dense mix asphaltic concrete. AECOM have evaluated a strengthening strategy; and have assessed that a 65mm structural overlay to the original section of the runway (600m – 2700m) and international taxiway will provide sufficient structural strength to cater for low volume B777 use in line with master planning assessments of passenger volumes for the airport. The revised PCN index post overlay will be PCN 70. All airside surfaces, namely the international apron and extended main runway formation, not receiving an asphaltic overlay are to receive a bituminous surface treatment.

The runway pavement works as described above have been progressed to the final detailed designs. A selection of design plans which best demonstrate the work described are included in Appendix A.

The following volumes of materials have been estimated (subject to change based on any design changes and outcomes of procurement process).

Table 1 Estimated quantities of material required for the runway pavement component of the TAIP TBU (this list is not exhaustive and subject to change)

Material	Unit	Quantity
Aggregates	m^3	100,000
Bitumen	m^3	3,000
Prime Coat	Litres	17,000
Fog Coat	Litres	6,000
Tack Coat	Litres	120,000
RBB Banding	Litres	5,000
White (Paint)	Litres	5,500
Yellow (Paint)	Litres	400

Material	Unit	Quantity
Glass Beads	Tonnes	5.1
In-situ Waste[1]	m^3	8,000

[1] In-situ to waste refers to material (topsoil and vegetation) from excavations and clearance work

2.1.2 Terminal

THE TERMINAL UPGRADES ARE SPECIFICALLY ADDRESSED IN THE EMP-TERMINAL ADDENDUM, DATED 13 JAUNARY 2015

2.1.3 Runway Lighting and Air Navigation Aids

The Aeronautical Ground Lighting (AGL) System upgrade will replace existing AGL lighting units to include power efficient LED type fittings with significant power savings (70% to 80%).

In addition to the runway, taxiway and apron edge lighting systems, the following items have been incorporated into the detailed design scope:

1) Illuminated Wind Direction Indicators – existing units have extensive structural corrosion damage.
2) Illuminated signs for international night operations.
3) Obstruction lights.
4) Runway threshold identification lights at the 11 threshold – these will replace the non-compliant wing bar installations.
5) Alterations to runway lighting to include extended runway end turning bays.
6) Replacement of aerodrome beacon on top of the Air Traffic Control (ATC) tower.

Replacement of the Air Navigation Aids listed below with new equipment:

1) Automatic Weather Station (AWS).
2) Automatic Dependent Surveillance-Broadcast (ADS-B) – currently on hold pending further independent review by the funding agency.

The physical works associated with the AGL and navigation aids will include trenching, pit excavations (for SITs and class D and Class G heavy duty pits), and excavations for foundations of lighting and towers (e.g. AWS). Details of these excavations are provided in Appendix A.

The ducts (trenches) will require a minimum 500 mm cover of compacted controlled low strength material (CLSM) fill. The sand and hardfill required for the backfill of trenches will make use of material from the excavations associated with the trenches, pits and foundations for the AWS pads. Material from other sources (e.g. the beach) will not be used. Concrete mixing will be subject to the requirements of this ESMP.

Old equipment and material associated with the airport navigation equipment which are obsolete and cannot be reused or recycled on island must be removed from island at completion of project works. Some transformers are very old and there is potential for these to contain polychlorinated biphenyls (PCBs). If these transformers are being replaced, handling and disposal should be in accordance with requirements of the Stockholm Convention and validated by a suitably qualified scientist or engineer.

2.1.4 New Air Traffic Control Tower

A new ATCT is proposed in a new location to improve sight lines and compliance under ICAO guidelines. The existing ATCT will remain for training and emergency use. The new ATCT is to be located near the DVOR (Doppler VHF Omnidirectional Range) equipment, approximately 720m northwest of the existing tower and past the newly constructed Airport Rescue and Fire Fighting Station. Preliminary conceptual plans for the site layout and tower design are included in Appendix A with a layout diagram shown in Figure 2 below.

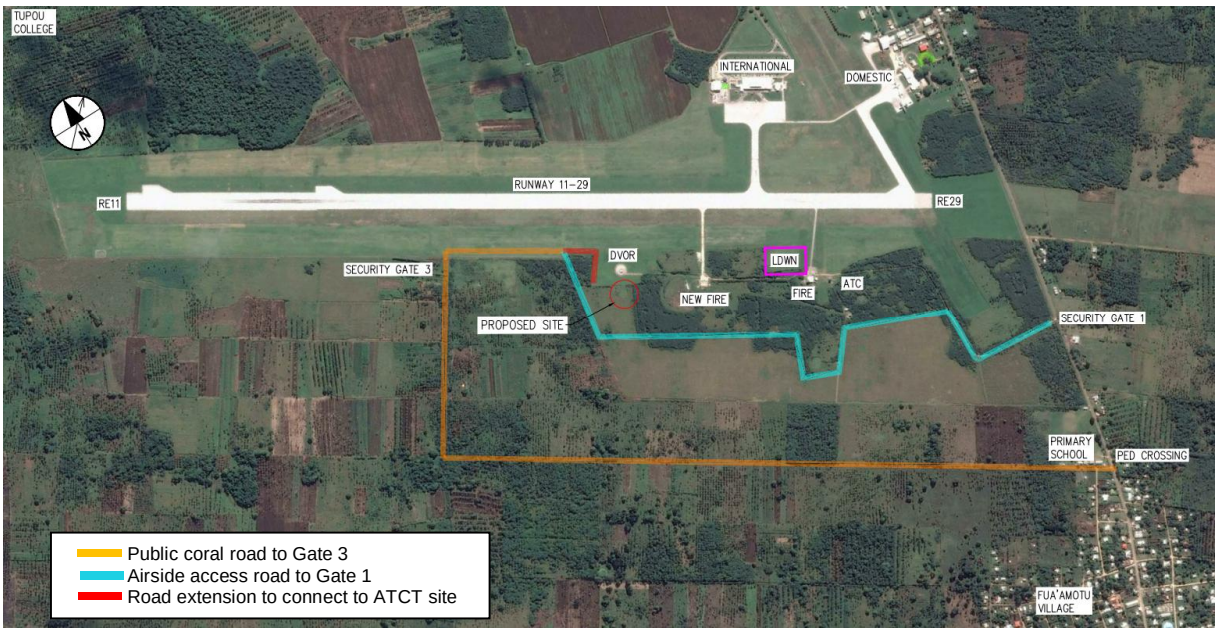


Figure 2 Layout diagram showing the proposed ATCT site (labelled "Proposed Site") in relation to other airport infrastructure

The ATCT footprint will measure 6.9m by 12.5m (86.25m^2) and include five levels with a height of approximately 19m. Facilities will include toilet and shower amenities, storage areas, offices, training room, sleeping quarters, equipment room, evacuation preparation room and the controller cab operations area (level 5a). The ATCT will include two rain water harvest storage tanks and two MOI septic tanks. Exact location of these tanks are to be determined on site however the rain water storage tanks should be above ground and located at least 5m away from the septic tanks. The drainage field of the septic tanks will not be located near the rain water supply tanks. The ATCT will be serviced by 594m^2 of chip seal car parking and 495m^2 of access road (72m long) connecting to the internal perimeter road from the DVOR and fire rescue station.

The ATCT construction will consist of precast concrete walls, stormshield windows on levels 1 to 4 with grey linled laminated hush glass in the controller cab. Aluminium window frames to be commercial heavy duty with very high wind speed resistance grade.

2.2 Alternatives

The airport is existing infrastructure which requires improvements to ensure continued operation. Alternatives regarding design approach and methodology were explored however budgets and constraints around land and natural resource availability limited the selection of design and construction methodology. The designs and proposed construction methodology have been selected based on the most effective use of natural resources, labour, ease of ongoing maintenance, effects on the local environment and community and in the case of the Terminal ability to build onto the design at a later date as and when funds are available.

2.3 Construction Methodology

The runway pavement will most likely be the first component of the TAIP TBU to be started followed by the navigational aids and the construction of the ATCT and terminal. The contracts for the physical works for each component have yet to be awarded so the precise construction methodology is unknown. However the conceptual and detailed designs provide an indication of the nature of the work. The Contractor's implementation ESMP will address specific methodological measures or impacts.

2.3.1 MOWP

The Method of Works Plan (MOWP) is a required document for any major construction works within the boundaries of an airport. The MOWP sets out the operational requirements for maintaining a functioning airport throughout the construction process. It includes the concessions and alternative arrangements that may need to be made (e.g. alternative aircraft parking apron) and staging of the construction process while ensuring the safety and security of all personnel, the community and aircraft and continued operation of the airport throughout

construction works. The existing ATCT will remain operational until the new ATCT is fully commissioned and put into operational service.

2.3.2 Materials and Equipment

The majority of materials and equipment for each component of the TAIP TBU will need to be imported. All cargo whether air or ship will need to be processed in accordance with Tongan quarantine and customs laws which require fumigation (proof of) of materials and equipment and declarations by personnel (specifically regarding communicable diseases).

2.3.3 Aggregate Supply

The coral based asphalt on the existing TBU runway has performed well to date as have other coral asphalt runways in the Pacific region. Therefore provided quality coral aggregate can be sourced, there are no technical impediments to being able to resurface and strengthen the runway using a coral asphaltic mix. Tongatapu island has several quarries near the airport (refer to Figure 3) which are either currently active or have previously been used to source aggregate for airport runway upgrades. The Contractor is required to use existing quarries and material supply companies with valid operating licenses.

Figure 3 Tongatapu quarry sites near the airport (TBU)

All quarry sites identified have been visually inspected and samples collected for testing to determine suitability. Further to this, past quarry inspection and testing information for Tongatapu has been retrieved from published sources dating from 2011 and 1993, and comparisons with that historic testing information have been undertaken. The now abandoned Quarry site Q1 (Ahononou Quarry) was the original supply site for the last runway overlay. Quarry Site Q2 is currently active, while site Q3 is not active. Samples from Q2 and Q3 were compared to samples from Q1 to gauge suitability of coral aggregate. Quarry Sites near Malapo village (Q2 and Q3) are privately owned. Ownership of the Quarry Site Q1 is thought to be owned by Prince Tungi (Pacific Region Infrastructure Facility, 2011. *Institutional Assessment of Road Construction and Maintenance Services in the Royal Kingdom of Tonga, Final Report*), however this requires further verification.

Quarry Site Q1 (Ahononou Quarry) was the main material source for the original runway construction and the later runway extension and resurfacing. The quarry walls are up to approximately 20m high (refer to Figure 4 photos) and it is likely that blasting will be required to achieve acceptable extraction rates. There is freshwater ponding at some areas across the quarry floor. The degree of weathering varies in the limestone. Upon visual inspection it is estimated that materials for basecourse and asphalt aggregates can be produced from this location with crushing and screening as processing requirement. Ahononou Quarry is located approximately 6km south west of the airport. The delivery route for material would pass through Fua'amotu village, however it may be possible to use alternative roads on the outskirts of Fua'amotu to reduce impact on road surface and residents within the village during transport. It is understood that the quarry has been inactive for approximately seven years and while bare road is still visible vegetation has started to recolonize areas of the quarry site where loose soil is available. There are no settlements near the Ahononou Quarry site – the nearest settlement is Fua'amotu over 3.5km east of the site. Ahononou Quarry is located approximately 30m inland from the coast, the photo on the left (below) shows the quarry face, the ocean is located approximately 30m behind this.

Figure 4 Quarry Site Q1

It was stated by locals that the disused quarries (Quarry Site Q3) were also used as material sources for the later works on the runway. There is material of different degrees of weathering. It appears that overall Quarry Sites Q2 and Q3have a slightly higher content of weathered limestone in comparison with quarry site Q1. However, it is estimated that the rock is suitable for production of asphalt aggregates and basecourse material with crushing and screening as processing requirement. A privately owned processing yard is set up and in operation near these quarries and produces different sizes of materials. Raw material samples were taken from the quarries and processed material samples were taken from the processed materials for suitability testing. Q2 is located approximately 1km south of Malapo village, approximately 1.4km east of Pelehake and approximately 1.4km north of Tupou College. Q3 is located approximately 0.5km south east of the site Q2. The main road route from Q2 and Q3 is approximately 6km along Tuku'Aho Road through Pelehake village then onto Airport Road to reach the airport. Alternative less trafficked roads are available however these would likely double the delivery route length and the quality of roads would need to be assessed. As can be seen in Figure 6 below grasses are starting to recolonize quarry site Q3.

Figure 5 Typical source rock

Figure 6 Quarry Site Q3 (abandoned)

Figure 7 Quarry Site Q2 in operation

Figure 8 Quarry Site Q2 processing yard

Bulk samples for testing were obtained from:

a) Ahononou Quarry (Q1) – Reported as being the primary quarry used for the construction of the airport extension.

b) Existing Commercial Quarry (Q2).

c) Abandoned Commercial Quarry (Q3) – Reportedly used for later works at the airport.

Laboratory testing data indicates that the quality of the aggregates in the wider area surrounding the airport are extremely variable and supports the general conclusions presented in earlier reference reports that the highest quality (the densest, least porous, strongest and most durable) aggregates have been those extracted from the Ahononou quarry site (Quarry Site Q1).

Other quarries founded at higher elevations typically have lower densities, higher absorption percentages and display somewhat lower crushing strength values and are generally more variable with regards to material characteristics. A lot of by product is generated at these locations during the crushing phase.

The Ahononou Quarry (Site Q1 refer Figure 3) is the preferred material source for the TBU runway works for asphaltic and basecourse aggregates. This site has also been identified as the preferred quarry source for roading upgrades in the Kingdom of Tonga. The 2011 Pacific Region Infrastructure Facility study (*Institutional Assessment of Road Construct5ion and Maintenance Services in the Royal Kingdom of Tonga, Final Report*) recommended that the Tonga Government secure leases for the land identified at Ahononou Quarry with a view to sub-leasing to a quarry operator and seek advice regarding operating permits and or the need for an EIA given the quarry has been used in the past (existing activity) but is not currently active. The Ministry of Infrastructure has

since sought bid submissions for the operation of Ahononou Quarry and have identified a preferred operator based on their submission assessment. It is understood the operator will be responsible for managing the quarry operation and providing reasonable and quality aggregate fit for purpose. Details regarding the operation of the site and whether the TAIP pavement contractor will purchase material from the operator or extract and process the material themselves is unclear.

2.3.4 Construction Lay Down Areas

The proposed construction lay down area to be utilised by all project Contractors (pavement works, building (terminal and ATCT) and navigational aids) at differing times is located adjacent (north western side) to the Airport Rescue and Fire Fighting (ARFF) building situated on the south eastern side of the runway. Drawing 60277004-AV-3104 Rev3 in Appendix A shows the proposed location of the lay down area and highlights the route to the quarries (through Fua'amotu village) and the route to the terminal. The scale of the lay down area may vary with each stage of works but is expected to be at its greatest during the runway pavement works. It is estimated that 1 hectare of land will be required for the duration of the TAIP TBU construction works. The proposed location is within the airport security perimeter fence and so will be a secure site with restricted access to non-authorised personnel.

The exact details of the location, size and site management (health and safety, solid waste management, water management and wastewater management) will need to be decided by the Contractors in consultation with TAL. Final approval of these details will be required by TAL before the construction lay down area can be set up and documented in the contractors' ESMP.

Construction lay down area size should be kept to a minimum, be fenced and materials and equipment kept secure to prevent access and use by non-authorised personnel. There are no existing hard stand areas available for stock piling or bunded areas (secondary containment) for hazardous substance storage. Vegetation clearance along with temporary hard stand and bunded areas will need to be constructed. The area identified as a potential construction lay down is overgrown with grasses and scrub (mainly wattle (*Acacia spp.*) trees). The wattles and scrub in this area of the airport are regularly cleared to maintain visuals of the airport. Noise, dust, vibration and increased traffic are impacts that can negatively affect communities and sensitive receptors. The closest residential properties are located approximately 850 m east on Airport Road. The outskirts of Fua'amotu village is approximately 1.1 km south east of the proposed construction lay down area. The construction lay down area is not a residential camp. Foreign contractors will use local existing accommodation facilities.

Transport to and from the construction lay down area, particularly of materials and equipment, must occur on the existing road network and measures undertaken to prevent dust, noise and vibration nuisance (e.g. wheel wash, covering of loads, servicing of vehicles). If the transport of material or equipment is likely to impact on normal pedestrian and vehicle traffic or pose an increased safety hazard, consideration should be given to moving these items during off peak times. Alternative less trafficked routes should also be investigated provided damage will not occur to existing road surfaces and dust and noise nuisances will not adversely affect residents.

Hard stand areas must be available for storage of hazardous substances and other equipment that poses a potential risk to the environment (e.g. leaking lubricant from machinery). Runoff from hard stand areas used to store machinery will need to be collected and treated (e.g. oil water separator) to prevent contamination of soil or water bodies. Hazardous substances (e.g. fuel, lubricants or oil) must be stored in a bunded area which is constructed with an impermeable base and water tight walls to contain the larger of 110 percent of the largest tank/container or 25 percent of the combined tank volumes in areas with a total storage volume equal or greater than 1,000 litres[1]. Solid waste and wastewater must be managed in such a way to prevent the spread of vector-borne diseases and contamination of soil and water bodies. The Tapuhia Landfill is located on the outskirts of Vaini village (approximately 10 km from the airport) and is the only approved operating landfill on Tongatapu. The Waste Authority Ltd (WAL) is a public enterprise that has been established to manage domestic solid waste and the Tapuhia landfill facility. It is likely that temporary toilets will be required for workers resulting in the need for disposal or treatment of wastewater. Construction of any temporary facilities and disposal procedures will need to be approved by TAL, Ministry of Health and MECC as required. The location of temporary sanitary facilities will also need to consider potential groundwater contamination and current boreholes for water supply.

[1] International Finance Corporation and World Bank Environmental, Health and Safety (EHS) Guidelines, Section 1.5 Hazardous Materials Management, Control Measures

All occupational health and safety requirements must be in place and workers trained in necessary procedures (e.g. spill response plan). Personal protection equipment (PPE) needs to be available to workers as required (e.g. high visibility vest, safety boots) and processes in place for obtaining relevant PPE.

2.3.5 Asphalt/ Bitumen Plant

The asphalt/ bitumen processing plant will be located either within the construction lay down area or at the quarry. The exact location is to be decided by the contractor and any site specific requirements for managing environmental, social and health and safety will need to be included in the Contractor's ESMP. High temperatures are used in preparing the bitumen and coating the aggregate therefore only authorised personnel should be able to access the plant area (whether at the lay down area or quarry). The proposed construction lay down area is located within the fenced airport compound so the general public will not be able to access the area. However due to the high temperatures involved and type of machinery the plant area itself should also be fenced. The plant will also need to be fitted with a dust scrubber regardless of whether it is located at the airport or quarry.

2.3.6 Duration and Timing of Construction Activities

Three separate contracts will probably be awarded for the three types of work, namely pavement rehabilitation (runway), terminal construction, and installation of navigational aids. As the contractors have yet to be appointed the exact duration of each component is not yet known, however indicative time scales for the physical portion of the works are as follows in probable order of commencement.

- Runway pavement – 24 weeks (to be confirmed)
- Lighting and navigational aids – 16 weeks (to be confirmed)
- ATCT construction – To be confirmed
- Terminal construction – To be confirmed

Normal working hours are Monday to Friday, 7am to 6pm. Works outside of these hours will require permission from TAL and notice to affected parties and the public at least one week prior to work commencing. It is likely the runway pavement works will need to work after hours in addition to the normal working hours in order to work around flight schedules to ensure safe operations of the airstrip for incoming and outgoing aircraft. 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.

3.0 Policy, Legal and Administration Framework

3.1 National Requirements

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, the following are the key legislative acts:

- Environmental Impact Assessment Act 2003
- 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 Environment and Climate Change (MECC) is the principal agency responsible for the management of the environment, and in administering the environmentally 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 to require environmental impact assessments and impose conditions for development projects within Tonga.

Accordingly, activities funded under the TAIP will follow the Government of Tonga's established procedures and associated guidelines established under the Environmental Assessment Act 2003, and environmental legislation of the relevant ministry.

The **Environmental Impact Assessment Act 2003** is specifically concerned with ensuring development projects are managed, conducted and carried out sustainably and appropriately. It requires that all major development projects submit an appropriate environmental impact assessment (EIA) report that will include a review of all relevant impacts as determined by the MECC from time to time. The definition of major development projects is provided in Schedule 1 of this Act, and covers a broad range of major development activities such as tourism facilities, abattoirs, marinas, or mining activity.

The MECC is also empowered with imposing appropriate mitigation measures on proposed development projects, in accordance with the outcomes of the environmental impact assessment reports.

The Regulations under this Act (Environmental Impact Assessment Regulations 2010) providing fuller procedural, compliance and penalty requirements were approved in 2010. The EIA Regulations identify information requirements for assessment of minor and major projects.

The MECC currently works closely with GOT ministries in assessing development projects and has a process in place for categorising development projects as minor or major according to the likely impact. It also requires the implementing agency to identify any potential environmental risks or impacts, and to propose appropriate mitigation measures. Approval from the MECC is required under these regulations in order that projects may proceed.

The MECC makes its recommendation for approval, deferral, mitigation, or cancellation of projects in relation to the powers of the Environmental Management Act 2010.

In regards to quarry operations, extractive industries are not separately defined, but would be covered by Item (k) – Mining where they disturb more than one hectare of land of Schedule 1.

As reported in a recent report on an institutional assessment of road construction and maintenance services, no quarries have applied for assessment since the Act was proclaimed in 2003. No case law has therefore been developed testing whether re-opening a quarry or expanding an existing quarry would require assessment under the legislation (McCotter, 2011[2]).

3.2 World Bank Policy

The TAIP TBU is a category B project under WB environmental and social screening guidelines and requires development of the project specific ESMP. Due to the nature of the project it is expected that environmental impacts will be site specific, few if any are irreversible, and mitigation measures can be readily designed and implemented. In accordance with the WB Operational Policy 4.01 Environmental Assessment this ESMP includes information on mitigation, monitoring, capacity development and training, and implementation costs. The ESMP outlines the potential environmental impacts and the measures needed to prevent, minimise, mitigate or compensate for adverse impacts and improve environmental performance of the project.

The ESMP is a dynamic document which must be updated as consultation and detailed designs of the project components are finalised to ensure currently unanticipated impacts and revised mitigation measures are addressed. Effective implementation of the ESMP is a requirement of the funding agencies and local legislation so monitoring is an integral component of implementation. A Monitoring Plan is included in Section 9 (and Appendix D) of this ESMP. This ESMP is to form part of the bidding documents for contract(s) awarded under the TAIP and will form the basis of the contractor's environmental management implementation plan.

[2] McCotter, April 2011. *Institutional Assessment of Road Construction and Maintenance Services in the Royal Kingdom of Tonga, Stage 1 Report: Technical Assessment*. Prepared for Pacific Infrastructure Advisory Center.

4.0 Environmental and Social Environment

4.1 Physical Environment

4.1.1 Location and Geography

The Kingdom of Tonga is a small island developing country located in the Central South Pacific between 15° and 23° 30' South and 173° and 177° West. It is an archipelago of 172 named islands (total land area of 747 km^2), 36 of which are inhabited (land area of 670 km^2).

Tonga consists of four main island groups extended over a north south axis: Tongatapu and 'Eua southernmost, Ha'apai, Vava'u and the Niuas (Niuafo'ou and Niuatoputapu). Nuku'alofa, the capital, is situated in Tongatapu, the largest island. The Kingdom's islands are comprised of both volcanic and uplifted coral islands and reefs. Tongatapu is a limestone capped islands with volcanic ash rich soils.

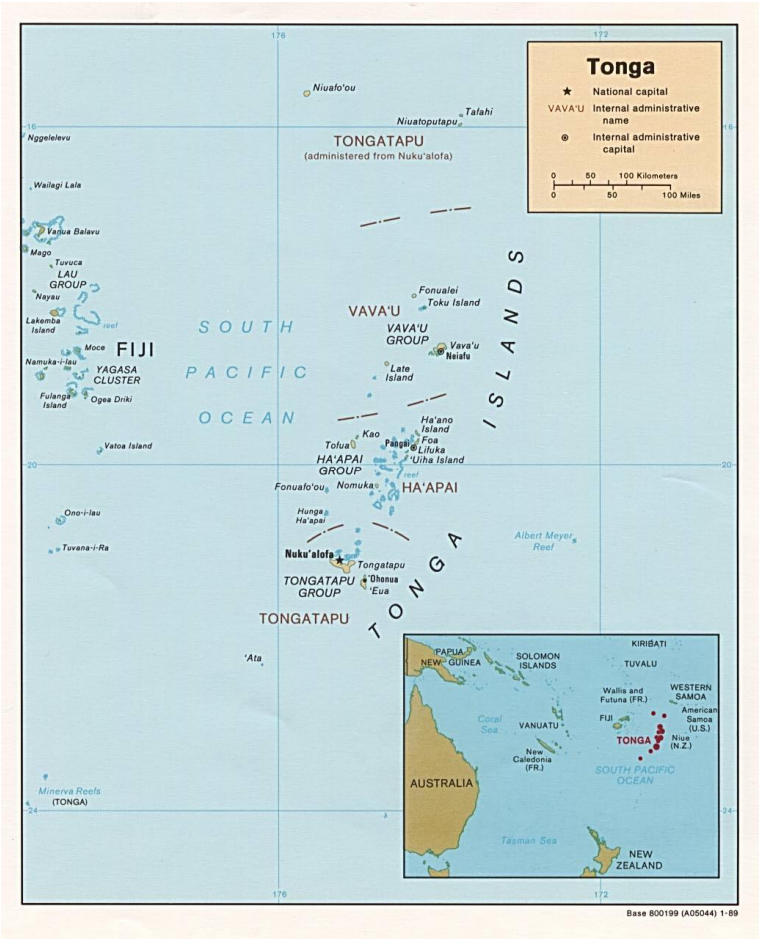


Figure 9 Location map, Kingdom of Tonga

Tongatapu is also the centre of economic development and the seat of the monarch. At the steep coast of the south, heights reach an average of 35m gradually decreasing towards the north. Tongatapu is highest in elevation around the villages of Fua'amotu and Nakolo with a height of 65m. The airport is located in this higher region of the island (refer to Figure 10).

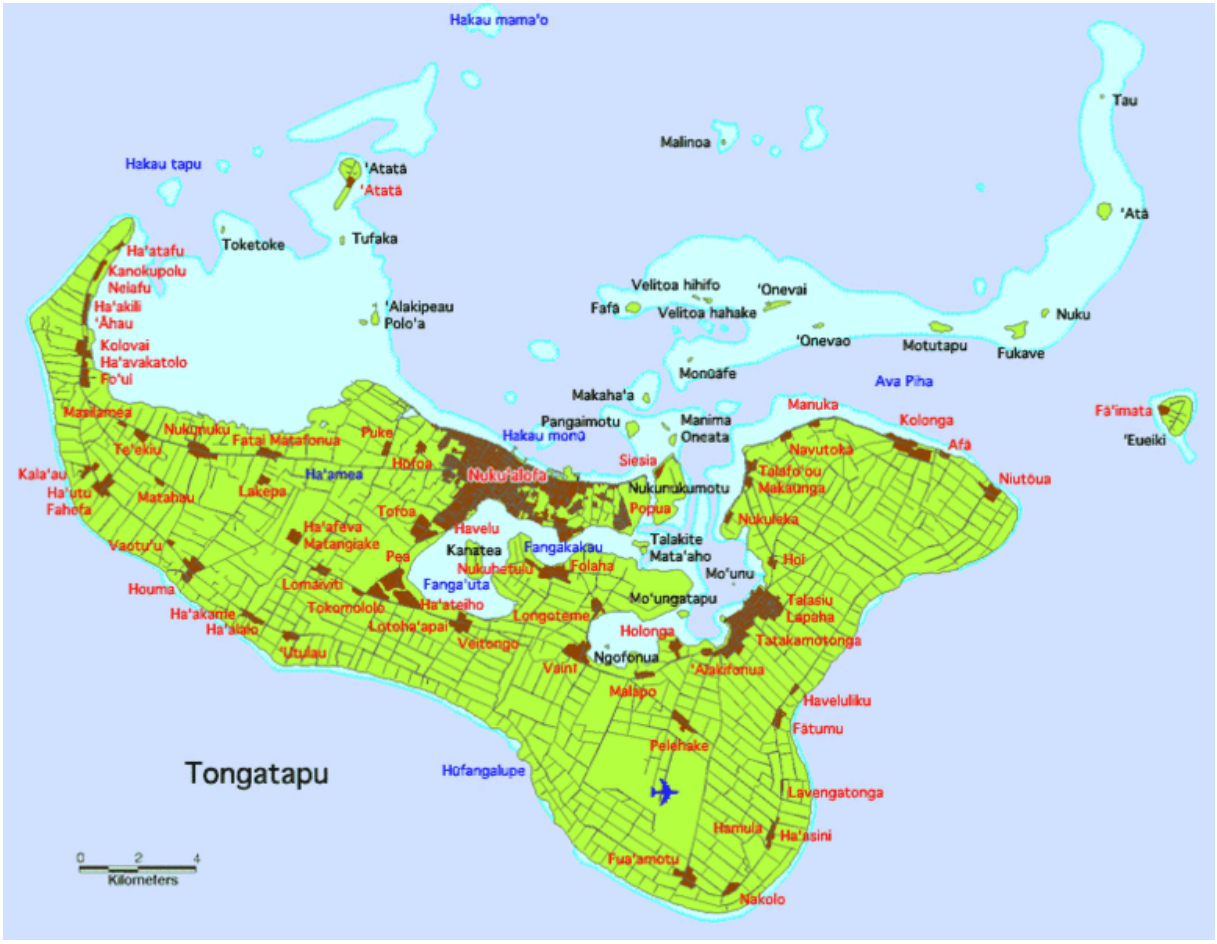


Figure 10 Tongatapu Island map

4.1.2 Land Use Around TBU

The Taliai Military Camp is adjacent (north) to the domestic terminal with residential houses located on the eastern side of Airport Road. It is understood many airport employees live in these residential properties. Surrounding land use is predominantly agriculture with crops of potato, maize, corn and squash to the north; coconut plantation to the south; and dairy farming to the west of the airport. The land within the boundary fence is mostly grassed and mown regularly with pockets of scrub (long grass and wattle trees) along the south eastern perimeter fence. In areas where the perimeter fence is not mounted on concrete edge beams the grass beneath is controlled using Gramoxone (active ingredient Paraquat dichloride), refer to Figure 11. There is evidence of channels and scouring of soil along the south western boundary where there is no vegetation cover beneath the fence and no concrete edge beams.

Figure 11 South western perimeter fence with no concrete edge beams

4.1.3 Climate

Tongatapu has a milder climate due to its southern latitude with a distinct warm wet season from November to April (also the cyclone season) and a cooler dry season from May to October. Temperature ranges from 22 to 29 ºC during the wet season and 18 to 25 ºC during the dry season. The average annual rainfall on Tongatapu is 1,753 mm with an average monthly rainfall during the dry season of 111 mm and 176 mm during the wet season.

4.1.4 Soils and Geology

Tongatapu is a low coral limestone island with rich volcanic soils (volcanic ash) able to support agricultural development of the land. The soils are generally free draining. The northern end of the island is low lying increasing to 65 m above sea level at Nakolo on the southern end of the island. The airport is located within an area that is sparsely populated but with a variety of agricultural activities surrounding it.

4.1.5 Water Resources

Tongatapu has a fresh water lens with a water table less than one metre above mean sea level. The lens reaches a maximum thickness of about 12 m at the three widest parts of the island. There is a reticulated water supply system which circulates groundwater. Most households will use this water for toilets, washing, cooking, bathing, watering plants and animals. Rainwater tanks at household and community level supplement the water supply. The airport site has a number of bores for extracting freshwater for use in the terminal and for fire fighting, along with rain tanks and a reservoir at the northern end of the runway. Over extraction, pollution from septic tanks and industrial activity all pose a threat to groundwater quality as does rising sea level as a result of climate change.

4.2 Biological Environment

4.2.1 Marine Biodiversity

The marine and coastal environment around Tongatapu is experiencing increasing pressure from encroachment into low lying marginal land, particularly around Fanga'uta and Fangakakau Lagoon (northern side of the island, refer Figure 10); effects of pollution; overfishing; and climate change. Ecosystems include the coral reef, seagrass beds, and mangrove forests. Two endemic marine species have been identified, one inshore fish known as 'Pokumei' (*Siganus niger*) and a giant clam (*Tridacna tevoro*), however there is not a lot of data available on these species.

The airport site is inland from the coast (approximately 2.5 km at the nearest point) so it is not expected that TAIP activities will have any effect on the marine or coastal environments.

4.2.2 Terrestrial Biodiversity

The greatest threat on Tongatapu to its terrestrial biodiversity (flora and fauna) is the expansion of agricultural activities and the conversion of land for houses and development. Tongatapu has only isolated remnants of woodland or forest, approximately 618.7 ha (MECC[3]). Low lying areas on the northern side of Tongatapu (particularly around Kolovai) are showing the effects of saltwater intrusion, with plants dying off or in poor condition due to the effects of saltwater.

Important crop species include root crops (e.g. yams, taro, sweet potato, and cassava), peanuts, mangoes, coconuts, breadfruit, pawpaw, pandanus, squash and watermelon. Some species are exported e.g. squash or are grown for the local market.

Terrestrial biodiversity, particularly on Tongatapu is limited with no endemic plants or animals. The area in which the airport is located is an agricultural area with differing types of agricultural activities along each boundary. There are no conservation or reserve areas near the airport. The land within the airport boundary fence is periodically cleared to maintain airport operation (security, safety and reduction of bird habitat to prevent air strike) and consists of open grass land and small shrubs (wattle and other opportunistic species).

4.2.3 Rare or Endangered Species

The 2008 International Union for Conservation of Nature (IUCN) Red List identified a total of 56 species in Tonga which are threatened. Six of Tonga's 357 assessed species are endemic to Tonga. Tonga has one reptile that has been assessed as extinct on the 2008 Red List: the Tonga Ground Skink, *Tachygia microlepis*. A total of 357

[3] Ministry of Environment and Climate Change. *The Kingdom of Tonga, Fourth Report, Review of Tonga National Biodiversity Strategy and Action Plan.* (GEF/UNEP)

species were assessed and 4 birds, 2 mammals, 9 fish, 35 invertebrates, 4 plants and 2 reptile species were identified as being threatened. The IUCN regard the threatened status of animals and plants as one of the most useful signs for assessing the condition of an ecosystem and its biodiversity. The IUCN Red List of Threatened Species™ (IUCN Red List) is widely recognized as the most comprehensive, apolitical approach for assessing and monitoring the status of biodiversity.

4.3 Socio-economic Conditions

4.3.1 Population and Demographics

According to the preliminary 2011 census results the population of Tonga is 103,036, with 73% of the population residing in Tongatapu (75,158). The annual rate of growth between the 1996 and 2011 census is calculated at 0.2% per annum, a population increase of 1% in 15 years. The population of each of Tongatapu's 7 districts are as follows:

- Kolofo'ou 18,832
- Kolomotu'a 16,946
- Vaini 12,951
- Tatakamotonga 7,252
- Lapaha 7,382
- Nukunuku 7,724
- Kolovai 4,071

The district of Tatakamotonga is where the airport is located

4.3.2 Education and Health

Education is important for Tongan people with compulsory education from age 6 to 14 years. The government provides free primary education however high school and senior school education is highly sought after and tends to be dominated by church or missionary schools with tough entrance exams. The literacy rate in Tonga of both Tongan and English is high, estimated at 99%.

The life expectancy at birth is 75 years.

4.3.3 Livelihoods and Economic Activities

Tonga has a small, open, South Pacific island economy. It has a narrow export base in agricultural goods which includes fisheries. Marine Aquarium Fisheries has become the second highest export revenue earner for the Kingdom. Squash, vanilla beans, and yams are the main agricultural exports.

The 2011 GDP was estimated at TOP$799.3 million, made up of 19% for the agricultural sector 20% for the industrial sector and 61% in the services sector. The household expenditure survey (2009) reported the total household income for urban Tongatapu residents was TOP $3,169 which includes income from wages, property and remittances. The total reported household expenditure (2009) was TOP $2,852, with 51% of expenditure going on food, 11% on transportation and 10% on housing and utilities.

As reported by the Tonga Department of Statistics the 2003 unemployment rate was 5.2%. The service sector had the highest proportion of employment, 37.6% followed by the agricultural sector (31.8%) and industry (30.6%).

4.3.4 Land Tenure and Rights

Tonga has a complex land system, which is administered through the Land Act 1988 and its subsidiary legislation. It is a comprehensive Act and provides for, amongst other things, the provision of land to estate holders (nobles), rights of Tongans to be allotted land, ownership, inheritance, lease and resumption of land to the Crown.

Land issues are sensitive and are governed by comprehensive legislative processes. Land in Tonga may not be sold, but may be leased or sub-leased. All leases up to 99 years require the consent of Cabinet; longer leases require Privy Council approval. Leases are common in Tonga and may be made between the landholder and individuals, organisations or companies.

Where land is required for public purposes, the Minister of Lands, Survey, Natural Resources and Environment may reserve Crown Land for this purpose. In cases where the required land is not Crown Land, and a lease or other agreement cannot be arranged, the King, with the consent of Privy Council may resume land compulsorily.

Resumption of land, as detailed in the legislation, requires appropriate compensation to the landholder. Whilst it is not often used in Tonga, it is an important clause that provides an avenue for the Crown to reoccupy land when and where it may be needed. There has been some precedent for this in the resumption of land in the Vaini district from the Noble for the construction of Hu'atolitoli Prison.

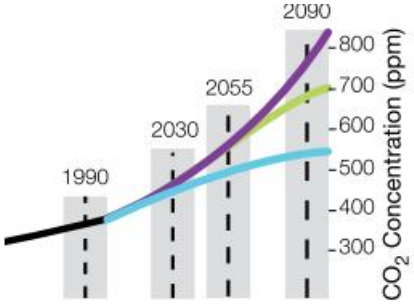
It is understood TBU land is leased from private landowners and leases were recently renewed. However there may be some outstanding issues around some subleases.

4.4 Projected Climate Changes and Impacts

The Pacific Climate Change Science Program (PCCSP) (part of the International Climate Change Adaptation Initiative) conducts critical climate research and capacity building in Pacific Island countries. Information regarding climate change projections was obtained from the BoM and CSIRO (2011) Climate Change in the Pacific: Scientific Assessment and New Research (Vol. 2: Country Reports) produced by the Pacific Climate Change Science Program.

Tonga, like many other pacific nations are already experiencing the effects of increased temperatures and rising sea level. Sea level (measured by satellite altimeters and tide gauges) has risen by 6 mm per year since 1993. Sea level does fluctuate year to year and decade to decade due to El Nino-Southern Oscillation. The annual mean air temperature in Nuku'alofa (since 1950) has increased by approximately 0.1 ºC per decade. Annual and wet season rainfall trends have shown a clear decreasing trend but no clear trends in dry season rainfall. Generally there has been substantial variation in rainfall from year to year.

The projected design life is 20 years for the runway, and 50 years for the new terminal structure (or less for specific components such as cladding). Climate change projections for 2030, 2055 and 2090 (relative to 1990) were reviewed. The PCCSP report (as identified above) reviewed a number of climate projection models to determine the most plausible representations of future climate in the pacific under the three emission scenarios developed by the Intergovernmental Panel on Climate Change (IPCC). The three emission scenarios are: low (B1), medium (A1B) and high (A2), for time periods around 2030, 2055 and 2090 (refer to Figure 12 for details of emission scenarios).



Source: PCCSP, 2011. *Current and future climate of Tonga Brochure*. Tonga Meteorological Service, Australian Bureau of Meteorology and CSIRO.

Figure 12 Carbon dioxide (CO_2) concentrations (parts per million, ppm) associated with three IPCC emissions scenarios: low emissions (B1 – blue), medium emissions (A1B – green) and high emissions (A2 – purple). The PCCSP has analysed climate model results for periods centred on 1990, 2030, 2055 and 2090 (shaded).

Table 2 below shows the projected changes in annual average air temperature and sea level for Tonga for the three emission scenarios and the three time horizons.

Table 2 Air temperature and sea level rise projections for the three emission scenarios and three time periods

Annual Average Air Temperature Projection				Sea Level Rise Projection			
Values represent 90% of the range of the models and changes are relative to the average of the period 1980-1999.							
	2030 (°C)	2055 (°C)	2090 (°C)		2030 (cm)	2055 (cm)	2090 (cm)
Low emissions scenario	0.2–1.0	0.5–1.5	0.8–2.0	Low emissions scenario	5–16	10–27	16–47
Medium emissions scenario	0.2–1.2	0.7–1.9	1.3–2.9	Medium emissions scenario	4–16	10–31	20–59
High emissions scenario	0.3–1.1	1.0–1.8	1.9–3.3	High emissions scenario	3–17	9–31	21–62

Source: PCCSP, 2011. *Current and future climate of Tonga Brochure*. Tonga Meteorological Service, Australian Bureau of Meteorology and CSIRO.

In the short term (2030) the climate models prediction for rainfall do not increase (or decrease) significantly, in either wet or dry seasons, however by 2090 it is expected that rainfall will increase during the wet season and stay the same or decrease during the dry season. There is only moderate confidence in the models prediction of rainfall in the wet season and low confidence for the dry season. There is high confidence that the intensity and frequency of extreme rainfall days are projected to increase. As most runoff from rain events goes to natural soakage this does have implications for localised flooding depending on impermeable surfaces and the ability of the rainfall to percolate into the ground. Due to the elevation of TBU sea level rise is unlikely to have any effect on the airport operations or design parameters.

5.0 Consultation and Stakeholder Engagement

5.1 Background and Approach

As required by WB Safeguards 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. This ESMP will remain 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 TAL either directly or through their nominated Consultant.

5.2 Outcomes of Consultation to Date

TO BE UPDATED WITH OUTCOMES OF ATCT CONSULTATION

The overarching EMP (22 February 2011) was publicised and public consultation held at the Fua'amotu Domestic Airport on Friday 4 February 2011). An announcement for the public consultation was placed in the following newspapers in both Tongan and English on 31 January 2011.

- TONGA CHRONICLE
- TAIMI 'O TONGA
- KELE'A
- TALAKI

The primary issues of concern raised by attendees at the TBU public consultation were noise, solid waste management, construction traffic, and the grievance mechanisms. All issues were addressed in the overarching EMP and have been incorporated into this updated TBU specific ESMP. A total of 18 people attended the public consultation and consisted of a roughly even mix of government employees (from a number of different departments) and non-government community representatives. Minutes from the public meetings and signed attendance record are included in the overarching EMP (22 February 2011).

The overarching EMP was reviewed by the Ministry of Environment and Climate Change (MECC) and accepted on 17 September 2010 (see Appendix B). The draft version of this updated TBU specific ESMP should also be provided to the MECC for review and feedback.

5.3 Disclosure

Disclosure does not equate to consultation (and vice versa) as disclosure is about transparency and accountability through release of information about the project. The draft overarching TAIP EMP has been made available on the WB Infoshop website and in hard copy at government offices (most applicable and accessible). A draft of this updated TAIP TBU ESMP should also be made available online (WB and government websites) and hard copies available at government offices and community centres on Tongatapu.

6.0 Environmental and Social Impacts

6.1 Overview of Impacts

The TAIP TBU scope is to rehabilitate the existing runway, upgrade the existing terminal and navigation aids, and construct a new ATCT. New land acquisition is not required and the project is unlikely to cause any major negative environmental or social impacts as the work is providing maintenance to and improving existing infrastructure. The social outcomes of the TAIP TBU are expected to be positive by improving safety, accessibility and mobility of island communities. No land acquisition is required thus no physical resettlement will be necessary.

Possible negative impacts related to the airport upgrade are expected to be confined to the construction phase. Public notices and consultation with affected people will continue throughout the project. Where appropriate warning notices and project bulletins will be posted informing the community when particular stages are to be completed and opportunities for involvement, whether through employment, collection and reuse of demolition materials or if there are complaints. With timely and proper implementation of this ESMP and application of appropriate mitigation measures, most if not all the potential negative impacts can be prevented or minimized. These impacts are expected to be limited to the following impacts, however this ESMP is a dynamic document and any changes in design or construction methodology may result in a reduction of impacts or additional impacts that will require mitigation.

6.2 Environmental Impacts

6.2.1 Solid Waste

Scarification, replacement of unsuitable pavement material, demolition within the terminal, replacement of lighting and navigation aids, site clearance for the new ATCT and facilities, and decommissioning and removal of specialist equipment of the old ATCT will lead to the generation of excess soil and demolition waste. Tongatapu is getting to terms with their waste management and have an approved, licensed landfill located on the outskirts of Vaini village. The WAL manages the landfill which is licensed to receive demolition waste including limited hazardous substance disposal (arrangements to be confirmed with WAL).

Material will also be generated from the excavations associated with the runway turning bays, concrete pads for navigational aids, cable trenches, ATCT foundations and car parking/ access road, and the removal of the old concrete surrounds of the fuel hydrant system. Most of the raw material can either be used to backfill areas where old equipment or infrastructure has been removed or as a resource (e.g. crushed concrete) for general use by TAL/ WAL and the community.

6.2.2 Water Resources

Freshwater will be required for workers and some construction activities (e.g. dust suppression, and concrete and bitumen production). The impact on current water supply could be significant if not properly mitigated through good resource planning. Water efficiency, conservation and reclamation practices will be adopted, for example use of non-potable water where suitable, use of an osmosis plant for non-potable water purification or a mobile desalination plant.

6.2.3 Biological Resources

For the most part the TAIP TBU will rehabilitate and upgrade the existing infrastructure. The airport land is defined by a secure perimeter fence designed to exclude animals and prevent access by people. Most of the airport land is mown grass however on the southern side of the runway there are some areas of scrub particularly around the ARFF building where the proposed construction lay down area is located. The location of the new ATCT, car park and access road is predominantly grass (refer to Figure 13). The vegetation within the airport perimeter fence is periodically cleared to maintain airport operations which include security and safety (particularly as it relates to reduction of bird habitat and potential for bird strike). This regular maintenance means that the species that do grow are pioneering, fast growing such as wattles and grasses. Mitigation measures will include liaison with the MECC should any fauna (reptile, avian, or mammal) be encountered that affect construction activities (e.g. nesting bird).

Figure 13 Photo of proposed new ATCT location (behind the current DVOR antenna) showing open grassed area

6.2.4 Hazardous Materials

Potential soil and water pollution from construction run-off with fuel and lubricants are expected to be temporary and minor. Work practices and mitigation measures for spills will be implemented, including spill response plan and bunded areas for storage (during construction and operation phase).

There is also potential for hazardous materials to be in the building materials used in existing structures that are to be demolished (e.g. asbestos containing material in the terminal).

6.2.5 Noise and Vibration

Noise and vibration disturbances are particularly likely during construction related to the transportation of construction materials from the quarry and operation of equipment (e.g. milling of pavement surface). These impacts will be short-term and affect different people at different times. Impacts include noise during pavement resurfacing and possible effect of vibration caused by operation of heavy machinery, increased traffic in some sections of roads, etc. Noise and vibration is likely to be an ongoing issue throughout the construction stage and to a lesser degree the operational phase (e.g. aircraft landing and take-off). As the airport is existing infrastructure any noise or vibration impacts are probably already being experienced by the local community.

6.2.6 Erosion and Sediment Control

Some soil erosion may occur as a result of the removal of shrubs and earth cover during resurfacing, and restoration of pavement areas and site clearance for the ATCT foundations, access road and car parking. The impacts on vegetative cover will be short-term and reversible through natural regeneration. There is only a thin topsoil layer in most parts and runoff is easily filtered into the underlying groundwater table. Where topsoil is required to be cleared this will be set aside for use in restoration of disturbed areas.

Sediment has the potential to be generated during any excavations, particularly for the turning bays at either end of the runway (6,400 m^2 and 4,800 m^2) and the ATCT works. The excavation of the turning bays will be to a depth of approximately 0.3 m. Excavation will also be required for the lighting and navigational aids (concrete pads and cable trenches). The ATCT foundations will be dug to a depth of **m. The area of the new ATCT is flat and so runoff from excavations will go to ground.

6.2.7 Air Emissions

Air pollution can arise due to improper maintenance of equipment, dust generation and the bitumen smoke / fumes arising from application of the new pavement seal and maintenance work. Impacts are expected to be localised and short term with only minor negative impact on the ambient air quality in the vicinity of the construction areas. No ongoing impact to air quality is expected as this is rehabilitation of existing infrastructure.

6.2.8 Traffic and Airport Operations

Traffic impacts will occur in transporting equipment and materials from the port and quarry. These impacts will mostly be short-term and through good mitigation and traffic management the impacts should be low. The Contractor(s) is responsible for developing and implementing a Traffic Management Plan (TMP). The TMP will

need to consider pedestrian traffic as well as vehicle traffic management, and particular attention will need to be given to management near sensitive receptors (residential dwellings, markets, churches etc). Upon completion of the construction phase of works traffic and road safety impacts caused by the TAIP TBU should cease.

The MOWP will specify safety measures required for the operation of the airport when construction work is underway. The MOWP includes instruction on airfield operational distances, FOD protection, airfield security, and responsibility hierarchy and communication methods.

6.2.9 Wastewater Discharges

Sanitary facilities for workers will be provided to prevent water bodies or other areas being used. The terminal will re-use the existing septic system (a new septic system may be installed at a later date) which will require the sludge to be cleaned out periodically (dependent on level of use). The new ATCT will have two septic tanks installed sized to accommodate the facilities and level of use within the ATCT. Drainage fields from the septic tanks will be directed away from the rain water harvesting storage tanks and groundwater abstraction bores which may be nearby (the nearest bore is understood to be at the ARFF).

Uncontrolled wastewater (e.g. sewage, grey water, wash water) discharges have the potential to contaminate soil, ground and surface water, and spread disease. Wash water from equipment can be contaminated with hydrocarbons (e.g. oil and fuel) which have a detrimental effect on aquatic life, water quality and soil quality. There are also human health impacts regarding hydrocarbon exposure which vary in severity depending on type and length of exposure. Wash water from concrete processing and cutting is highly alkaline and can burn vegetation, result in fish kills and also cause burns to the skin. Sediment loads in wash water if allowed to discharge to either marine or freshwater systems can also adversely impact aquatic life and water quality. While the potential impacts of uncontrolled discharges of wastewater can adversely affect the receiving environment, they can be easily mitigated through planning and implementation of mitigation measures (as outlined in Section 7.8). While the airport and proposed construction camp location is not near any surface freshwater or marine environments there is groundwater which will need to be protected from uncontrolled wastewater discharges.

6.2.10 Quarry and Aggregate Supply

Potential adverse impacts from uncontrolled quarrying or mining are high and include all of the above listed impacts, namely:

- Air emissions – machinery and dust
- Noise and vibration – machinery and blasting (if used)
- Water – consumption, hydrology (changes to site drainage patterns and groundwater), wastewater, and contamination
- Waste – overburden, by-products and contaminated waste material
- Land conversion – loss of habitat, agricultural land

Only licensed quarry operations, whether private or government owned, will be used to source suitable aggregate (Ahononou Quarry is the recommended source to be confirmed by the contractor). The potential quarry sources identified in section 2.3.3 are either currently operating as a quarry or have been used as a quarry in the recent past so land conversion has already taken place. Impacts of quarrying are not limited to the location of the quarry but can extend along the delivery route. Noise, dust, and traffic (vehicle and pedestrian) safety are primary concerns for the transport of materials from the quarry site.

Depending on the quarry site selected to supply the required aggregate a more detailed assessment of impacts will be completed by the contractor in their ESMP along with mitigation measure suitable for the location and activities within the quarry. The Ahononou Quarry is located near the coast therefore there is potential for effects to reach the coastal and marine environment if not managed in accordance with international standard practice (see Section 8.10 for specific mitigation measures that will be applicable to Ahononour Quarry only).

6.2.11 Biosecurity

Some equipment will most likely need to be imported which can harbour plant and animal species which may pose a threat to Tonga's biodiversity and ecosystems.

6.2.12 Secondary and Cumulative Impacts

Secondary and cumulative impacts tend to be triggered by impacts to environmental resources that function as integral parts of a larger system over time and space, and can initially be 'invisible' to the normal present time impact assessment. Secondary impacts can include land use changes due to improved accessibility which in turn can impact habitats and pressure on existing resources and utilities (e.g. water supply). Secondary and cumulative impacts also often cannot be managed solely by the project executors (TAL). Town planning (e.g. restricting development and clearing of land) and conservation are two examples of external influences which can assist in reducing secondary and cumulative impacts.

Secondary and cumulative impacts are not always negative, positive impacts include increased business and supply chain opportunities due to improved infrastructure and accessibility, improved access to health and education facilities and employment (beyond the scope of the project).

The airport is existing infrastructure which has existing impacts (e.g. noise and dust generation). In most cases the TAIP will not be able to remedy these impacts however the designs can lessen and in some cases mitigate some of the impacts.

6.3 Social Impacts

6.3.1 Health and Safety

During construction and operation health and safety is to be managed through a Site Specific Safety Management Plan (to be developed by the contractors for their respective works) and application of international environmental and health and safety (EHS) standards (WB/IFC EHS Guidelines). The primary hazards identified are construction works involving hot bituminous products (up to 165 °C), and working in extreme ambient temperatures.

Trenches for the navigational aids are not expected to exceed 1.2 m however batter slopes or shoring may be required to stabilise the sides of the trenches. Exposed trenches pose a risk to the community and airport operations therefore trenches will be progressively filled as the cable ducts are laid. At any one time the maximum length of exposed trench shall be 30 m. Exposed trenches shall be secured at night to prevent access by non-authorised personnel.

In construction of the new ATCT there will be hazards associated with working at heights.

7.0 Mitigation Measures

Due to the nature of the rehabilitation activities proposed there are some mitigation measures which are applicable to all aspects of the project, while others that are specific to particular components. Sensitive receptors and environmental values have been identified around the airport site which will require specific mitigation measures for safety and environmental protection. The mitigation measures are outlined in Appendix C. The mitigation tables detail the impact or issue, the mitigation required, where this is to occur, when this mitigation is to be applied, estimated costs, implementation responsibility and supervision responsibility.

This ESMP should be included in all bidding documents and form the basis of the Contractors ESMP which will detail implementation of the mitigation measures identified in this ESMP. The ESMPs are dynamic documents which should be updated to include any variation from the current scope or addition of newly identified impacts and mitigation measures that may arise through the bidding and contracting process (if not addressed in the Contractor's ESMP) or consultation. The mitigation measures associated with the impacts identified above are detailed below.

7.1 Aggregate and Quarrying

Aggregate will ideally be sourced from existing quarry sites on Tongatapu (Ahononou Quarry has been recommended as the most suitable). Once the suitable quarry is confirmed the contractor is responsible for reviewing site operations to ensure that the operation is legal and approved for supply of aggregate (under Tongan law). The contractor and TAL will have a choice as to which quarry source to use and how the quarry operation is to be set up (e.g. operated by the TAIP contractor or a local quarry operator). If the contractor uses a local operator they are responsible for reviewing operating license/permits and any conditions of operation which may have been imposed to ensure the operation is legal and that the contractor's work complies with any transport or purchase requirements. If the TAIP contractor is to operate the quarry (or part of) themselves they are responsible for securing the necessary operating permits and completing environmental assessments. An EIA and quarry management plan may be required to support any permit application. As a minimum the contractor should adopt the IFC Environmental, Health and Safety Guidelines for Construction Materials Extraction. Key mitigation measures from this document are outlined below.

Dust is a major issue at quarry sites and can travel some distance and affect a large number of people if not properly managed. As stated in Section 2.3.3 the nearest settlement is Fua'amotu village located approximately 3.5km east of Ahononou Quarry. Dust should be managed using the same measures as identified in Appendix C along with use of linear layout for materials handling to reduce the need for loading and unloading and vehicle movements around the site. When locating operations consideration should be given to prevailing wind conditions.

Water is significant resource in quarry activities and where possible closed circuit systems should be implemented for treatment and re-use in site activities and processes (e.g. washing plants). There is no surface water near the site, although freshwater was observed ponding at the base of the old pit (at Ahononou Quarry). It is not clear whether this is localised ponding due to rainfall or groundwater. Implementing a closed circuit water management cycle would allow for treatment of wastewater contaminated with sediment (through settlement ponds) and collection of wastewater contaminated with hydrocarbons for treatment through an oil water separator.

In order to minimise site waste careful planning and understanding of product quality is required. Overburden and by-product should be stockpiled for use in rehabilitation of the quarry site at a later date.

Other mitigation measures that have been identified for the project as a whole (refer to Appendix C) are also applicable to the quarry site if managed by the TAIP pavement contractor. For example chance find of archaeological artefacts or loss of biodiversity, erosion and sediment control measures (e.g. clean water diversion), wastewater treatment, noise and vibration mitigation etc.

The transport of material from the quarry will need to be managed through a Traffic Management Plan which will identify the route, maximum load limits, required transport permits and required measures to reduce dust. Mitigation measures provided in Appendix C include covering of loads, refused delivery of overloaded trucks, transport during off peak times and route identification which uses existing less trafficked roads.

7.2 Hazardous Substance Use, Storage and Disposal

Hazardous liquids (e.g. fuel and lubricants) must be managed within hardstand and bunded areas to prevent runoff to surrounding permeable ground. Bunded areas (secondary containment) must contain the larger of 110 percent of the largest tank or 25 percent of the combined volumes in areas with a total storage volume equal or greater than 1,000 litres. Bunded areas are to be impervious (water tight), constructed from chemically resistant material, and be sheltered from the rain as rain water allowed to collect within the bund could be contaminated if there is any hazardous substance residue on storage containers or spilt product within the bund. A spill response plan must be in place and all workers trained in correct implementation of the spill response plan. Spill kits should be available in close proximity to where hazardous substances are used and stored e.g. on the work truck or beside the fuel store.

The bitumen and asphalt plant should be located at the construction lay down area or quarry to contain potential environmental impacts. The location of the construction lay down area should be such that residential settlements are not impacted by dust, noise or runoff.

Asbestos (hazardous substance) is suspected in some building materials used in the terminal and potentially the old ATCT. Other areas, such as wrapped pipes and floor surfaces, may also have asbestos containing material (ACM). The International Finance Corporation (IFC) Environmental, Health and Safety (EHS) Guidelines for Occupational Health and Safety (section 2.4 Chemical Hazards) should be followed for demolition, handling and transport of any ACM. An asbestos management plan which clearly identifies the locations where the ACM is present, its condition (e.g. whether it is in friable form with the potential to release fibres), procedures for monitoring its condition, procedures to access the locations where ACM is present to avoid damage, and training of staff who can potentially come into contact with the material to avoid damage and prevent exposure. The plan should be made available to all persons involved in operations and maintenance activities, including the MECC and MOH. The plan should describe the work in detail and may include but not be limited to the following:

- Containment of interior areas where removal will occur in a negative pressure enclosure;
- Protection of walls, floors, and other surfaces with plastic sheeting;
- Construction of decontamination facilities for workers and equipment;
- Removing the ACM using wet methods, and promptly placing the material in impermeable containers;
- Final clean-up with special vacuums and dismantling of the enclosure and decontamination facilities;
- Inspection and air monitoring as the work progresses, as well as final air sampling for clearance, by an entity independent of the contractor removing the ACM.

Repair or removal and disposal of existing ACM in buildings should only be performed by specially trained personnel (equivalent to training standards required under applicable regulations in the United States and Europe) following Tongan national requirements, or in their absence, internationally recognised procedures.

Tapuhia Landfill is authorised to accept selected hazardous substances however arrangement must be made with the operator prior to transport (refer to http://www.wasteauthority.to/ for further information). Any personnel in contact with the ACM must be wearing suitable PPE, including respiratory protection, suitable for the removal of asbestos to be worn while handling and transporting the material. All workers should be provided with onsite washing facilities, and should wash hands, face, and boots/shoes before eating, drinking or smoking, and before returning home. Work clothing should be removed as soon as possible after arriving home and should be washed separately from other family laundry. It is advisable to have an officer from MECC and or MOH onsite during asbestos removal and packing to assist in monitoring and ensuring compliance with environmental, and health and safety requirements.

Work on the apron is restricted to an application of bituminous surface treatment and no excavation into the sub base is required which is where hydrocarbon contamination (related to the fuel hydrant system) is most likely to occur. If staining or odour is encountered during the works a photoionization detector (PID) should be used to quantify the potential risk to workers. The worker breathing zone concentration of volatile organic compounds (VOCs) should not exceed 5 part per million. If the concentration of VOCs does exceed this limit workers must immediately move to an upwind location until the vapours clear.

7.3 Safety and Traffic Management

The airport is protected by a patrolled perimeter security fence. All works, including the construction lay down area will occur within this fence. Security clearance will be required for all airside construction workers. Airside construction works will be managed through the MOWP and TAL will be responsible for ensuring the safe operation of the airport at all times. The MOWP will detail the specific safety and security requirements for the airport operations, including safe operating distances and responsibility of key project roles.

The transport of materials has the potential to impact the community through noise, dust and road safety. The Contractors are responsible for developing a TMP which will specify how traffic (vehicle and pedestrian) will be managed, including transport times (outside peak hours), maximum speed and loads of trucks, use of flag controls at site entrances (construction lay down area) and around specific work areas.

7.4 Stormwater and Water Management

Localised flooding on the shoulders of the runway, taxiway and apron were observed and occurs where compaction has occurred and drains have blocked.

During construction clean water diversion bunds will be used to direct any runoff from undisturbed areas away from work areas, stockpiles and storage areas. The diversion bunds will direct this clean water to land for soakage. There are no surface water bodies adjacent to the airport.

Water required for construction activities such as dust suppression and concrete production will need to be managed carefully so as not to impact on the island's freshwater supply or the airport's needs for ARFF. Where possible rain water should be collected or non-potable water should be used, provided there will be no risk of contamination of groundwater.

The airport has a number of bores used to extract water for the terminal and ARFF operations. Due to the proximity of these bores, monitoring should be completed prior to construction works commence, during construction works and at completion of all construction works to confirm no contamination of groundwater as a result of the works. Depending on what works are being undertaken (e.g. terminal versus runway pavement) different bores may be selected to provide information on groundwater quality at any given time in that area. As a minimum the bores that should be included in the monitoring programme are the terminal bore, to capture activities related to the terminal upgrade and apron pavement works, and the bore nearest to the construction laydown area (near the ARFF building), to capture any potential effects as a result of a spill or general site activities. Other bores may also be identified by the MECC as requiring monitoring to determine effects from construction and or operational activities.

Parameters that should be monitored include pH, electrical conductivity, total nitrogen and total petroleum hydrocarbons (TPH).

The new ATCT will be fitted with two rain water collection tanks (2 x **m^3) to service the kitchen and bathroom facilities within the tower. These will likely be above ground tanks to allow for maintenance and cleaning and prevent cross contamination with groundwater contamination (if present).

7.5 Bitumen, Asphalt and Concrete Plant

Bitumen and asphalt production requires very high temperatures which pose a significant risk to workers and the general public. Therefore the bitumen and asphalt plant should be located within a secure compound (the construction lay down area or quarry) to ensure security and reduce risk of unauthorised access. The plant also requires use of hazardous materials which must be stored on hard stand areas within bunded areas (both should be available at the construction lay down area or quarry). The equipment must be fitted with a dust scrubber to prevent the dispersal of fine coral particulates.

The project requires concrete production for the terminal, new ATCT, navigational aids and runway. It is unknown whether the bulk of concrete will be prefabricated at a concrete plant on the island or in-situ. If concrete is to be constructed in-situ care needs to be taken with slurry and runoff from the concrete. Concrete production should only take place when there is no rain forecast. Concrete slurry is highly alkaline and cannot be diluted. Sand bags or diversion drains must be used to divert runoff from concrete cutting or setting areas. Any concrete debris must be collected and disposed of as a hazardous substance and removed to an authorised landfill (Tapuhia Landfill). Wastewater from concrete cutting or production must be collected and treated (settling and neutralisation through

pH adjustment). All equipment used in concrete production must be cleaned in designated wash down areas away from surface water and not be allowed to permeate to ground.

7.6 Construction Lay Down Area

The construction lay down area will be used to store equipment and materials for all components of the project, and as such there are a number of potential hazards associated with the equipment and materials. The construction lay down area is within the airport perimeter fence however additional fencing may be required around specific stores (e.g. hazardous substances) to prevent access by unauthorised personal. Areas within the compound must be clearly marked for solid waste collection, machinery maintenance, hazardous substance storage, plant operations (concrete, bitumen, asphalt) and toilet facilities for workers. Each of these areas must be constructed in such a way to prevent any potential adverse impacts on the surrounding environment. Including hard stand areas, protection from wind and rain, bunding (hazardous substances), clean water diversion drains, and collection and treatment of waste water from site operations (e.g. concrete production, machinery maintenance). The construction lay down area is not a residential camp. Foreign contract and project staff will utilise existing local accommodation. The ground of the construction lay down area will likely be compacted by the end of its use and so restoration will require scarification of the soil, application of topsoil and revegetation.

7.7 Erosion and Sediment Control

The land around TBU is relatively flat, with porous soils. While construction activities should be limited to the dry season there is still potential for rainfall events. Clean water diversion bunds should be constructed around any excavation to prevent ingress of runoff from surrounding areas. Any ponding which may occur within an excavated area shall either be allowed to percolate into the subsoil or pumped out to a settling area or used for dust suppression at a later date. Excavations should be kept to a manageable size to reduce the time of exposure. The largest stockpiles will be within the construction lay down area for the quarried aggregate. These stockpiles will need to be on an impermeable geotextile or hardstand and runoff directed to permeable land. The aggregate material will be inert larger size pieces. Stockpiles of any fine grain materials (e.g. sand and topsoil) must be covered to prevent dust and sediment laden runoff during rain events.

7.8 Wastewater Management

There are a number of activities during construction and operation phases of the project which will generate wastewater. During construction wastewater will be generated by the sanitation facilities provided for workers and as there is no reticulated wastewater treatment system on the island, the contractor is responsible for the collection and treatment of the generated wastewater from sanitation facilities. There are a number of options regarding sewage treatment that the contractor can implement to mitigate the potential impacts on the land and or water (groundwater). These include mobile proprietary treatment systems (to be imported for the project) and composting systems. The contractor is responsible for ensuring the treatment and disposal of wastewater is in accordance with TAL advice and approved by MOI and MOH as required.

Wastewater from wash down areas is to be collected either in a settlement pond or tank to allow sediment and particulate matter to drop out before the water can be reused as wash water, dust suppression or in other processes. A separate wash down area is required for machinery or material with oil or fuel residue as this wash water is required to be treated through a mobile oil water separator. Wash water from concrete production, cutting, washing of equipment used and areas where concrete is produced must be collected and treated to lower the pH (closer to neutral) and to allow settlement of suspended solids (see Section 7.5). All wash down areas and wastewater treatment areas, should be located within the construction camp.

Treated wash water where possible should be reused for dust suppression or within other processes. Direct discharge to the marine or coastal environment is prohibited. Discharges of treated wash water (as described above) are to occur to land only with vegetation cover and in areas where groundwater quality is not going to be affected (e.g. not adjacent to an extraction bore). Sufficient measures to avoid direct discharges are required, which may include bunding (e.g. sand bags), demarcation of exclusion zones, and limited use of large machinery.

7.9 Solid Waste Management

The Tapuhia Landfill is the only authorised landfill on Tongatapu operated by WAL. The contractor is responsible for coordinating with WAL, TAL and the Ministry of Infrastructure regarding what waste can be accepted by Tapuhia Landfill (e.g. hazardous substances, wastewater). Waste streams able to be re-used or recycled are to

be done by licensed operators able to provide this service. Some waste can be re-used within the project however excess re-usable or recyclable waste will be provided to TAL (or nominated receiver). The type of waste expected to be generated are:

- Building materials from demolition
- Decommissioned electrical equipment (transformers and generators) as required in the old ATCT
- Excess rubble generated from milling of the runway surface and excavations
- Green waste from clearing the area for the construction camp and new ATCT, car park and access road
- Packaging materials from imported supplies
- Waste oil, lubricants etc.
- Wastewater from sanitary facilities (dependent on system used).

Any waste that cannot be disposed of at the Tapuhia Landfill, reused or recycled must be removed from the island at the completion of the project. International waste conventions (e.g. Waigani, Basel and Stockholm conventions) may apply depending on the type of waste that is be transported across country boundaries.

7.10 Marine and Coastal Specific Mitigation Measures

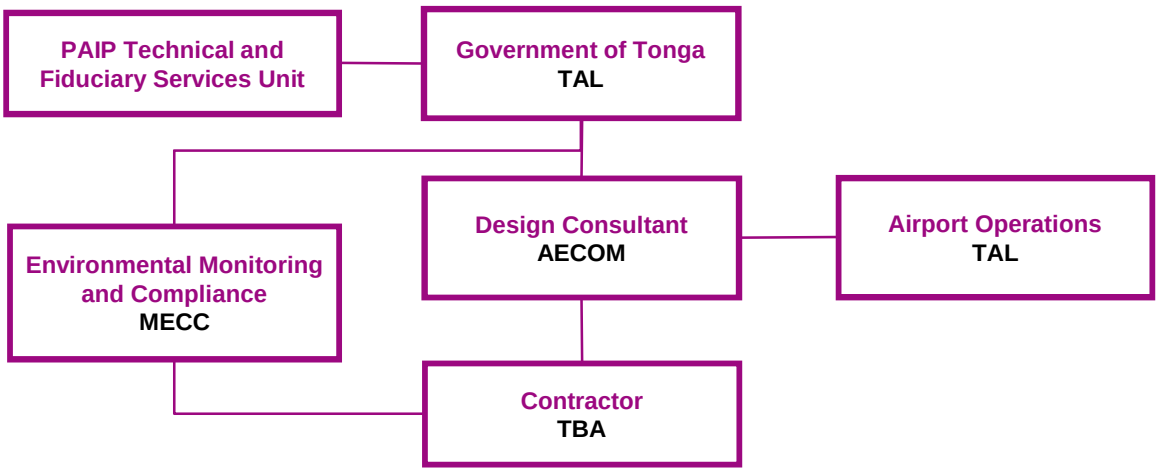
The airport is not located near the coast however Ahononou Quarry (the preferred quarry source) is located approximately 30m inland from the coast. Quarry activities generally can have a negative impact on the environment in which they operate. However many of these impacts can be managed effectively through good site planning and implementation of mitigation measures. The Ahononou Quarry should clearly mark the boundary of the site with fencing to prevent creep into the coastal environment. Currently the old quarry face separates the main quarry area and the coast. Extraction and process activities must not extend beyond this toward the water (see Figure 14) and should be located as far inland as property boundaries allow.

Figure 14 Ahononou Quarry showing quarry face and ocean in the background (looking west up the coast)

When planning the site layout, process activities, settlement ponds, and stockpile areas these should be located outside the coastal margin. Site runoff should be intercepted and not permitted to discharge directly to the coast. Machinery and vehicles must not use the beach.

8.0 Roles and Responsibilities

The TAL is responsible for delivery of the TAIP TBU project (including all components), funding received and contracts awarded under the TAIP. TAL is the Implementing Agency in regards to funding received from donors including the WB. A Project Management Unit (PMU) within TAL has been established to undertake the day to day management of the project. Aspects of the monitoring required by the ESMP will be undertaken by TAL. The implementation of this ESMP is the responsibility of the contractors awarded contracts under the TAIP. The diagram below shows the reporting and responsibilities for this ESMP. The MECC has a statutory responsibility to respond to pollution complaints, and ensuring impacts are managed as per the ESMP. There will also be ongoing airport operational monitoring requirements of the MECC.



8.1 Institutional Capacity

TAL will require environmental awareness training for monitoring the Contractors. Personnel from the MOI will work alongside the Contractor and Resident Engineer to capacity build and gain a better understanding of the type of runway surface seal being used and ongoing maintenance requirements. A training budget must be put aside to enable this capacity building with the Government departments. There may also be an opportunity for an Officer from the MECC to work with the Contractor's environmental officer. TBU has x-ray equipment for security screening however equipment for monitoring of the x-ray machines is not available. Costs for ongoing monitoring of x-ray equipment have been included below but are provisional based on whether x-ray equipment is actually installed. It is understood that noise meters will not be required as these have already been allowed for in the TSCP.

An indicative training budget is as follows:

Training for Contractors and TAL/ MECC personnel (onsite training in Tonga)	US$ 15,000
Operational monitoring of x-ray equipment (annual cost)	US$ 1,000
Miscellaneous (e.g. MECC participation)	US$ 2,000
TOTAL Budget	**US$ 18,000**

8.2 Complaints and Incident Reporting

All complaints and incidents should be referred to the TAL's Project Officer (or designated staff) for undertaking complaint/incident investigation procedures. All complaints must be acknowledged with the complainant within 24hours. In general the following procedure should be followed:

- Log complaint/incident, date of receipt and acknowledge complaint receipt
- Investigate the complaint/incident to determine its validity and to assess the source of the problem
- Identify and undertake any action required, communicate response action to complainant (if requested by complainant)
- Log the date of resolution

- Report the complaint in monthly monitoring report including actions, resolution status and any outstanding actions required.

Signage at site and public advertisements (print media and online) will be displayed by the contractor outlining the complaints procedure and contact details for making complaints.

9.0 Compliance and Monitoring Plan

9.1 Monitoring Plan

The Environmental Monitoring Plan identifies the environmental monitoring requirements to ensure that all the mitigation measures identified in this ESMP are implemented effectively. Environmental monitoring methodology (refer Appendix D for details) for this project includes:

- Audit of detailed designs.
- Audit and approval of site environmental planning documents.
- Consultations with communities and other stakeholders as required.
- Routine site inspection of construction works to confirm or otherwise the implementation and effectiveness of required environmental mitigation measures.

Non-compliance to environmental mitigation measures identified in the ESMP will be advised to the Contractor(s) in writing by TAL's nominated Environmental Officer as required. The non-compliance notification will identify the problem, including the actions the Contractor needs to take and a time frame for implementing the corrective action.

9.2 Monitoring Plan Reporting

Throughout the construction period, the Contractor(s) will include results of the ESMP monitoring in a monthly report for submission to the TAL who is responsible for submitting these monthly progress reports to the PAIP TFSU. The format of the monthly report shall be agreed with all agencies but is recommended to include the following aspects:

- Description and results of environmental monitoring activities undertaken during the month, including record of all consultation (formal and informal).
- Status of implementation of relevant environmental mitigation measures pertaining to the works.
- Key environmental problems encountered and actions taken to rectify problems.
- Summary of non-compliance notifications issued to the Contractor during the month.
- Summary of environmental complaints received and actions taken.
- Key environmental issues to be addressed in the coming month.

A day to day contract diary is to be maintained pertaining to administration of the contract, request forms and orders given to the Contractors, and any other information which may at a later date be of assistance in resolving queries which may arise concerning execution of works. This day to day contract diary is to include any environmental events that may arise in the course of the day, including incidents and response, complaints and inspections completed. Discussions with the local community both informal and formal should be noted in the day to day contract diary and include names and contact details of individuals and the outcome of any agreements or resolutions. If agreements regarding use of land and or removal of vegetation are made the owner must sign the meeting minutes to document agreement.

During airport operations the TBU Managers will include an environmental management section as part of their normal reporting to TAL. The environmental management section shall include an analysis of the operation monitoring programme, any environmental issues arising and recommendations (including cost estimates as required) for further action.

TAL is also responsible for quarterly progress reports to the WB. This quarterly progress report will include a section on environmental and social compliance and issues. This section will cover (as a minimum) the overall compliance with implementation of the ESMP, any environmental or social issues arising as a result of project works and how these issues will be remedied or mitigated, and the schedule for completion of project works.

10.0 Contingency Plan

It is recommended that the Contractors prepare a Contingency Plan encompassing cyclone and storm events. The purpose of the Plan is to ensure all staff are fully aware of their responsibilities in respect to human safety and environmental risk reduction. Procedures should clearly delineate the roles and responsibilities of staff, define the functions to be performed by them, the process to be followed in the performance of these functions including tools and equipment to be kept in readiness, and an emergency medical plan. All of the Contractor's staff should undergo training/induction to the Plan.

The wet season on Tongatapu is November to April which coincides with the cyclone season. Construction activities should be limited to the dry season (May to October) however storm and rain events can still occur during this period causing flooding and bringing high winds.

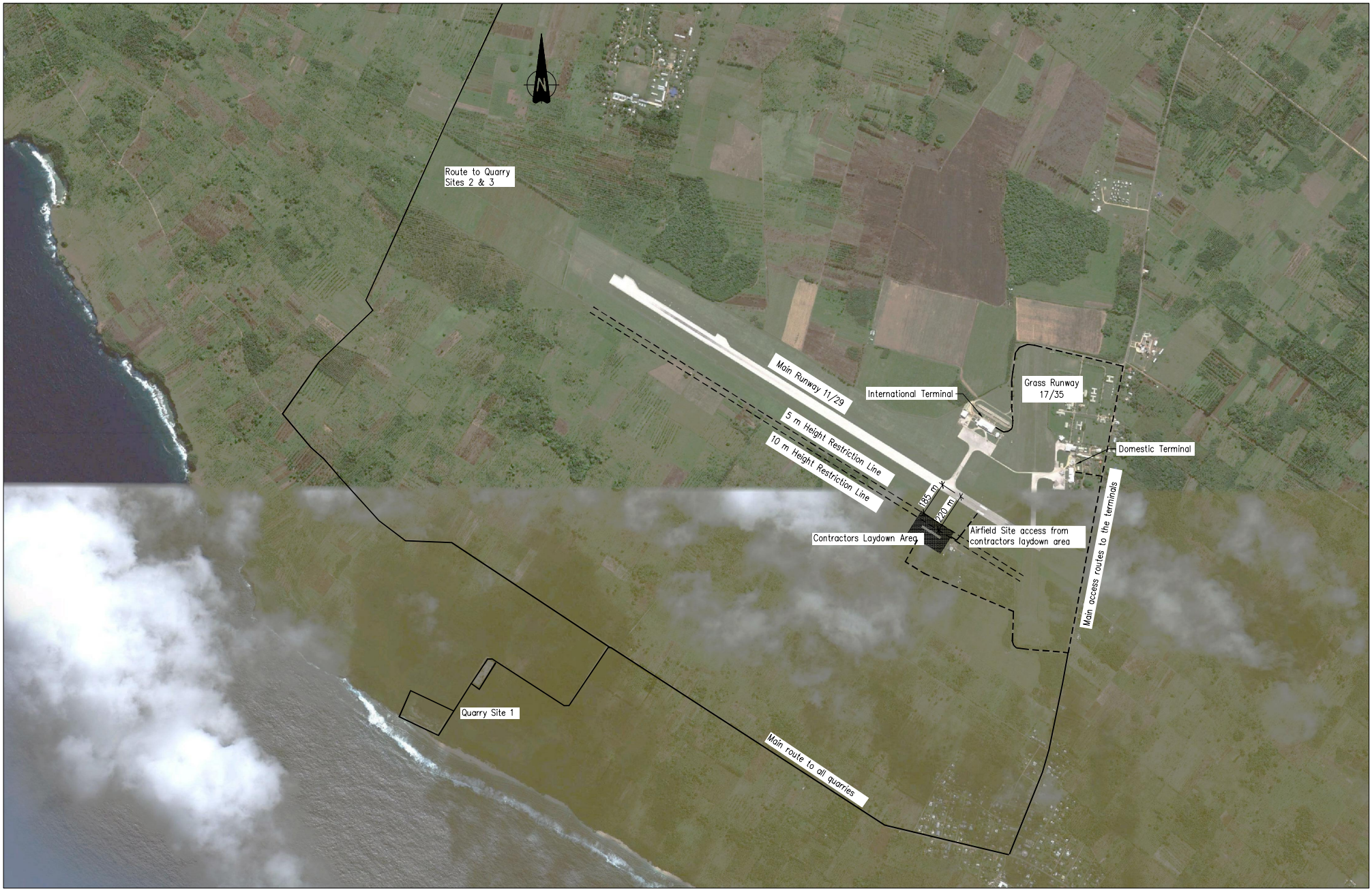
The Contractors are responsible for monitoring weather forecasts, inspecting all erosion and sediment control measures and undertaking any remedial works required prior to the forecast rain or storm event.

In general the Contractors will:

- Inspect daily weather patterns to anticipate periods of risk and be prepared to undertake remedial works on erosion and sediment control measures to suit the climatic conditions;
- Monitor the effectiveness of such measures after storms and incorporate improvements where possible in accordance with best management practice;
- Ensure appropriate resources are available to deal with the installation of additional controls as and when needed; and
- Inform TAL if there are any concerns associated with the measures in place.

Appendix A

Plans and Detailed Designs



NOT FOR CONSTRUCTION

REVISIONS					
No.	BY	DATE	DESCRIPTION	APPD
3	JCZ	24.05.13	FOR TENDER ISSUE	CR
2	RP	20.05.13	DETAILED DESIGN ISSUE	CR
1	NW	22.03.13	90% DRAFT ISSUE	CR

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2000

DESIGNED	VK	CHECKED	CR
DRAWN	VK	CHECKED	JP
APPROVED	CR	DATE	Mar-13

SCALES: 1:2500 (A1)

AECOM

AECOM New Zealand Limited

CLIENT: TONGA AIRPORTS LIMITED

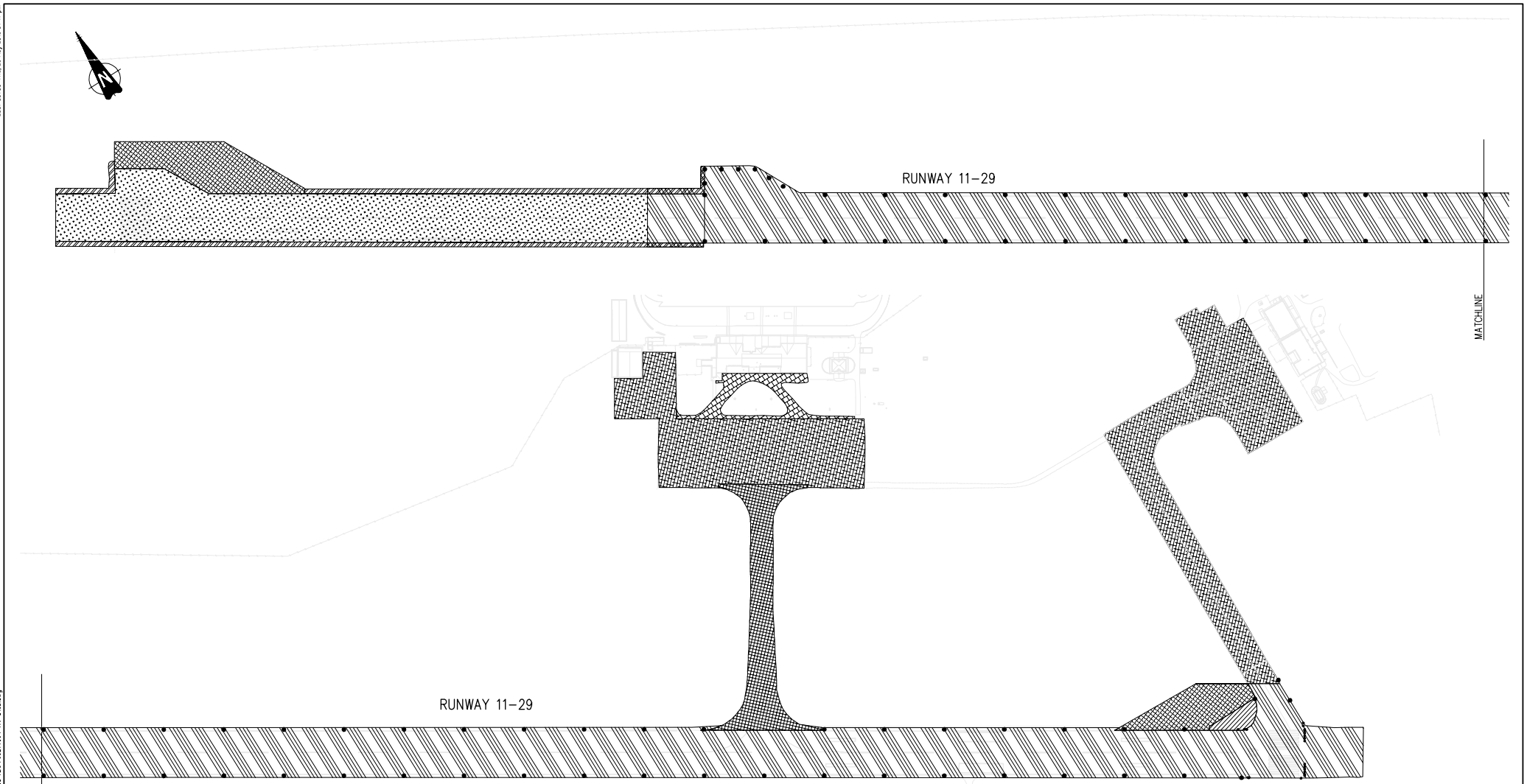
PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)

FUA'AMOTU INTERNATIONAL AIRPORT (TBU)
SITE ACCESS AND CONTRACTOR LAYDOWN AREAS

A1 | STATUS: FOR TENDER | DRAWING NO: 60277004-AV-3104 | REV: 3

CAD Ref: K:\...PROJECTS\ATTA PAIP Airports (60277003 60277004 60277008)\5. CAD\15.3 Working\DRG\03 TBU\60277004-AV-3104.dwg

Last saved: Thu, 23 May 2013 07:15 pm



LEGEND:

- Runway 65mm min AC structural overlay, with approximately 5% down ramps on 3m runway shoulders
- Sprayed Enrichment Surface Treatment (SEST) – Runway
- SEST to remaining width of shoulders (Approximately 4.5m)
- Runway Turning Node Construction (100mm of AC, 300mm of Coral Base course, 300mm of Coral Sub–base)
- Reconstruct existing concrete pavement with (100mm of AC, 300mm of Coral Base course, 300mm of Coral Sub–base)
- Taxiway 65mm min AC Structural Overlay
- SEST – Apron & AGL hardstand area
- SEST – Domestic Taxiway and Apron
- International apron airside access – 40mm nominal AC overlay
- Existing runway edge lights to be raised using space plates

NOT FOR CONSTRUCTION

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2000

DESIGNED	VK	CHECKED	CR
DRAWN	VK	CHECKED	JP
APPROVED	CR	DATE	Mar-13

REVISIONS

No.	BY	DATE	DESCRIPTION	APPD
3	JCZ	24.05.13	FOR TENDER ISSUE	CR
2	RP	20.05.13	DETAILED DESIGN ISSUE	CR
1	NW	22.03.13	90% DRAFT ISSUE	CR

SCALES: 1:2000 (A1)

AECOM

AECOM New Zealand Limited

CLIENT: TONGA AIRPORTS LIMITED

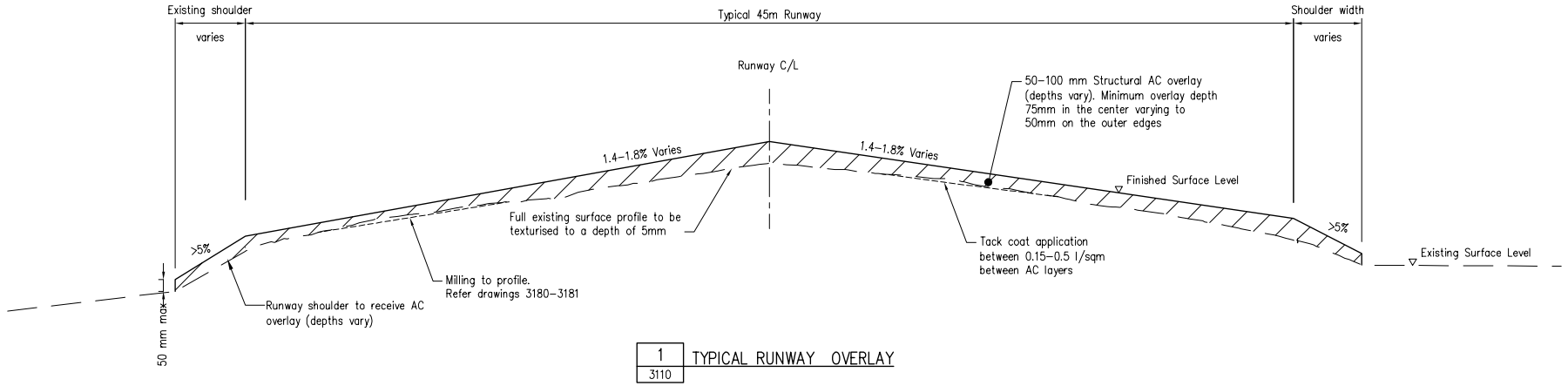
PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)

FUA'AMOTU INTERNATIONAL AIRPORT (TBU)
RUNWAY OVERLAY PLAN - WORK EXTENTS

A1 | STATUS: FOR TENDER | DRAWING NO. 60277004-AV-3105 | REV: 3

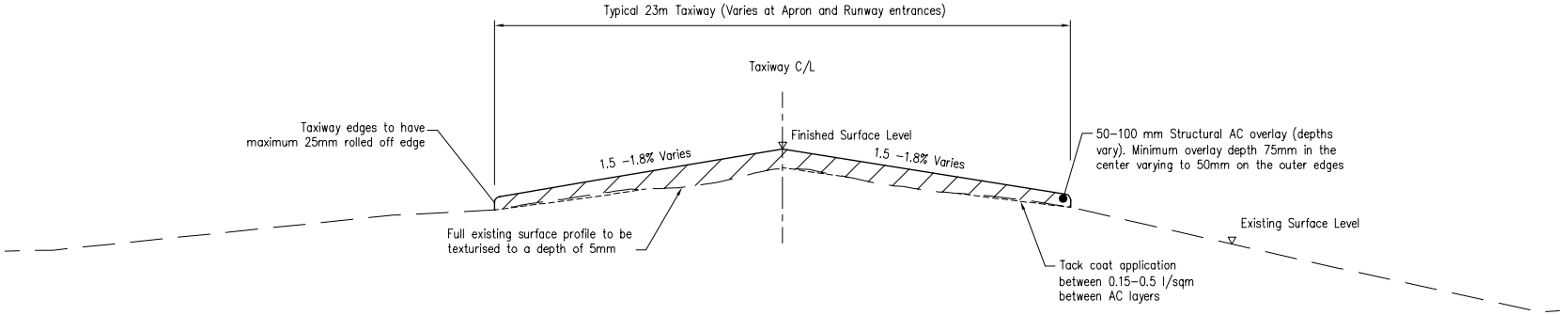
CAD Ref: K:\...PROJECTS\ATTA PAIP Airports (60277003 60277004 60277008)\5 CAD\5.3 Working\GRG\03 TBU\ 60277004-AV-3105.dwg

Last saved: Thu, 23 May 2013 07:17 pm



1 3110 TYPICAL RUNWAY OVERLAY

1H:10V



2 3113 TYPICAL TAXIWAY STRUCTURAL OVERLAY

1H:10V

NOT FOR CONSTRUCTION

REVISIONS					
No.	BY	DATE	DESCRIPTION	APPD
3	JCZ	24.05.13	FOR TENDER ISSUE	CR
2	RP	20.05.13	DETAILED DESIGN ISSUE	CR
1	NW	22.03.13	90% DRAFT ISSUE	CR

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2000

DESIGNED	VK	CHECKED	CR
DRAWN	VK	CHECKED	JP
APPROVED	CR	DATE	Mar-13

SCALES:

1:100 H (A1)

1:10V (A1)

AECOM

AECOM New Zealand Limited

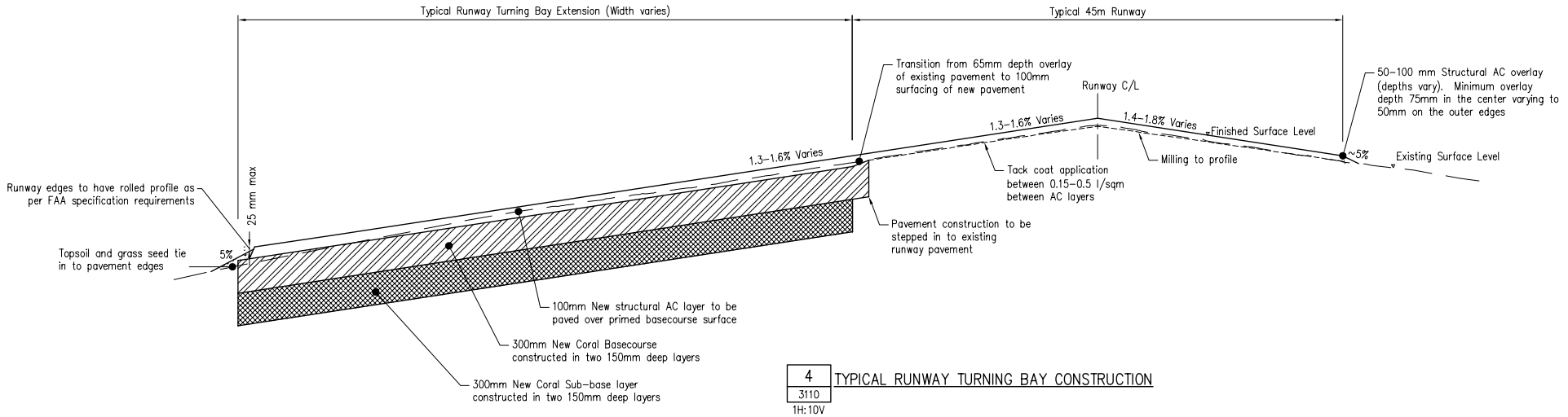
CLIENT:

TONGA AIRPORTS LIMITED

PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)

FUA'AMOTU INTERNATIONAL AIRPORT (TBU)
TYPICAL CROSS SECTIONS

A1 | STATUS: FOR TENDER | DRAWING NO. 60277004-AV-3106 | REV: 3



4 / 3110 — TYPICAL RUNWAY TURNING BAY CONSTRUCTION

1H:10V

NOT FOR CONSTRUCTION

REVISIONS					
No.	BY	DATE	DESCRIPTION	APPD
3	JCZ	24.05.13	FOR TENDER ISSUE	CR
2	RP	20.05.13	DETAILED DESIGN ISSUE	CR
1	NW	22.03.13	90% DRAFT ISSUE	CR

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2000

DESIGNED	VK	CHECKED	CR
DRAWN	VK	CHECKED	JP
APPROVED	CR	DATE	Mar-13

SCALES:

AECOM New Zealand Limited

CLIENT: TONGA AIRPORTS LIMITED

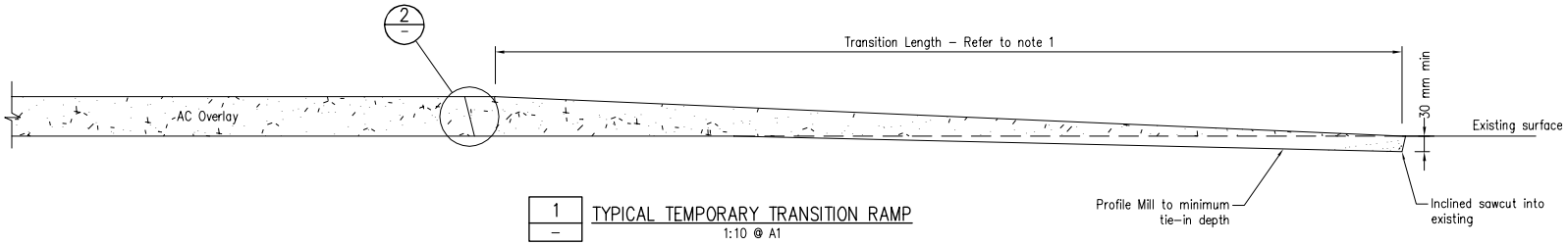
PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)

FUA'AMOTU INTERNATIONAL AIRPORT (TBU)
TYPICAL CROSS SECTIONS

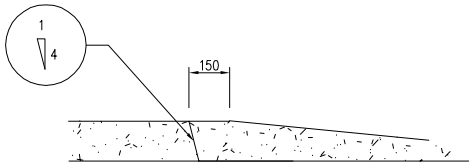
A1 | STATUS: FOR TENDER | DRAWING NO. 60277004-AV-3107 | REV: 3

NOTES:

1. Transition Length, Temporary during construction
   – Overlay Thickness 50 mm = 5000 mm long
   – Overlay Thickness 75 mm = 7500 mm long
2. All sawcuts rear set minimum 150 mm from rolled edges or transitions.
3. All sawcuts inclined 1:4 to full depth of AC layer.
4. No vertical sawcuts – No exceptions.



1 / – TYPICAL TEMPORARY TRANSITION RAMP
1:10 @ A1
1:10



2 / – INCLINED SAWCUT DETAIL
1:10

Note:
All Sawcuts – longitudinal and transverse to have 1:4 inclined face

NOT FOR CONSTRUCTION

REVISIONS

No.	BY	DATE	DESCRIPTION	APPD
3	JCZ	24.05.13	FOR TENDER ISSUE	CR
2	RP	20.05.13	DETAILED DESIGN ISSUE	CR
1	NW	22.03.13	90% DRAFT ISSUE	CR

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DESIGNED	VK	CHECKED	CR
DRAWN	VK	CHECKED	JP
APPROVED	CR	DATE	Mar-13

SCALES: AS SHOWN

AECOM New Zealand Limited

CLIENT: TONGA AIRPORTS LIMITED

PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)

FUA'AMOTU INTERNATIONAL AIRPORT (TBU)
TEMPORARY RAMPING DETAILS

A1 | STATUS: FOR TENDER | DRAWING NO. 60277004-AV-3185 | REV: 3

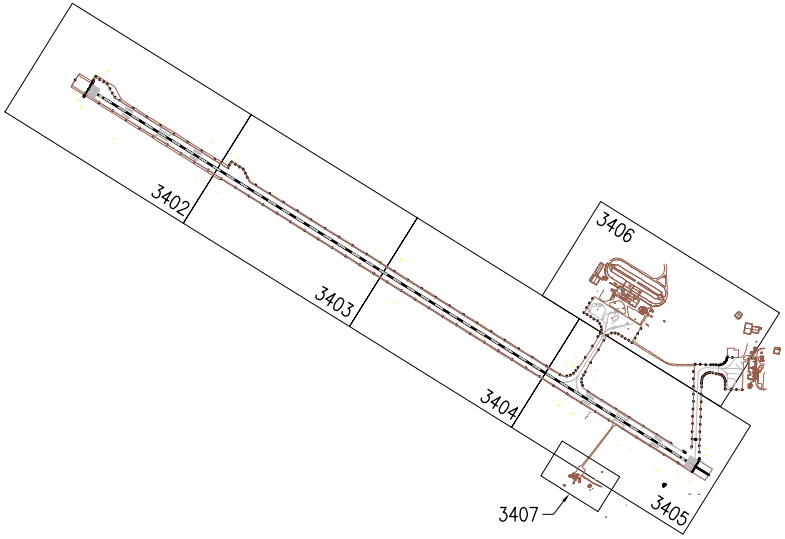
Last saved: Thu, 23 May 2013 07:27 pm

CAD Ref: K:\...PROJECTS\ATTA PAIP Airports (60277003 60277004 60277008)\5 CAD\5.3 Working\DRG\03 TBU\ 60277004-AV-3185.dwg

FUA'AMOTU INTERNATIONAL AIRPORT, TONGA

AIRFIELD LIGHTING

SITE LOCALITY PLAN



SHEET LAYOUT PLAN

FUA'AMOTO INTERNATIONAL AIRPORT – DRAWING LIST

DRAWING NO	TITLE
60277004–AV–3400	COVER SHEET
60277004–AV–3401	LOCALITY PLAN AND LIST OF DRAWINGS
60277004–AV–3402	AIRFIELD LIGHTING – LAYOUT SHEET 1
60277004–AV–3403	AIRFIELD LIGHTING – LAYOUT SHEET 2
60277004–AV–3404	AIRFIELD LIGHTING – LAYOUT SHEET 3
60277004–AV–3405	AIRFIELD LIGHTING – LAYOUT SHEET 4
60277004–AV–3406	AIRFIELD LIGHTING – LAYOUT SHEET 5
60277004–AV–3407	AIRFIELD LIGHTING – LAYOUT SHEET 6
60277004–AV–3410	LIGHT FIXTURE AND PIT INSTALLATION DETAILS
60277004–AV–3411	CLASS 'D' AND 'G' HEAVY DUTY PIT DETAILS
60277004–AV–3412	SIT PIT DETAILS SHEET
60277004–AV–3413	AUTOMATIC WEATHER STATION INSTALLATION
60277004–AV–3414	AUTOMATIC WEATHER STATION SCHEMATIC
60277004–AV–3415	NDB ANTENNA DUCT
60277004–AV–3416	NDB BLOCK DIAGRAM

NOT FOR CONSTRUCTION

REVISIONS

No.	BY	DATE	DESCRIPTION	APPD
3	JC	19.06.13	FOR TENDER ISSUE	CR
2	NL	10.05.13	DETAILED DESIGN	CR
1	NW	15.03.13	90% DRAFT ISSUE	CR

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2000

DESIGNED	SH	CHECKED	CR
DRAWN	NW/NL	CHECKED	CR
APPROVED	CR	DATE	May-13

SCALES: AS SHOWN

AECOM New Zealand Limited

CLIENT: TONGA AIRPORTS LIMITED

PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)

FUA'AMOTU INTERNATIONAL AIRPORT (TBU)
AIRFIELD LIGHTING - LOCALITY PLAN AND DRAWING LIST

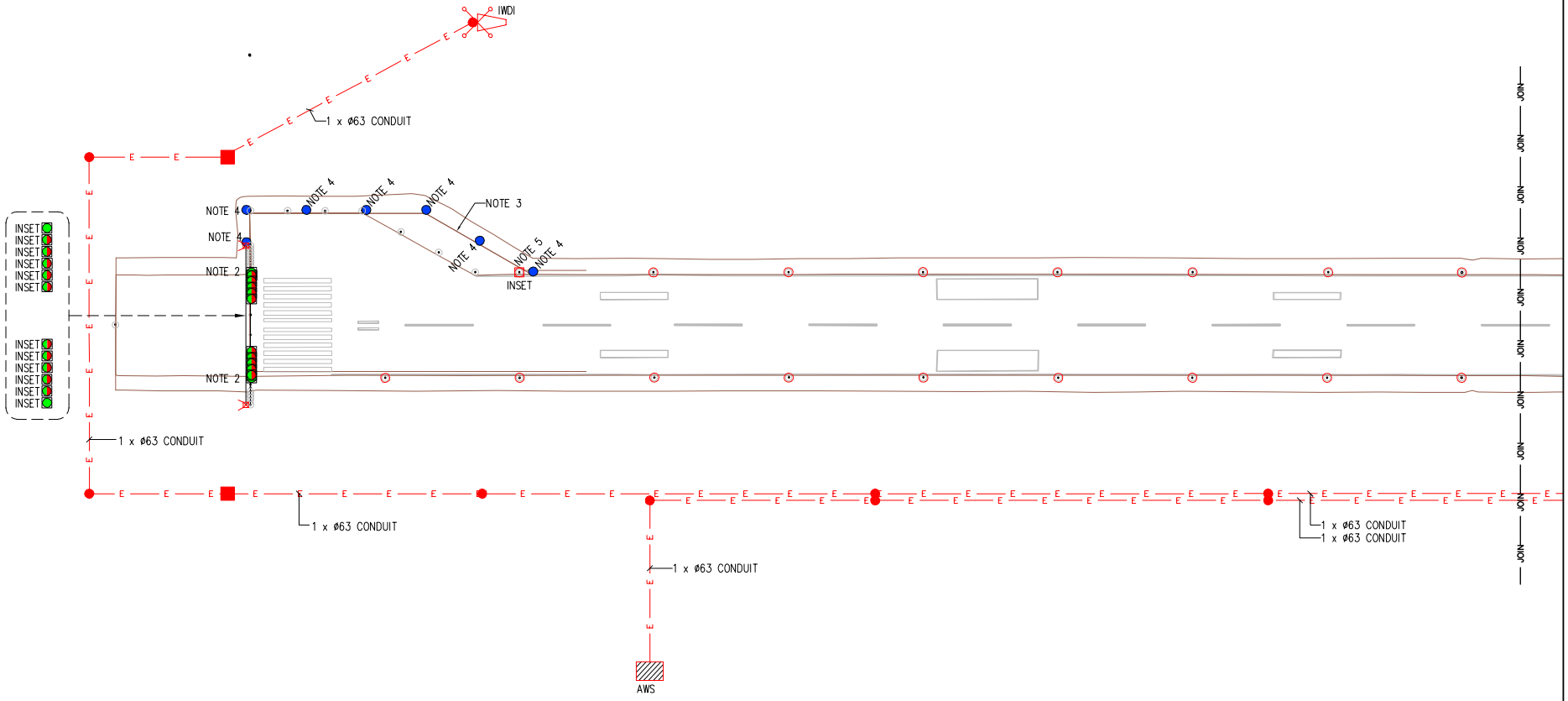
A1 | STATUS: FOR TENDER | DRAWING NO: 60277004-AV-3401 | REV: 3

DESIGN NOTES:

1. UNLESS OTHERWISE DETAILED ON THE DRAWING, NEW RUNWAY LIGHTS, TURNING NODE LIGHTS AND TAXIWAY EDGE LIGHTS MUST BE MOUNTED ON THE EXISTING MOUNTINGS AND CONNECTED TO THE EXISTING SECONDARY CABLES.
2. REMOVE EXISTING WING BAR LIGHTS AND BASES AND REINSTATE PAVEMENT TO THE SATISFACTION OF THE CONTRACT ADMINISTRATOR.
3. PRIOR TO COMMENCEMENT OF CIVIL WORKS FOR TURNING NODE EXTENSION, LOCATE EXISTING RUNWAY LIGHTING PRIMARY CABLE AND EXTEND CABLE TO CLEAR CIVIL WORKS AREA. SUPPLY AND INSTALL NEW CABLE DIRECT BURIED.
4. SUPPLY AND INSTALL NEW TURNING NODE LIGHTS ON NEW MOUNTINGS AS DETAILED ON THE DRAWINGS. RE-USE AND RELOCATE EXISTING SIT'S TO OUTSIDE NEW TURNING NODE PAVEMENT AREA AND CONNECT TO DIVERTED RUNWAY LIGHTING PRIMARY CABLE.
5. SUPPLY AND INSTALL NEW INSET RUNWAY EDGE LIGHT ON NEW INSET BASE. RE-USE AND RELOCATE EXISTING SIT AND CONNECT TO DIVERTED RUNWAY LIGHTING PRIMARY CABLE.

SYMBOL LEGEND:

- MEDIUM INTENSITY RUNWAY EDGE LIGHT – ELEVATED OMNI-DIRECTIONAL WHITE
- MEDIUM INTENSITY RUNWAY EDGE LIGHT – INSET OMNI-DIRECTIONAL WHITE
- MEDIUM INTENSITY RUNWAY EDGE LIGHT – ELEVATED OMNI-DIRECTIONAL WHITE / RED
- MEDIUM INTENSITY THRESHOLD LIGHT – ELEVATED OMNI-DIRECTIONAL GREEN
- MEDIUM INTENSITY THRESHOLD LIGHT – INSET OMNI-DIRECTIONAL GREEN
- MEDIUM INTENSITY RUNWAY THRESHOLD / END LIGHT – ELEVATED BI-DIRECTIONAL GREEN / RED
- MEDIUM INTENSITY RUNWAY THRESHOLD / END LIGHT – INSET UNI-DIRECTIONAL GREEN / RED
- MEDIUM INTENSITY ELEVATED TURNING NODE AND TAXIWAY EDGE LIGHT – ELEVATED OMNI-DIRECTIONAL BLUE
- MEDIUM INTENSITY ELEVATED TURNING NODE AND TAXIWAY EDGE LIGHT – INSET OMNI-DIRECTIONAL BLUE
- MEDIUM INTENSITY HOLD POINT LIGHT – ELEVATED OMNI-DIRECTIONAL YELLOW
- MEDIUM INTENSITY HOLD POINT LIGHT – INSET UNI-DIRECTIONAL YELLOW
- RUNWAY THRESHOLD IDENTIFICATION LIGHT
- ILLUMINATED WIND DIRECTION INDICATOR 'IWDI'
- SIT PIT
- HEAVY DUTY PIT (CLASS 'G' 900x900x900)
- AUTOMATED WEATHER STATION (AWS)
- E — NEW PRIMARY DUCT AND CABLE



AIRFIELD LIGHTING PLAN – SHEET 1

1:1000

NOT FOR CONSTRUCTION

REVISIONS					
No.	BY	DATE	DESCRIPTION	APPD
3	JC	19.06.13	FOR TENDER ISSUE	CR
2	NL	10.05.13	DETAILED DESIGN	CR
1	NW	15.03.13	90% DRAFT ISSUE	CR

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2000

DESIGNED	SH	CHECKED	CR
DRAWN	NW/NL	CHECKED	CR
APPROVED	CR	DATE	May-13

SCALES: 1:1000 (A1)

AECOM New Zealand Limited

CLIENT: TONGA AIRPORTS LIMITED

PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)

FUA'AMOTU INTERNATIONAL AIRPORT (TBU)
AIRFIELD LIGHTING - LAYOUT SHEET 1

A1 | STATUS: FOR TENDER | DRAWING NO: 60277004-AV-3402 | REV: 3

Last saved: Wed, 19 Jun 2013 05:16 pm

CAD Ref: K:\...PROJECTS\ATTA PAIP Airports (60277003 60277004 60277008)\5. CAD\15.3 Working\DRG\03 TBU\ 60277004-AV-3402.dwg

Last saved: Wed, 19 Jun 2013 05:16 pm

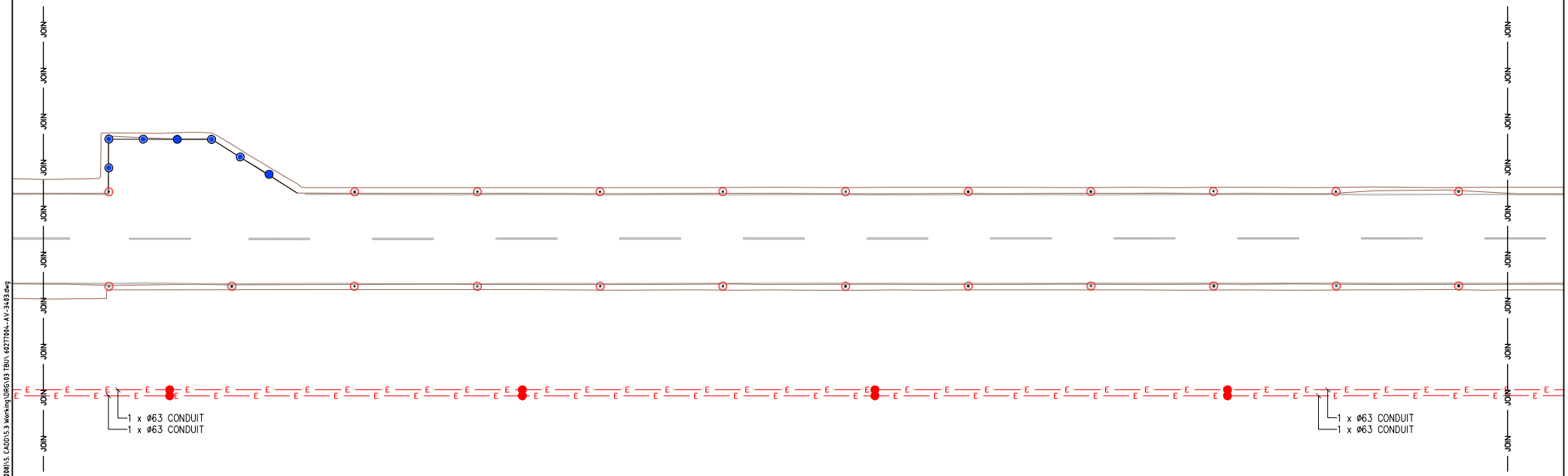
CAD Ref: K:\...PROJECTS\ATTA PAIP Airports (60277003 60277004- 60277008)\S CAD\CS3 Working\DRG\03 TBU\ 60277004-AV-3413.dwg

DESIGN NOTES:

1. UNLESS OTHERWISE DETAILED ON THE DRAWING, NEW RUNWAY LIGHTS, TURNING NODE LIGHTS AND TAXIWAY EDGE LIGHTS MUST BE MOUNTED ON THE EXISTING MOUNTINGS AND CONNECTED TO THE EXISTING SECONDARY CABLES.

SYMBOL LEGEND:

- MEDIUM INTENSITY RUNWAY EDGE LIGHT – ELEVATED OMNI–DIRECTIONAL WHITE
- MEDIUM INTENSITY RUNWAY EDGE LIGHT – INSET OMNI–DIRECTIONAL WHITE
- MEDIUM INTENSITY RUNWAY EDGE LIGHT – ELEVATED OMNI–DIRECTIONAL WHITE / RED
- MEDIUM INTENSITY THRESHOLD LIGHT – ELEVATED OMNI–DIRECTIONAL GREEN
- MEDIUM INTENSITY THRESHOLD LIGHT – INSET OMNI–DIRECTIONAL GREEN
- MEDIUM INTENSITY RUNWAY THRESHOLD / END LIGHT – ELEVATED BI–DIRECTIONAL GREEN / RED
- MEDIUM INTENSITY RUNWAY THRESHOLD / END LIGHT – INSET UNI–DIRECTIONAL GREEN / RED
- MEDIUM INTENSITY ELEVATED TURNING NODE AND TAXIWAY EDGE LIGHT – ELEVATED OMNI–DIRECTIONAL BLUE
- MEDIUM INTENSITY ELEVATED TURNING NODE AND TAXIWAY EDGE LIGHT – INSET OMNI–DIRECTIONAL BLUE
- MEDIUM INTENSITY HOLD POINT LIGHT – ELEVATED OMNI–DIRECTIONAL YELLOW
- MEDIUM INTENSITY HOLD POINT LIGHT – INSET UNI–DIRECTIONAL YELLOW
- RUNWAY THRESHOLD IDENTIFICATION LIGHT
- ILLUMINATED WIND DIRECTION INDICATOR 'IWDI'
- SIT PIT
- HEAVY DUTY PIT (CLASS 'G' 900x900x900)
- AUTOMATED WEATHER STATION (AWS)
- E — NEW PRIMARY DUCT AND CABLE



AIRFIELD LIGHTING PLAN – SHEET 2
1:1000

NOT FOR CONSTRUCTION

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2000

DESIGNED	SH	CHECKED	CR
DRAWN	NW/NL	CHECKED	CR
APPROVED	CR	DATE	May-13

REVISIONS

No.	BY	DATE	DESCRIPTION	APPD
3	JC	19.06.13	FOR TENDER ISSUE	CR
2	NL	10.05.13	DETAILED DESIGN	CR
1	NW	15.03.13	90% DRAFT ISSUE	CR

SCALES: 1:1000 (A1)

AECOM New Zealand Limited

CLIENT: TONGA AIRPORTS LIMITED

PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)

FUA'AMOTU INTERNATIONAL AIRPORT (TBU)
AIRFIELD LIGHTING - LAYOUT SHEET 2

A1	STATUS: FOR TENDER	DRAWING NO: 60277004-AV-3403	REV: 3

Last saved: Wed, 19 Jun 2013 05:16 pm

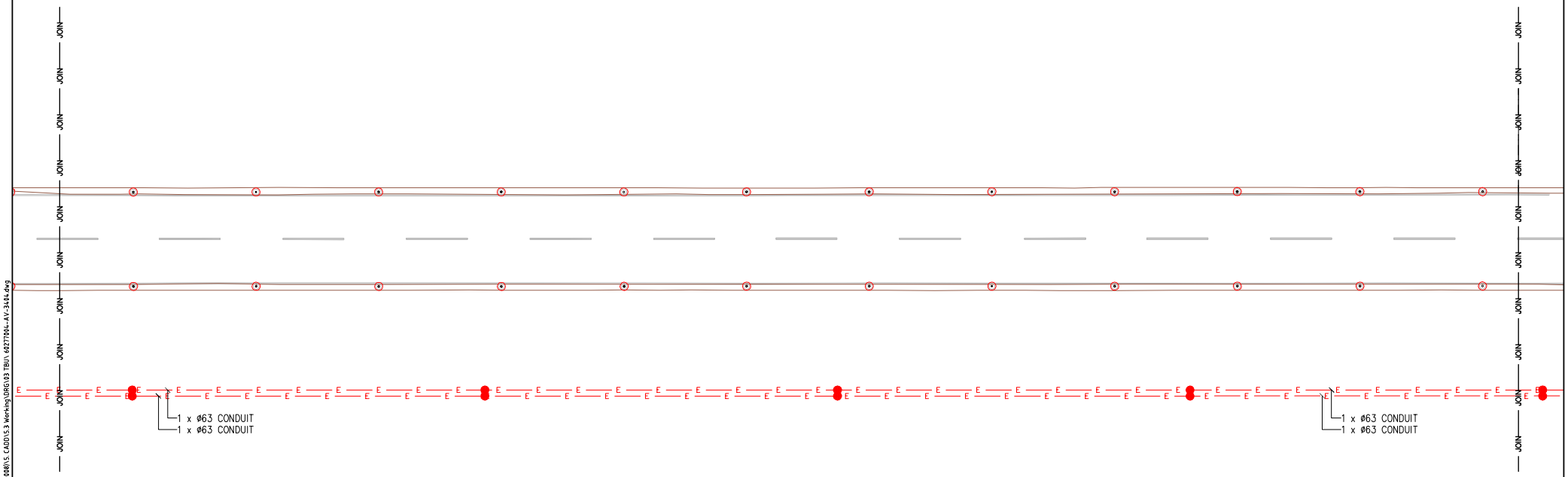
CAD Ref: K:\...PROJECTS\ATTA PAIP Airports (60277003 60277004 60277008)\5 CAD\5.3 Working\DRG\03 TBU\60277004-AV-3414.dwg

DESIGN NOTES:

1. UNLESS OTHERWISE DETAILED ON THE DRAWING, NEW RUNWAY LIGHTS, TURNING NODE LIGHTS AND TAXIWAY EDGE LIGHTS MUST BE MOUNTED ON THE EXISTING MOUNTINGS AND CONNECTED TO THE EXISTING SECONDARY CABLES.

SYMBOL LEGEND:

- MEDIUM INTENSITY RUNWAY EDGE LIGHT – ELEVATED OMNI-DIRECTIONAL WHITE
- MEDIUM INTENSITY RUNWAY EDGE LIGHT – INSET OMNI-DIRECTIONAL WHITE
- MEDIUM INTENSITY RUNWAY EDGE LIGHT – ELEVATED OMNI-DIRECTIONAL WHITE / RED
- MEDIUM INTENSITY THRESHOLD LIGHT – ELEVATED OMNI-DIRECTIONAL GREEN
- MEDIUM INTENSITY THRESHOLD LIGHT – INSET OMNI-DIRECTIONAL GREEN
- MEDIUM INTENSITY RUNWAY THRESHOLD / END LIGHT – ELEVATED BI-DIRECTIONAL GREEN / RED
- MEDIUM INTENSITY RUNWAY THRESHOLD / END LIGHT – INSET UNI-DIRECTIONAL GREEN / RED
- MEDIUM INTENSITY ELEVATED TURNING NODE AND TAXIWAY EDGE LIGHT – ELEVATED OMNI-DIRECTIONAL BLUE
- MEDIUM INTENSITY ELEVATED TURNING NODE AND TAXIWAY EDGE LIGHT – INSET OMNI-DIRECTIONAL BLUE
- MEDIUM INTENSITY HOLD POINT LIGHT – ELEVATED OMNI-DIRECTIONAL YELLOW
- MEDIUM INTENSITY HOLD POINT LIGHT – INSET UNI-DIRECTIONAL YELLOW
- RUNWAY THRESHOLD IDENTIFICATION LIGHT
- ILLUMINATED WIND DIRECTION INDICATOR 'IWDI'
- SIT PIT
- HEAVY DUTY PIT (CLASS 'G' 900x900x900)
- AUTOMATED WEATHER STATION (AWS)
- E — NEW PRIMARY DUCT AND CABLE



AIRFIELD LIGHTING PLAN – SHEET 3

1:1000

NOT FOR CONSTRUCTION

REVISIONS

No.	BY	DATE	DESCRIPTION	APPD
3	JC	19.06.13	FOR TENDER ISSUE	CR
2	NL	10.05.13	DETAILED DESIGN	CR
1	NW	15.03.13	90% DRAFT ISSUE	CR

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2000

DESIGNED	SH	CHECKED	CR
DRAWN	NW/NL	CHECKED	CR
APPROVED	CR	DATE	May-13

SCALES: 1:1000 (A1)

AECOM

AECOM New Zealand Limited

CLIENT: TONGA AIRPORTS LIMITED

PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)

FUA'AMOTU INTERNATIONAL AIRPORT (TBU)
AIRFIELD LIGHTING - LAYOUT SHEET 3

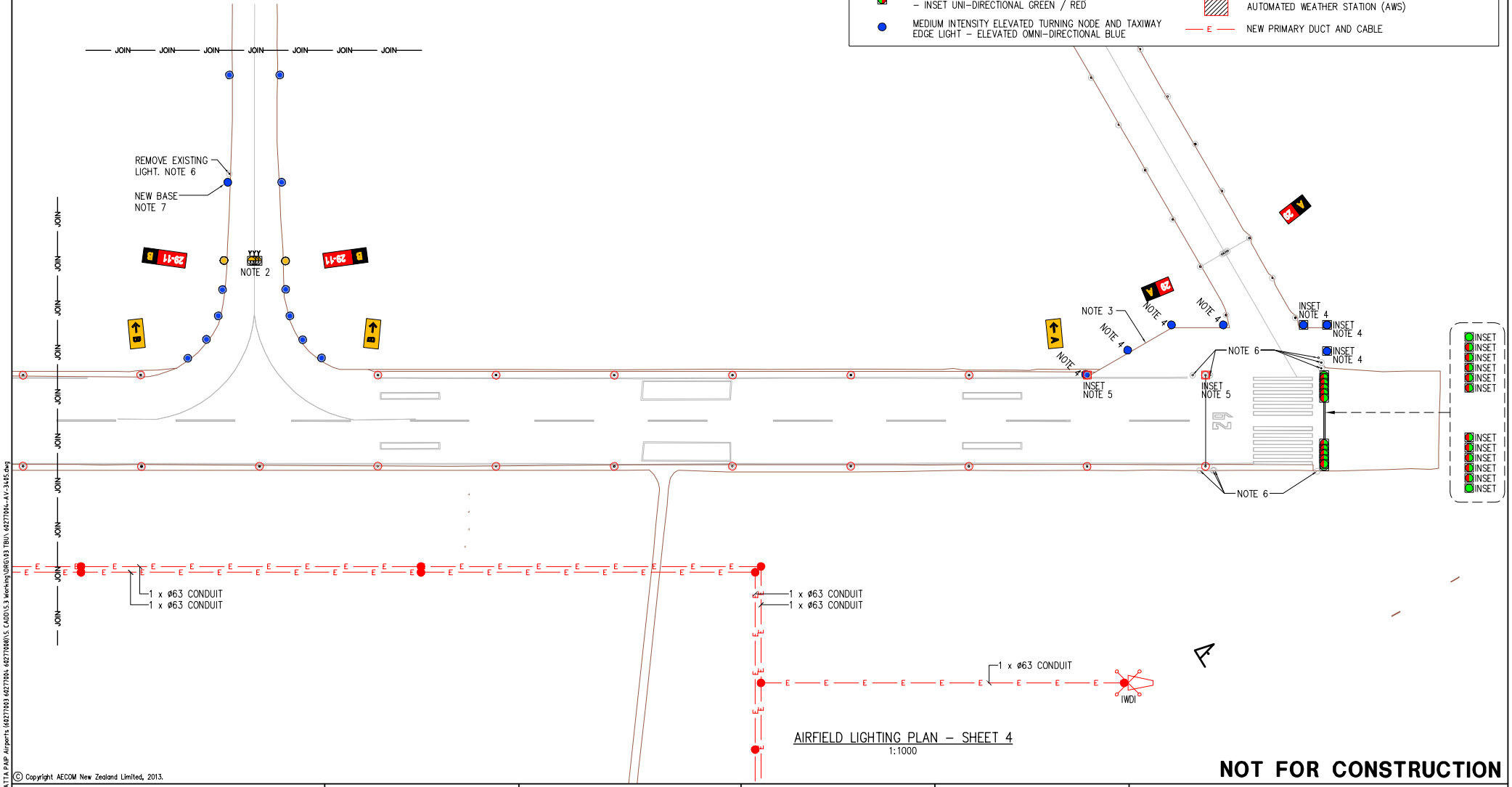
A1	STATUS: FOR TENDER	DRAWING NO: 60277004-AV-3404	REV: 3

DESIGN NOTES:

1. UNLESS OTHERWISE DETAILED ON THE DRAWING, NEW RUNWAY LIGHTS, TURNING NODE LIGHTS AND TAXIWAY EDGE LIGHTS MUST BE MOUNTED ON THE EXISTING MOUNTINGS AND CONNECTED TO THE EXISTING SECONDARY CABLES.
2. SUPPLY AND INSTALL 3 NEW INSET HOLDING POINT LIGHTS. INSTALL 3 NEW SIT's OFF PAVEMENT. SUPPLY AND INSTALL NEW SECONDARY CABLES FROM LIGHTS TO SIT's AS DETAILED ON THE DRAWINGS
3. PRIOR TO COMMENCEMENT OF CIVIL WORKS FOR TURNING NODE EXTENSION, LOCATE EXISTING RUNWAY LIGHTING PRIMARY CABLE AND EXTEND CABLE TO CLEAR CIVIL WORKS AREA. SUPPLY AND INSTALL NEW CABLE DIRECT BURIED.
4. SUPPLY AND INSTALL NEW TURNING NODE LIGHTS ON NEW MOUNTINGS AS DETAILED ON THE DRAWINGS. RE-USE AND RELOCATE EXISTING SIT'S TO OUTSIDE NEW TURNING NODE PAVEMENT AREA AND CONNECT TO DIVERTED RUNWAY LIGHTING PRIMARY CABLE.
5. SUPPLY AND INSTALL NEW INSET RUNWAY EDGE LIGHT ON NEW INSET BASE. RE-USE AND RELOCATE EXISTING SIT PIT AND CONNECT TO DIVERTED RUNWAY LIGHTING PRIMARY CABLE.
6. REMOVE EXISTING LIGHT AND MOUNTING AND REINSTATE PAVEMENT
7. SUPPLY AND INSTALL NEW TAXIWAY EDGE LIGHT ON NEW MOUNTING AS DETAILED ON THE DRAWINGS

SYMBOL LEGEND:

- MEDIUM INTENSITY RUNWAY EDGE LIGHT – ELEVATED OMNI-DIRECTIONAL WHITE
- MEDIUM INTENSITY RUNWAY EDGE LIGHT – INSET OMNI-DIRECTIONAL WHITE
- MEDIUM INTENSITY RUNWAY EDGE LIGHT – ELEVATED OMNI-DIRECTIONAL WHITE / RED
- MEDIUM INTENSITY THRESHOLD LIGHT – ELEVATED OMNI-DIRECTIONAL GREEN
- MEDIUM INTENSITY THRESHOLD LIGHT – INSET OMNI-DIRECTIONAL GREEN
- MEDIUM INTENSITY RUNWAY THRESHOLD / END LIGHT – ELEVATED BI-DIRECTIONAL GREEN / RED
- MEDIUM INTENSITY RUNWAY THRESHOLD / END LIGHT – INSET UNI-DIRECTIONAL GREEN / RED
- MEDIUM INTENSITY ELEVATED TURNING NODE AND TAXIWAY EDGE LIGHT – ELEVATED OMNI-DIRECTIONAL BLUE
- MEDIUM INTENSITY ELEVATED TURNING NODE AND TAXIWAY EDGE LIGHT – INSET OMNI-DIRECTIONAL BLUE
- MEDIUM INTENSITY HOLD POINT LIGHT – ELEVATED OMNI-DIRECTIONAL YELLOW
- MEDIUM INTENSITY HOLD POINT LIGHT – INSET UNI-DIRECTIONAL YELLOW
- RUNWAY THRESHOLD IDENTIFICATION LIGHT
- ILLUMINATED WIND DIRECTION INDICATOR 'IWDI'
- SIT PIT
- HEAVY DUTY PIT (CLASS 'G' 900x900x900)
- AUTOMATED WEATHER STATION (AWS)
- E — NEW PRIMARY DUCT AND CABLE



AIRFIELD LIGHTING PLAN – SHEET 4
1:1000

NOT FOR CONSTRUCTION

REVISIONS					
No.	BY	DATE	DESCRIPTION		APPD
4	JC	19.06.13	FOR TENDER ISSUE		CR
3	NL	10.05.13	DETAILED DESIGN		CR
2	NW	26.03.13	90% DRAFT ISSUE REVISION		CR
1	NW	15.03.13	90% DRAFT ISSUE		CR

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DESIGNED	SH	CHECKED	CR
DRAWN	NW/NL	CHECKED	CR
APPROVED	CR	DATE	May-13

SCALES: 1:1000 (A1)

AECOM New Zealand Limited

CLIENT: TONGA AIRPORTS LIMITED

PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)

FUA'AMOTU INTERNATIONAL AIRPORT (TBU)
AIRFIELD LIGHTING - LAYOUT SHEET 4

A1 | STATUS: FOR TENDER | DRAWING NO: 60277004-AV-3405 | REV: 4

Last saved: Wed, 19 Jun 2013 05:16 pm

CAD Ref: K:\...PROJECTS\ATTA PAIP Airports (60277003 60277004 60277008)\5 CAD\15.3 Working\ORG\03 TBU\ 60277004-AV-3405.dwg

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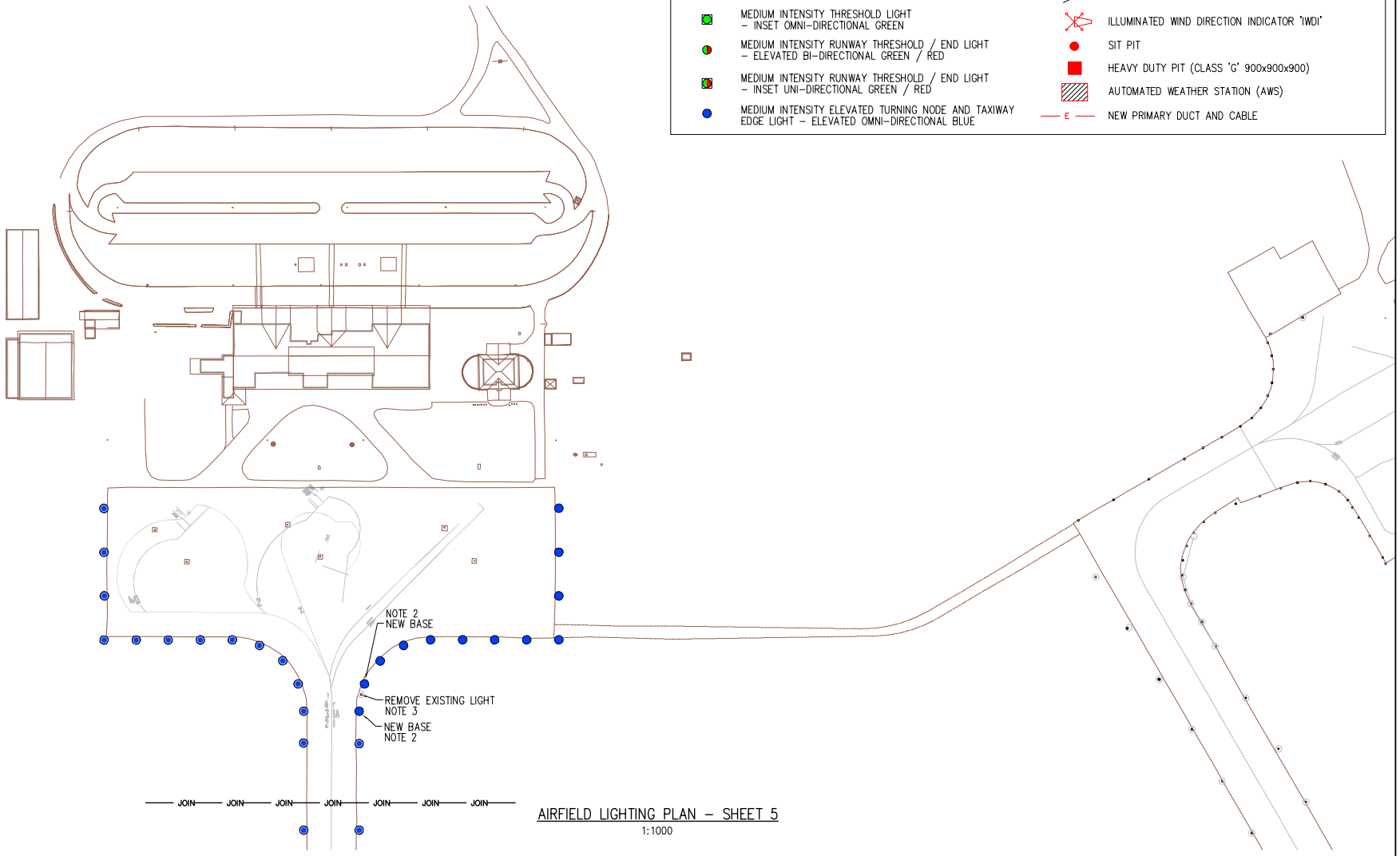
CAD Ref: K:\...PROJECTS\ATTA PAIP Airports (60277003 60277004 60277008)\5 CAD\15.3 Working\DRG\03 TBU\60277004-AV-3416.dwg

DESIGN NOTES:

1. UNLESS OTHERWISE DETAILED ON THE DRAWING, NEW RUNWAY LIGHTS, TURNING NODE LIGHTS AND TAXIWAY EDGE LIGHTS MUST BE MOUNTED ON THE EXISTING MOUNTINGS AND CONNECTED TO THE EXISTING SECONDARY CABLES.
2. SUPPLY AND INSTALL NEW TAXIWAY EDGE LIGHT ON NEW MOUNTING AS DETAILED ON THE DRAWINGS
3. REMOVE EXISTING LIGHT AND MOUNTING AND REINSTATE PAVEMENT

SYMBOL LEGEND:

- MEDIUM INTENSITY RUNWAY EDGE LIGHT – ELEVATED OMNI-DIRECTIONAL WHITE
- MEDIUM INTENSITY RUNWAY EDGE LIGHT – INSET OMNI-DIRECTIONAL WHITE
- MEDIUM INTENSITY RUNWAY EDGE LIGHT – ELEVATED OMNI-DIRECTIONAL WHITE / RED
- MEDIUM INTENSITY THRESHOLD LIGHT – ELEVATED OMNI-DIRECTIONAL GREEN
- MEDIUM INTENSITY THRESHOLD LIGHT – INSET OMNI-DIRECTIONAL GREEN
- MEDIUM INTENSITY RUNWAY THRESHOLD / END LIGHT – ELEVATED BI-DIRECTIONAL GREEN / RED
- MEDIUM INTENSITY RUNWAY THRESHOLD / END LIGHT – INSET UNI-DIRECTIONAL GREEN / RED
- MEDIUM INTENSITY ELEVATED TURNING NODE AND TAXIWAY EDGE LIGHT – ELEVATED OMNI-DIRECTIONAL BLUE
- MEDIUM INTENSITY ELEVATED TURNING NODE AND TAXIWAY EDGE LIGHT – INSET OMNI-DIRECTIONAL BLUE
- MEDIUM INTENSITY HOLD POINT LIGHT – ELEVATED OMNI-DIRECTIONAL YELLOW
- MEDIUM INTENSITY HOLD POINT LIGHT – INSET UNI-DIRECTIONAL YELLOW
- RUNWAY THRESHOLD IDENTIFICATION LIGHT
- ILLUMINATED WIND DIRECTION INDICATOR 'IWDI'
- SIT PIT
- HEAVY DUTY PIT (CLASS 'G' 900x900x900)
- AUTOMATED WEATHER STATION (AWS)
- E — NEW PRIMARY DUCT AND CABLE



AIRFIELD LIGHTING PLAN – SHEET 5
1:1000

NOT FOR CONSTRUCTION

REVISIONS					
No.	BY	DATE	DESCRIPTION	APPD
3	JC	19.06.13	FOR TENDER ISSUE	CR
2	NL	10.05.13	DETAILED DESIGN	CR
1	NW	15.03.13	90% DRAFT ISSUE	CR

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2000

DESIGNED	SH	CHECKED	CR
DRAWN	NW/NL	CHECKED	CR
APPROVED	CR	DATE	May-13

SCALES: 1:1000 (A1)

AECOM New Zealand Limited

CLIENT: TONGA AIRPORTS LIMITED

PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)

FUA'AMOTU INTERNATIONAL AIRPORT (TBU)
AIRFIELD LIGHTING - LAYOUT SHEET 5

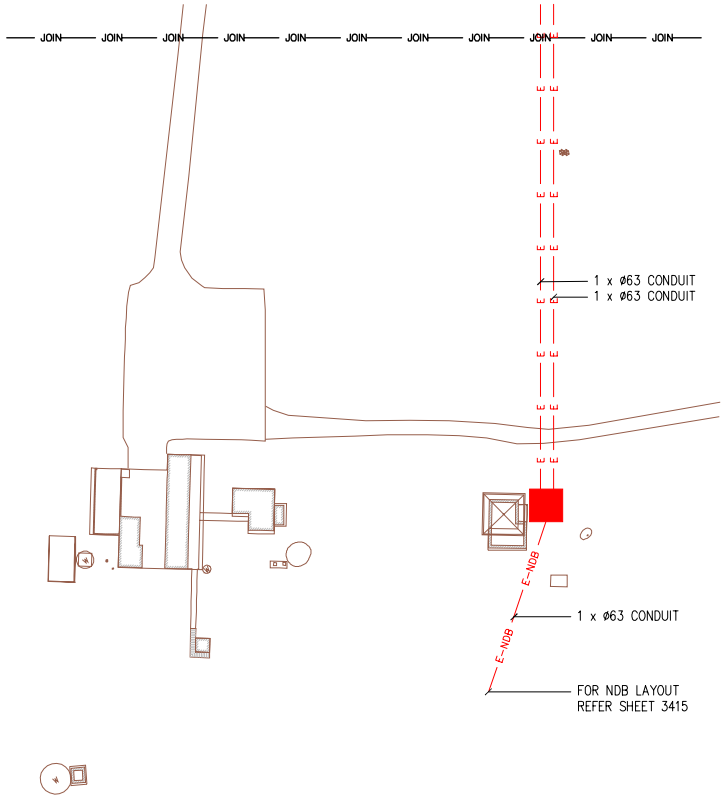
A1 | STATUS: FOR TENDER | DRAWING NO: 60277004-AV-3406 | REV: 3

Last saved: Wed, 19 Jun 2013 05:17 pm

CAD Ref: K:\...PROJECTS\ATTA PAIP Airports (60277003 60277004 60277008)\5 CAD\15.3 Working\DRG\03 TBU\ 60277004-AV-3417.dwg

SYMBOL LEGEND:

- MEDIUM INTENSITY RUNWAY EDGE LIGHT – ELEVATED OMNI-DIRECTIONAL WHITE
- MEDIUM INTENSITY RUNWAY EDGE LIGHT – INSET OMNI-DIRECTIONAL WHITE
- MEDIUM INTENSITY RUNWAY EDGE LIGHT – ELEVATED OMNI-DIRECTIONAL WHITE / RED
- MEDIUM INTENSITY THRESHOLD LIGHT – ELEVATED OMNI-DIRECTIONAL GREEN
- MEDIUM INTENSITY THRESHOLD LIGHT – INSET OMNI-DIRECTIONAL GREEN
- MEDIUM INTENSITY RUNWAY THRESHOLD / END LIGHT – ELEVATED BI-DIRECTIONAL GREEN / RED
- MEDIUM INTENSITY RUNWAY THRESHOLD / END LIGHT – INSET UNI-DIRECTIONAL GREEN / RED
- MEDIUM INTENSITY ELEVATED TURNING NODE AND TAXIWAY EDGE LIGHT – ELEVATED OMNI-DIRECTIONAL BLUE
- MEDIUM INTENSITY ELEVATED TURNING NODE AND TAXIWAY EDGE LIGHT – INSET OMNI-DIRECTIONAL BLUE
- MEDIUM INTENSITY HOLD POINT LIGHT – ELEVATED OMNI-DIRECTIONAL YELLOW
- MEDIUM INTENSITY HOLD POINT LIGHT – INSET UNI-DIRECTIONAL YELLOW
- RUNWAY THRESHOLD IDENTIFICATION LIGHT
- ILLUMINATED WIND DIRECTION INDICATOR 'IWDI'
- SIT PIT
- HEAVY DUTY PIT (CLASS 'G' 900x900x900)
- AUTOMATED WEATHER STATION (AWS)
- E — NEW PRIMARY DUCT AND CABLE



AIRFIELD LIGHTING PLAN – SHEET 6
1:500

NOT FOR CONSTRUCTION

REVISIONS					
No.	BY	DATE	DESCRIPTION	APPD
4	JC	19.06.13	FOR TENDER ISSUE	CR
3	NL	10.05.13	DETAILED DESIGN	CR
2	NW	26.03.13	90% DRAFT ISSUE REVISION	CR
1	NW	15.03.13	90% DRAFT ISSUE	CR

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2000

DESIGNED	SH	CHECKED	CR
DRAWN	NW/NL	CHECKED	CR
APPROVED	CR	DATE	May-13

SCALES: 1:500 (A1)

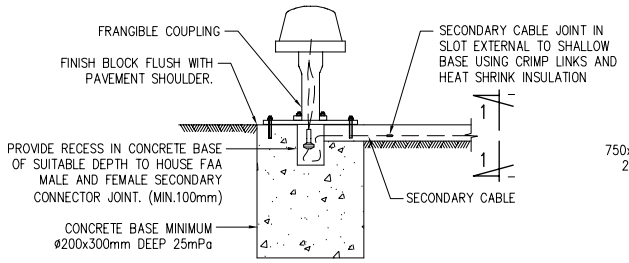
AECOM New Zealand Limited

CLIENT: TONGA AIRPORTS LIMITED

PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)

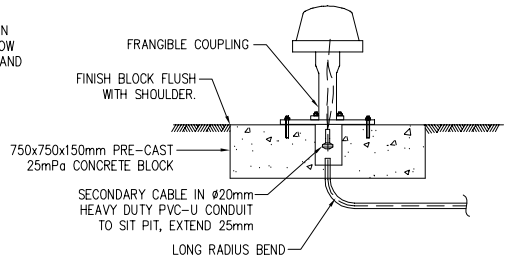
FUA'AMOTU INTERNATIONAL AIRPORT (TBU)
AIRFIELD LIGHTING - LAYOUT SHEET 6

A1 | STATUS: FOR TENDER | DRAWING NO: 60277004-AV-3407 | REV: 4



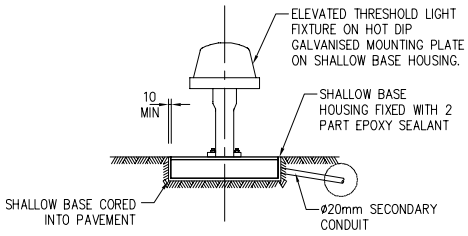
TYPICAL INSTALLATION ELEVATED EDGE LIGHT FIXTURE IN SEALED SHOULDER

NTS



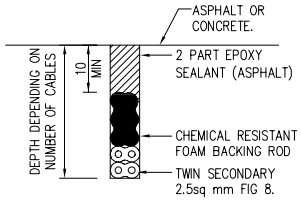
TYPICAL INSTALLATION ELEVATED LIGHT FIXTURE IN UNSEALED SHOULDER

NTS



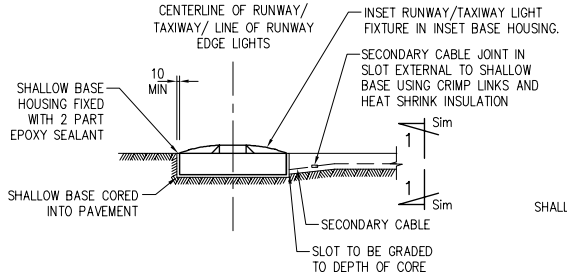
TYPICAL ELEVATED THRESHOLD LIGHT INSTALLATION ON SHALLOW BASE HOUSING

NTS



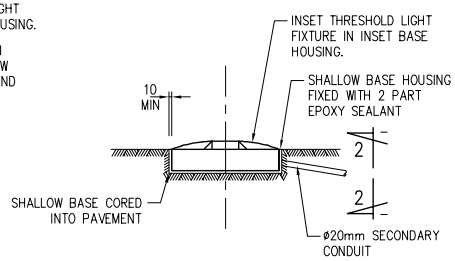
SAWN CABLE SLOT DETAIL

NTS



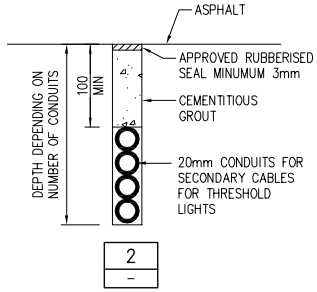
TYPICAL INSTALLATION INSET LIGHT FIXTURE IN SHALLOW BASE HOUSING

NTS



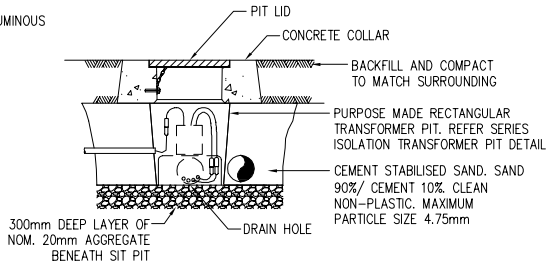
TYPICAL INSET THRESHOLD LIGHT INSTALLATION ON SHALLOW BASE HOUSING

NTS



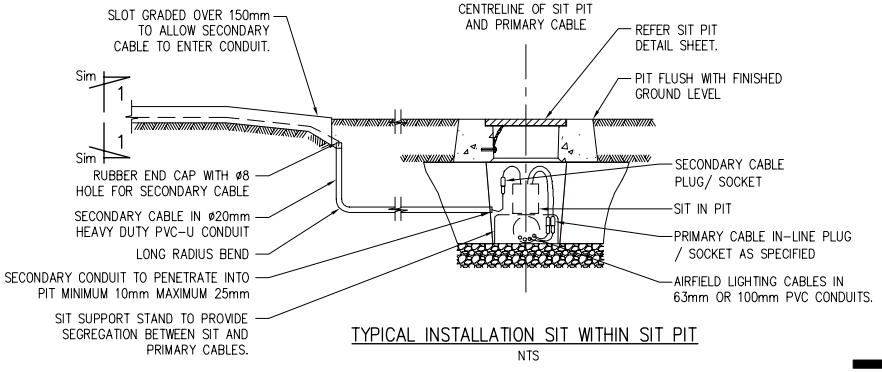
THRESHOLD LIGHT CONDUITS INSTALLATION DETAIL

NTS



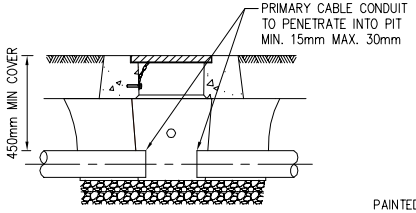
SIT PIT INSTALLATION REQUIREMENTS

NTS



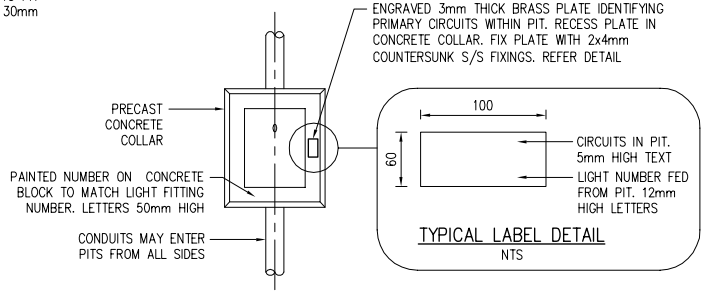
TYPICAL INSTALLATION SIT WITHIN SIT PIT

NTS



SIT PIT PRIMARY CABLE PENETRATION

NTS

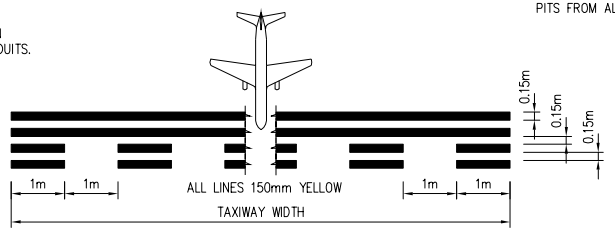


TYPICAL LABEL DETAIL

NTS

SIT PIT DETAIL

NTS



TAXIWAY HOLD POINT

NTS

NOT FOR CONSTRUCTION

REVISIONS				
No.	BY	DATE	DESCRIPTION	APPD
3	JC	19.06.13	FOR TENDER ISSUE	CR
2	NL	10.05.13	DETAILED DESIGN	CR
1	NW	15.03.13	90% DRAFT ISSUE	CR

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DESIGNED	SH	CHECKED	CR
DRAWN	NW/NL	CHECKED	CR
APPROVED	CR	DATE	May-13

SCALES: NTS

AECOM

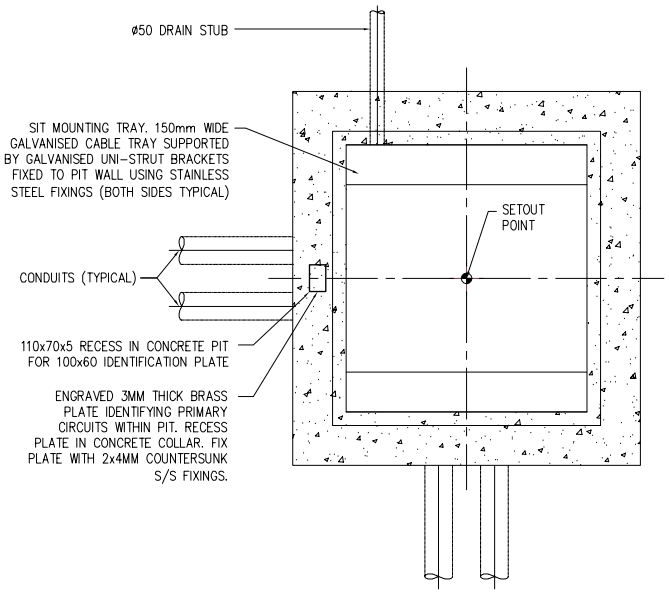
AECOM New Zealand Limited

CLIENT: TONGA AIRPORTS LIMITED

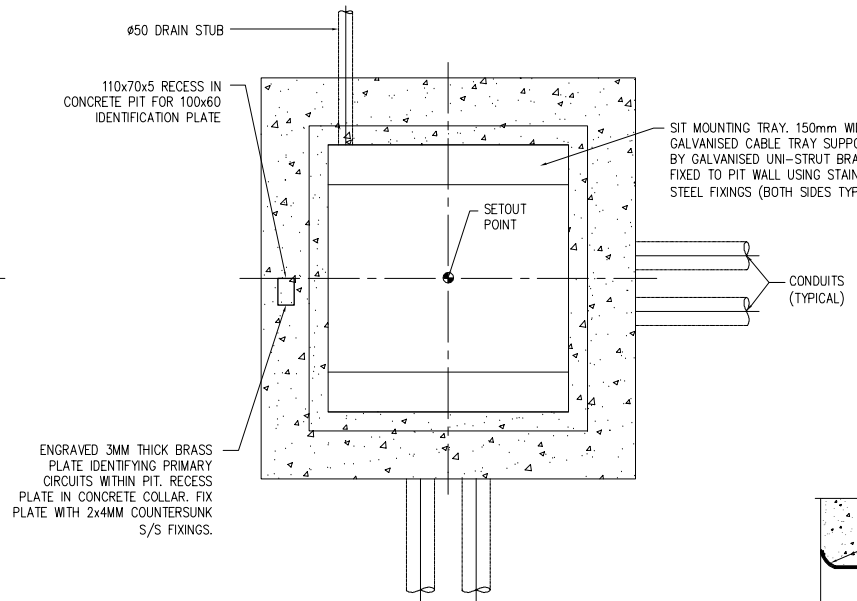
PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)

FUA'AMOTU INTERNATIONAL AIRPORT (TBU)
LIGHT FIXTURE AND PIT I NSTALLATION DETAILS

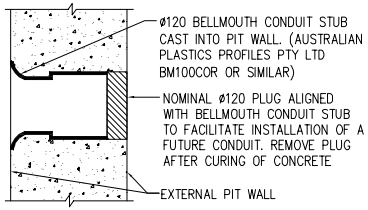
A1 | STATUS: FOR TENDER | DRAWING NO: 60277004-AV-3410 | REV: 3



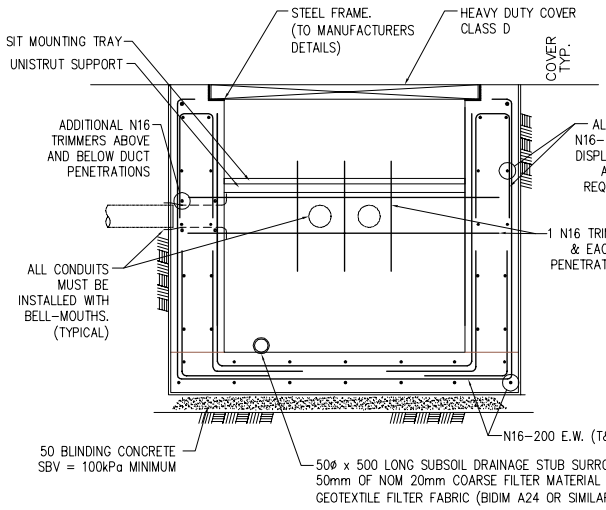
CLASS D ELECTRICAL PIT
GENERAL ARRANGEMENT
SCALE 1:10



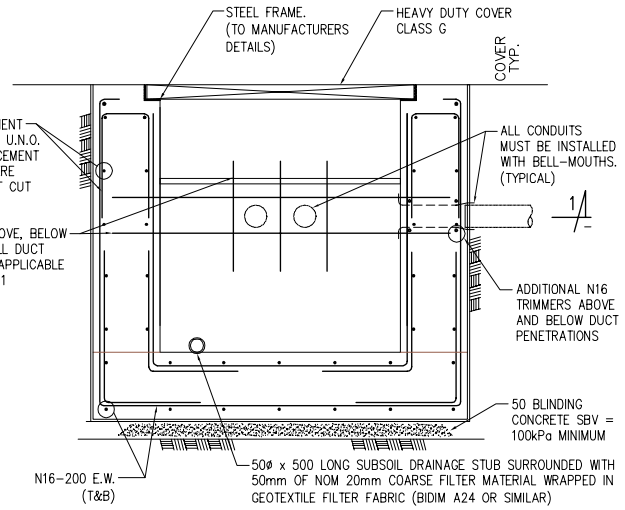
CLASS G ELECTRICAL PIT
GENERAL ARRANGEMENT
SCALE 1:10



1
–
NTS



TYPICAL SECTION OF CLASS D PIT



TYPICAL SECTION CLASS G PIT

NOTE 1:
PROVIDE NUMBER OF PENETRATIONS OF THE REQUIRED SIZE AND AT THE REQUIRED DEPTH TO SUIT EACH LOCATION

NOT FOR CONSTRUCTION

REVISIONS					
No.	BY	DATE	DESCRIPTION	APPD
3	JC	19.06.13	FOR TENDER ISSUE	CR
2	NL	10.05.13	DETAILED DESIGN	CR
1	NW	15.03.13	90% DRAFT ISSUE	CR

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DESIGNED	SH	CHECKED	CR
DRAWN	NW/NL	CHECKED	CR
APPROVED	CR	DATE	May-13

SCALES: NTS

AECOM New Zealand Limited

CLIENT: TONGA AIRPORTS LIMITED

PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)

FUA'AMOTU INTERNATIONAL AIRPORT (TBU)
CLASS 'D' AND 'G' HEAVY DUTY PIT DETAILS

A1 | STATUS: FOR TENDER | DRAWING NO. 60277004-AV-3411 | REV: 3

CAD Ref: K:\...PROJECTS\ATTA PAIP Airports (60277003 60277004- 60277008)\5 CAD\15.3 Working\GRG\03 TBU\ 60277004-AV-3411.dwg

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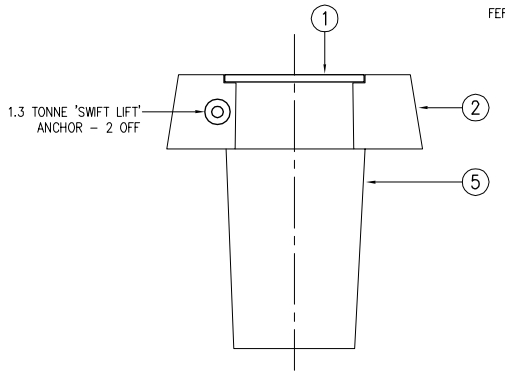
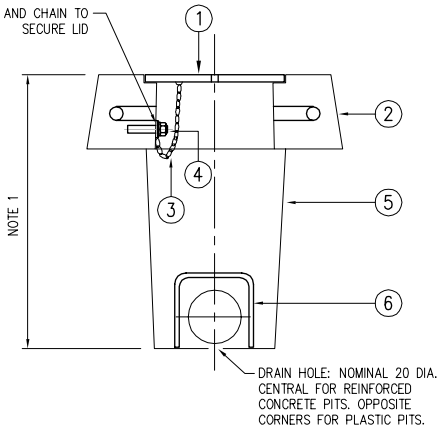
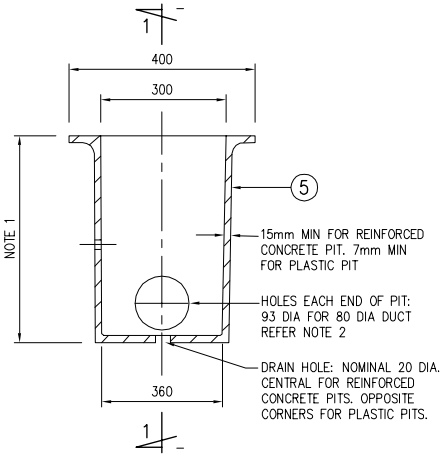


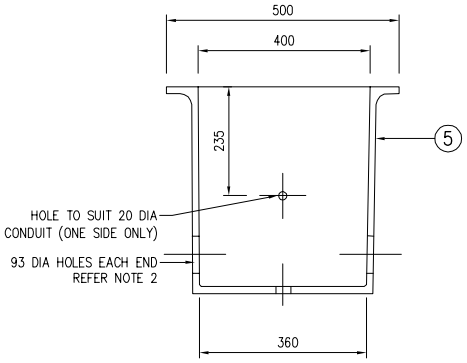
SERIES ISOLATION TRANSFORMER PIT – ASSEMBLED END VIEW



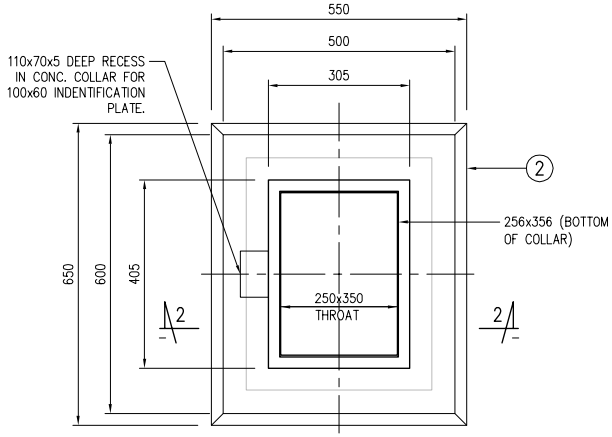
SERIES ISOLATION TRANSFORMER PIT – END VIEW SECTION



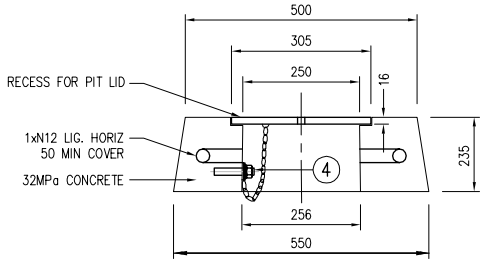
TRANSFORMER PIT – END VIEW SECTION



1 – NTS



CONCRETE COLLAR – PLAN VIEW



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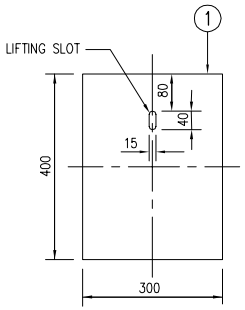


LID – PLAN VIEW

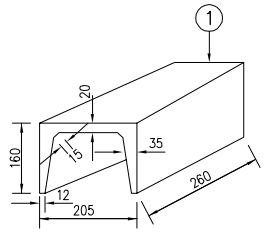
NOTES:

1A. STANDARD PIT DEPTH 430mm FOR 450mm COVER OVER TOP OF DUCT, OVERALL DEPTH 590mm
1B. SPECIAL PIT DEPTH 480mm FOR 500mm COVER OVER TOP OF DUCT, OVERALL DEPTH 640mm
1C. SPECIAL PIT DEPTH 730mm FOR 750mm COVER OVER TOP OF DUCT, OVERALL DEPTH 945mm
2. WHERE DUCTS ARE SMALLER OR LARGER THAN 80mm ARE USED, PROVIDE HOLES OF APPROPRIATE SIZES FOR DUCT SIZE USED

PART NUMBERS:

PART NUMBERS PROVIDED FOR INFORMATION ONLY.
ITEMS MAY BE SOURCED FROM OTHER SUPPLIERS

ITEM	DESCRIPTION	BVCI PTY LTD	COOKE PRECAST CONCRETE PTY LTD
1	PIT LID WITH CHAIN	321200	SIT/CSL
2	PIT COLLAR	523165	SIT/COL
5	TRANSFORMER PIT	124060	SIT/PIT
6	TRANSFORMER SUPPORT STAND	124065	SIT/TS



TRANSFORMER STAND – ISOMETRIC VIEW

NOTE:
DIMENSIONS SHOWN FOR REINFORCED CONCRETE PIT. SIMILAR FOR PLASTIC PIT

PARTS LIST:

ITEM	DESCRIPTION	MATERIAL	NOTE
1	PIT LID	16mm THICK HOT DIP GALVANISED STEEL GRADE 250	
2	PIT COLLAR	32 MPa PRECAST CONCRETE COLLAR WITH 1xN12 LIG. 80+/– SLUMP. 14–20mm AGGREGATE	50 MIN COVER TO LIG. 1.3 TONNE SWIFT LIFT ANCHOR – 2 OFF
3	LID CHAIN	GENERAL PURPOSE HOT DIP GALVANISED 5mm CHAIN (188.7m/100kg) 500mm LENGTH	WELD TO UNDERSIDE OF STEEL LID AND BOLT TO ITEM 4
4	CHAIN FIXING	STUD/WASHER/NUT/FERRULE	CAST OR CHEMICALLY ANCHORED STAINLESS STEEL STUD IN COLLAR
5	TRANSFORMER PIT	U.V STABILISED POLYETHYLENE OR FIBERGLASS REINFORCED CONCRETE (RECTANGULAR)	REFER NOTES 1A, 1B AND 1C FOR PIT REQUIRED DEPTHS
6	TRANSFORMER SUPPORT STAND	U.V STABILISED POLYETHYLENE OR FIBERGLASS REINFORCED CONCRETE	

SERIES ISOLATING TRANSFORMER PIT / CONSTRUCTION DETAILS

NOT FOR CONSTRUCTION

REVISIONS No.	BY	DATE	DESCRIPTION	APPD
3	JC	19.06.13	FOR TENDER ISSUE	CR
2	NL	10.05.13	DETAILED DESIGN	CR
1	NW	15.03.13	90% DRAFT ISSUE	CR

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DESIGNED	SH	CHECKED	CR
DRAWN	NW/NL	CHECKED	CR
APPROVED	CR	DATE	May-13

SCALES: NTS

AECOM New Zealand Limited

CLIENT: TONGA AIRPORTS LIMITED

PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)

FUA'AMOTU INTERNATIONAL AIRPORT (TBU)
SIT PIT DETAILS SHET

A1 | STATUS: FOR TENDER | DRAWING NO: 60277004-AV-3412 | REV: 3

CAD Ref: K:\...PROJECTS\ATTA PAIP Airports (60277003 60277004- 60277008)\5 CAD\5.3 Working\DRG\03 TBU\ 60277004-AV-3412.dwg

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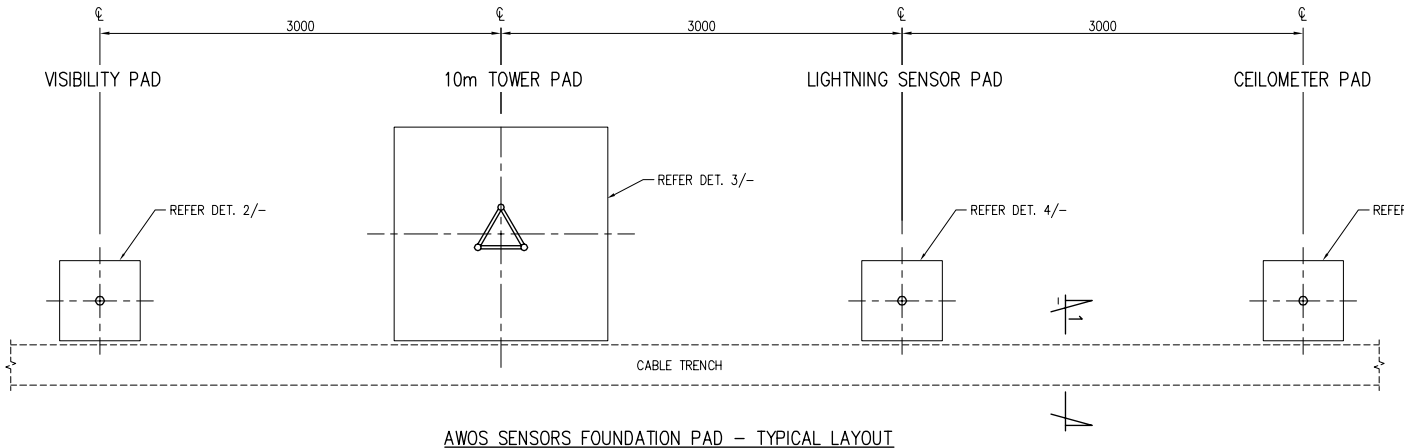
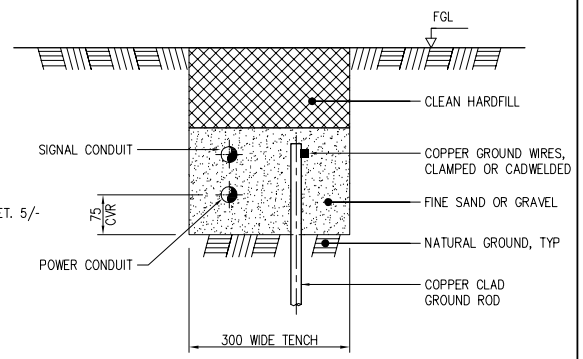


AWOS SENSORS FOUNDATION PAD – TYPICAL LAYOUT

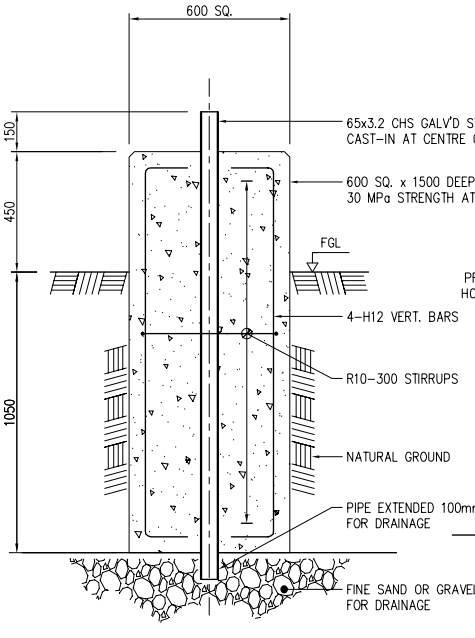
1:20mm



TYPICAL TRENCH DETAIL

1

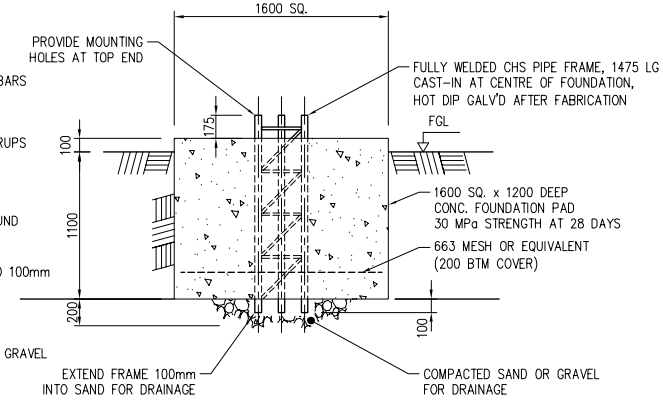
1:5mm



VISIBILITY SENSOR FOUNDATION PAD DETAIL

2

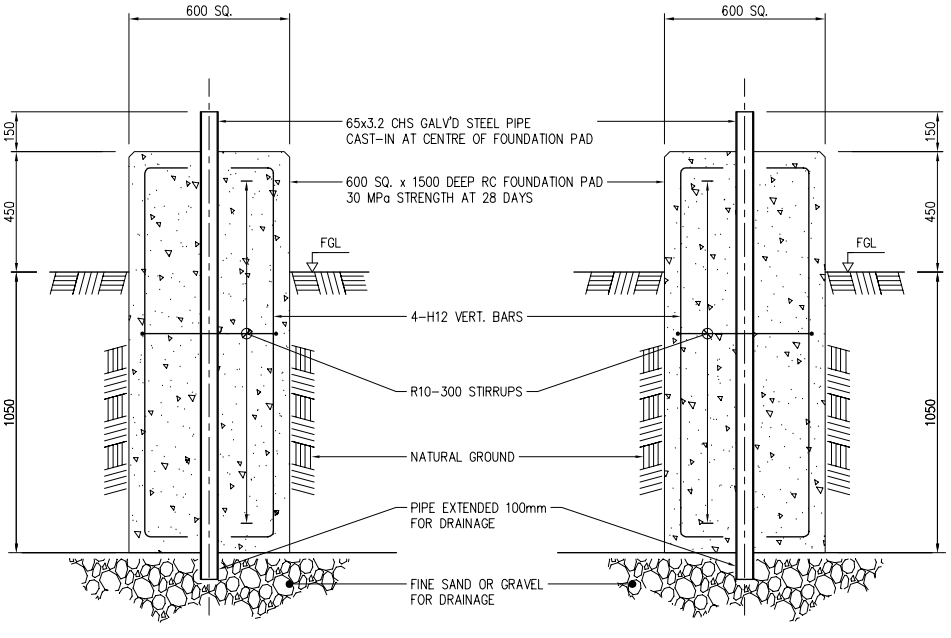
1:10mm



10m TOWER FOUNDATION PAD DETAIL

3

1:20mm



LIGHTNING SENSOR FOUNDATION PAD DETAIL

4

1:10mm

CEILOMETER FOUNDATION PAD DETAIL

5

1:10mm

NOT FOR CONSTRUCTION

REVISIONS				
No.	BY	DATE	DESCRIPTION	APPD
3	JC	19.06.13	FOR TENDER ISSUE	CR
2	NL	10.05.13	DETAILED DESIGN	CR
1	NW	15.03.13	90% DRAFT ISSUE	CR

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2000

DESIGNED	SH	CHECKED	CR
DRAWN	NW/NL	CHECKED	CR
APPROVED	CR	DATE	May-13

SCALES: AS SHOWN

AECOM

AECOM New Zealand Limited

CLIENT: TONGA AIRPORTS LIMITED

PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)

FUA'AMOTU INTERNATIONAL AIRPORT (TBU)
AUTOMATIC WEATHER STATION INSTALLATION

A1 | STATUS: FOR TENDER | DRAWING NO: 60277004-AV-3413 | REV: 3

CAD Ref: K:\...PROJECTS\ATTA PAIP Airports (60277003 60277004- 60277008)\5 CAD\15.3 Working\DRG\03 TBU\ 60277004-AV-3413.dwg

Last saved: Wed, 19 Jun 2013 05:17 pm

FUA'AMOTU NDB
NTS

NOT FOR CONSTRUCTION

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2000

DESIGNED	SH	CHECKED	CR
DRAWN	NW/NL	CHECKED	CR
APPROVED	CR	DATE	May-13

REVISIONS

No.	BY	DATE	DESCRIPTION	APPD
3	JC	19.06.13	FOR TENDER ISSUE	CR
2	NL	10.05.13	DETAILED DESIGN	CR
1	NW	15.03.13	90% DRAFT ISSUE	CR

SCALES: AS SHOWN

AECOM New Zealand Limited

CLIENT: TONGA AIRPORTS LIMITED

PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)

FUA'AMOTU INTERNATIONAL AIRPORT (TBU)
NDB ANTENNA DUCT

A1 | STATUS: FOR TENDER | DRAWING NO: 60277004-AV-3415 | REV: 3

PRELIMINARY CONCEPTUAL DESIGN FOR THE NEW TONGA AIRPORT LIMITED CONTROL TOWER, FUA'AMOTU INTERNATIONAL AIRPORT COMPOUND, TONGATAPU

DRAWING INDEX

DATED: OCTOBER, 2014

PRELIMINARY WORKS SERIES

ATTACHMENTS

PRELIMINARY COSTING REPORT

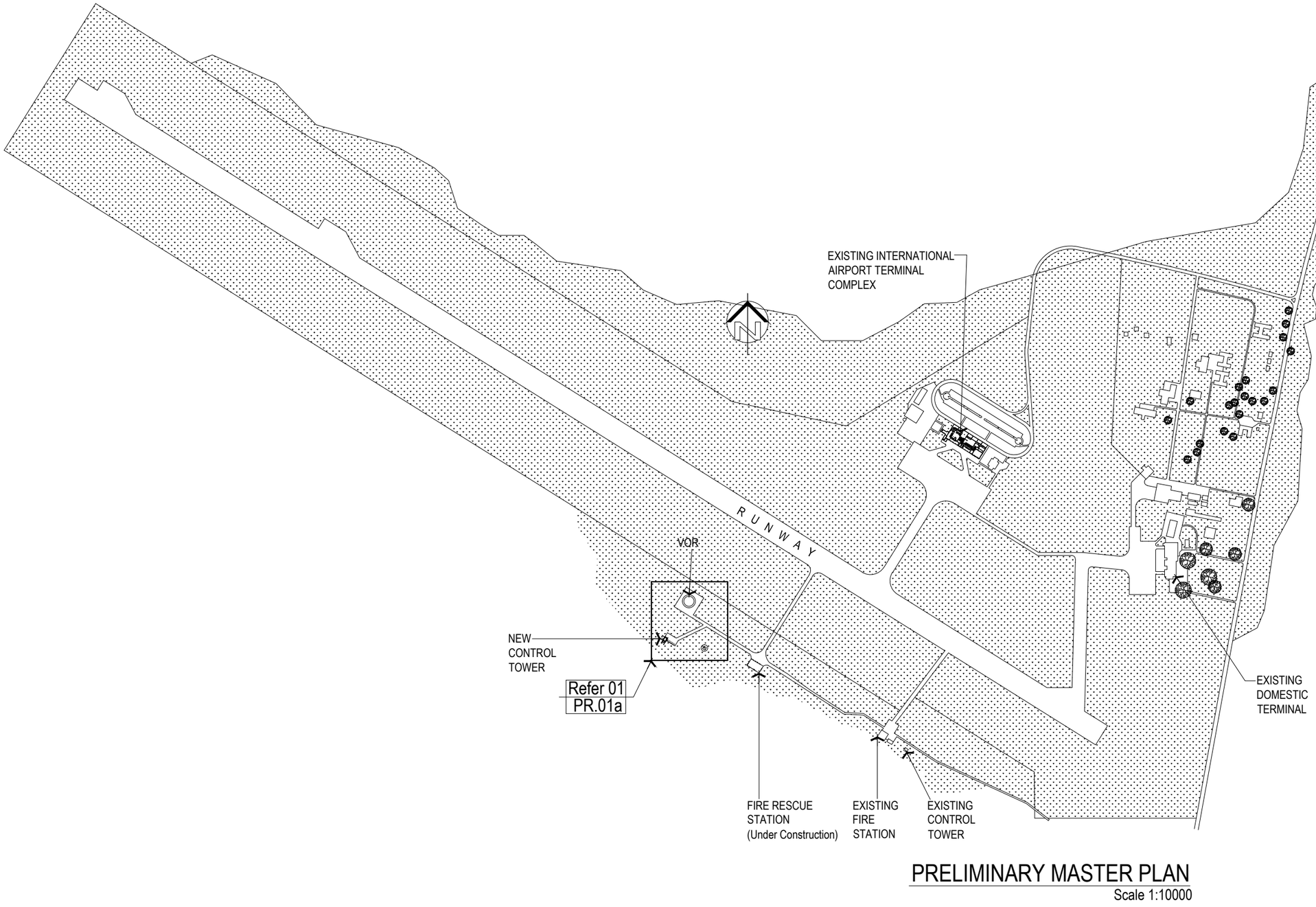
3D PERSPECTIVE VIEWS & ELEVATIONS

PRELIMINARY FOR APPROVAL ONLY

Quality Design Ltd

Architectural Services & Contract Supervision

Level 2, Tali'eva Bldg, Taufa'ahau Rd, Downtown, Nuku'alofa
Ph : 21-493 or 874-1011
EMail : qualitydesign.tupou51@gmail.com



PRELIMINARY MASTER PLAN

Scale 1:10000

NOTE:

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EMail: qualitydesign.tupou51@gmail.com

CLIENT'S LOGO:

PROJECT TITLE:
NEW TONGA AIRPORT LTD
CONTROL TOWER

PROJECT LOCATION:
LOCATED AT FUA'AMOTU AIRPORT COMPOUND, TONGATAPU

DRAWING TITLE:
PRELIMINARY MASTER SITE PLAN

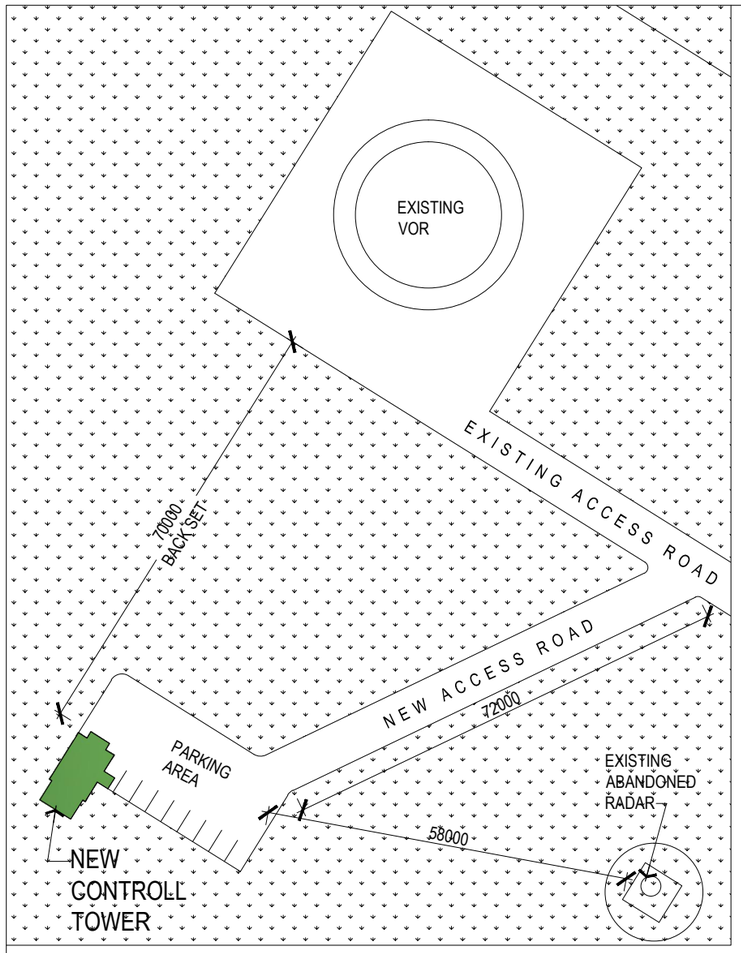
job no	: QD-001-035-2014
ref	: TAL/WK/B13/04
date	: OCT '2014'
scales	: As Shown
drawn	: QD

NORTH POINT

NORTH

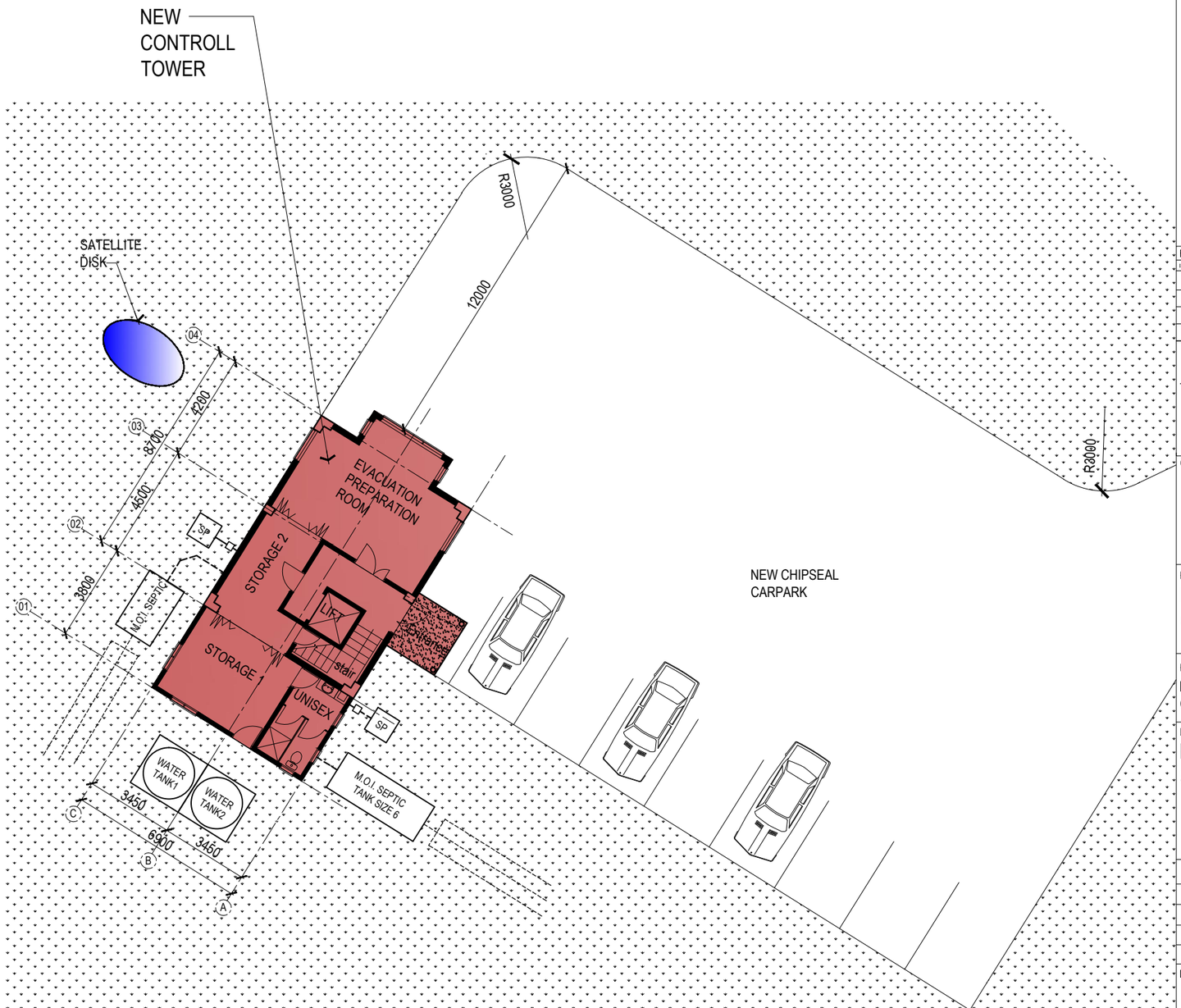
DRAWING SHEET#
PR.01

REV#



01 PRELIMINARY PARTIAL SITE PLAN
PR.01 Scale 1:1000

DESCRIPTION	FLOOR AREA m2
CARPARK	594
ACCESS ROAD	495
DESCRIPTION	**No.s**
WATER TANKS	2
SEPTIC	2
UNDERGROUND SERVICES	2



PRELIMINARY ENLARGE SITE PLAN
Scale 1:200

NOTE:

LEGEND:

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ISSUE	DATE	DETAILS	CHECK	DRAWN

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CLIENT'S LOGO:

PROJECT TITLE:
NEW TONGA AIRPORT LTD
CONTROL TOWER

PROJECT LOCATION:
LOCATED AT FUA'AMOTU AIRPORT COMPOUND, TONGATAPU

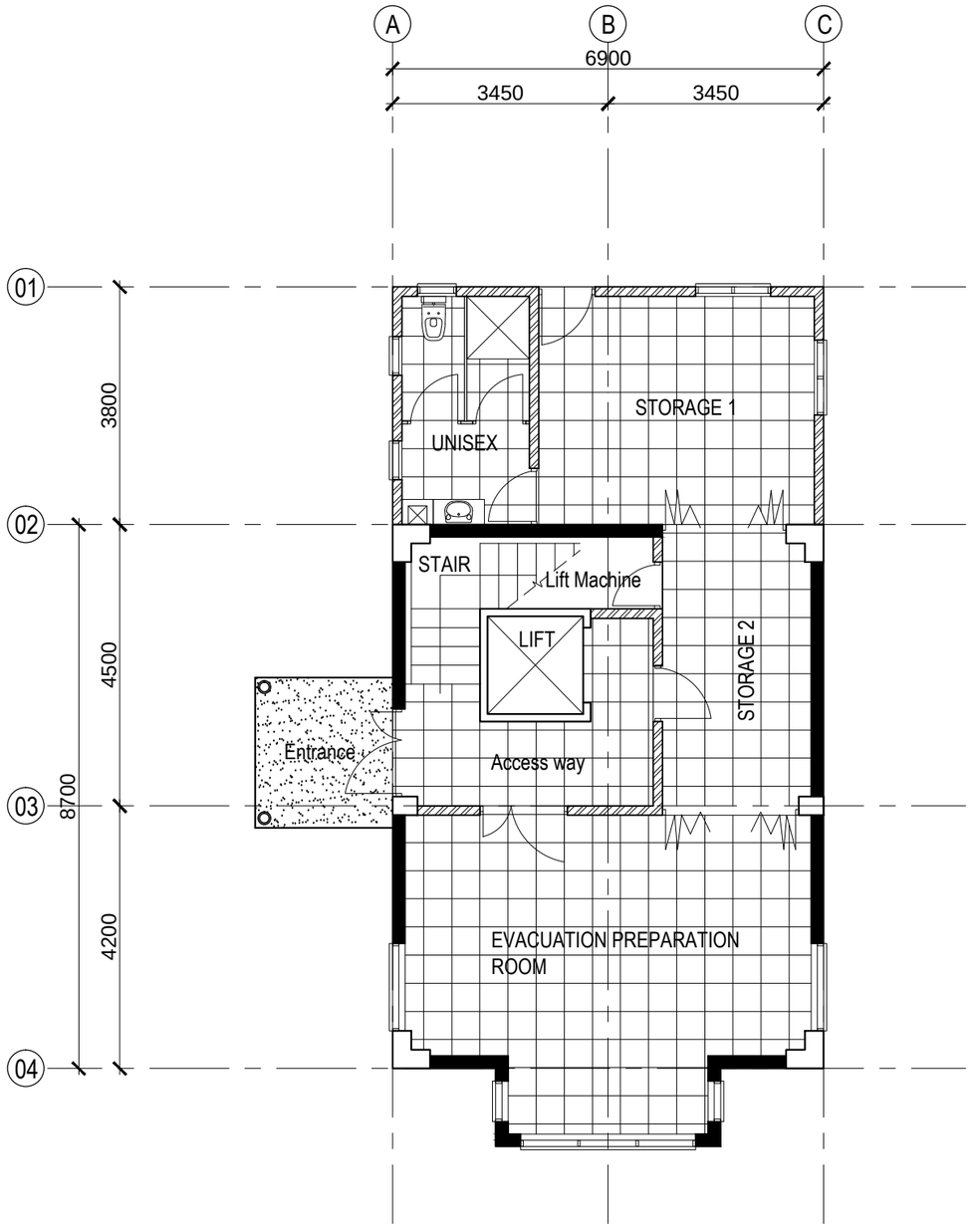
DRAWING TITLE:
PRELIMINARY ENLARGED SITE PLAN

job no	: QD-001-035-2014
ref	: TAL/WK/B13/04
date	: OCT '2014'
scales	: As Shown
drawn	: QD

NORTH POINT
NORTH

DRAWING SHEET#
PR.01a

REV#



PRELIMINARY PLAN - LEVEL 1

Scale 1:100

Descriptions	Floor area (m2)
STORAGE 1	16.0
STORAGE 2	10.7
UNISEX	7.4
ENTRANCE	5.3
LIFT	3.2
STAIR	4.9
EVACUATION PREPARATION ROOM	28.8
ACCESS WAY	7.9

LEGEND:	DESCRIPTIONS
	200mm Pre-Cast concrete walls, render and paint finish
	150mm Pre-Cast concrete walls, render and paint finish
	Commercial grade Aluminium Proprietary partitions with glass panels
	RONDO GRIDs wall framings, lined with 6mm Villaboard internal linings, tape jointed and paint finish
	450 x 450mm selective Ceramic floor tiles
	R.C. Columns, to engineer design, columns are to render and paint finish
	Corner R.C. Columns to engineer design, however, columns are to render and paint finish
	Commercial grade aluminium frame 'Awning' type windows with 'Stormshield' specified glazing
	Corrugated Colorsteel Cladd Service Duct

NOTE:

CONTRACTOR TO CHECK AND VERIFY ALL LEVELS,DATUMS AND DIMENSIONS ON SITE AND SHALL REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO START OF WORK & DURING THE CONSTRUCTION PHASE

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EMail: qualitydesign.tupou51@gmail.com

CLIENT'S LOGO:

TONGA AIRPORTS LIMITED

PROJECT TITLE:
NEW TONGA AIRPORT LTD CONTROL TOWER

PROJECT LOCATION:
LOCATED AT FUA'AMOTU AIRPORT COMPOUND, TONGATAPU

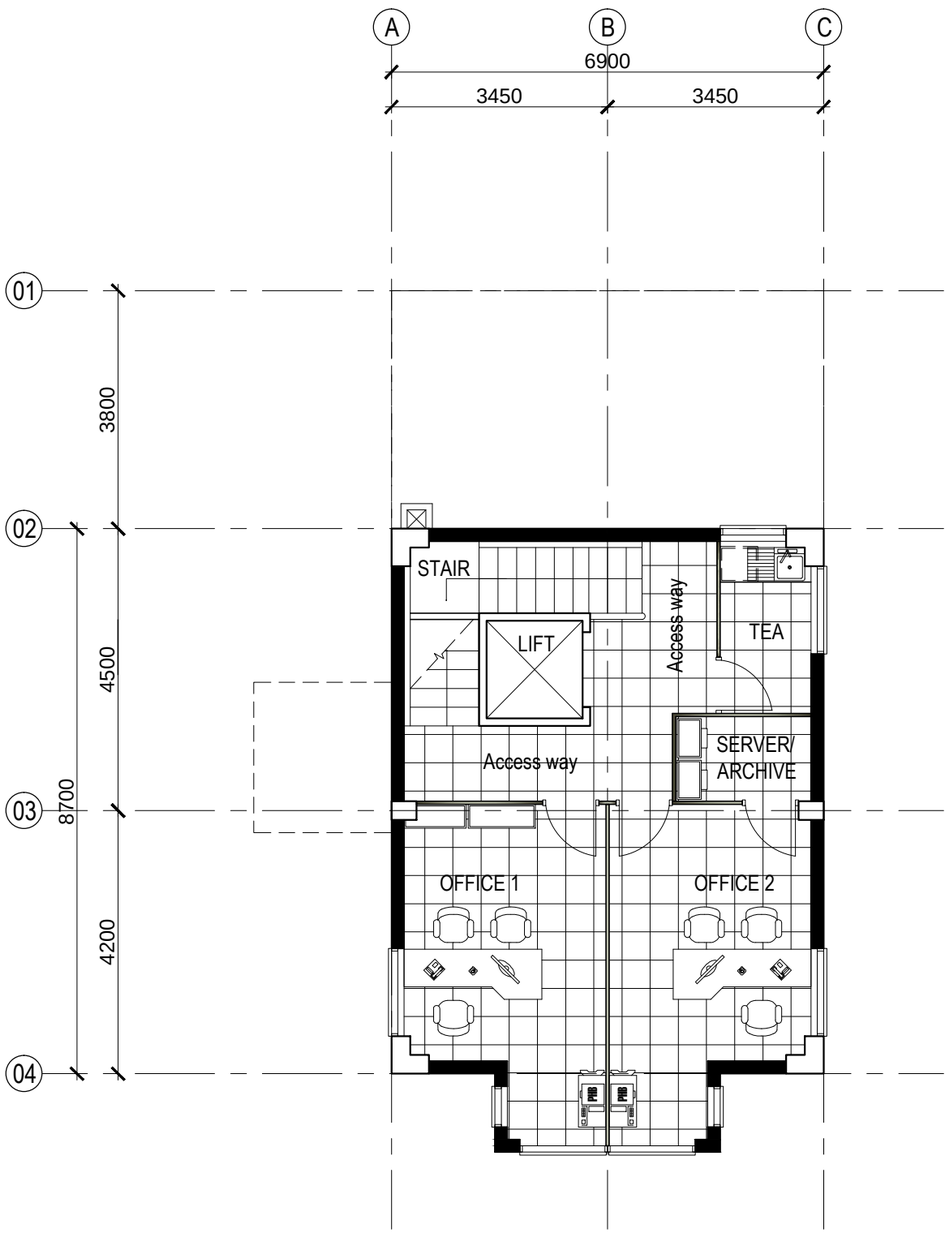
DRAWING TITLE:
PRELIMINARY LEVEL 1 PLAN

job no : QD-001-035-2014
ref : TAL/WK/B13/04
date : OCT '2014'
scales : As Shown
drawn : QD

NORTH POINT

DRAWING SHEET#
PR.02

REV#



PRELIMINARY PLAN - LEVEL 2

Scale 1:100

Descriptions	Floor area (m2)
STAIR	6.5
LIFT	3.2
Access Way	9.9
OFFICE 1	15.2
OFFICE 2	15.2
TEA	3.9
SERVER/ARCHIVE	2.9

LEGEND:	DESCRIPTIONS
	200mm Pre-Cast concrete walls, render and paint finish
	150mm Pre-Cast concrete walls, render and paint finish
	Commercial grade Aluminium Proprietary partitions with glass panels
	RONDO GRIDs wall framings, lined with 6mm Villaboard internal linings, tape jointed and paint finish
	450 x 450mm selective Ceramic floor tiles
	R.C. Columns, to engineer design, columns are to render and paint finish
	Corner R.C. Columns to engineer design, however, columns are to render and paint finish
	Commercial grade aluminium frame 'Awning' type windows with 'Stormshield' specified glazing
	Corrugated Colorsteel Cladd Service Duct

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ISSUE	DATE	DETAILS	CHECK	DRAWN

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EMail: qualitydesign.tupou51@gmail.com

CLIENT'S LOGO:

TONGA AIRPORTS LIMITED

PROJECT TITLE:

NEW TONGA AIRPORT LTD CONTROL TOWER

PROJECT LOCATION:

LOCATED AT FUA'AMOTU AIRPORT COMPOUND, TONGATAPU

DRAWING TITLE:

PRELIMINARY LEVEL 2 PLAN

job no	: QD-001-035-2014
ref	: TAL/WK/B13/04
date	: OCT '2014'
scales	: As Shown
drawn	: QD

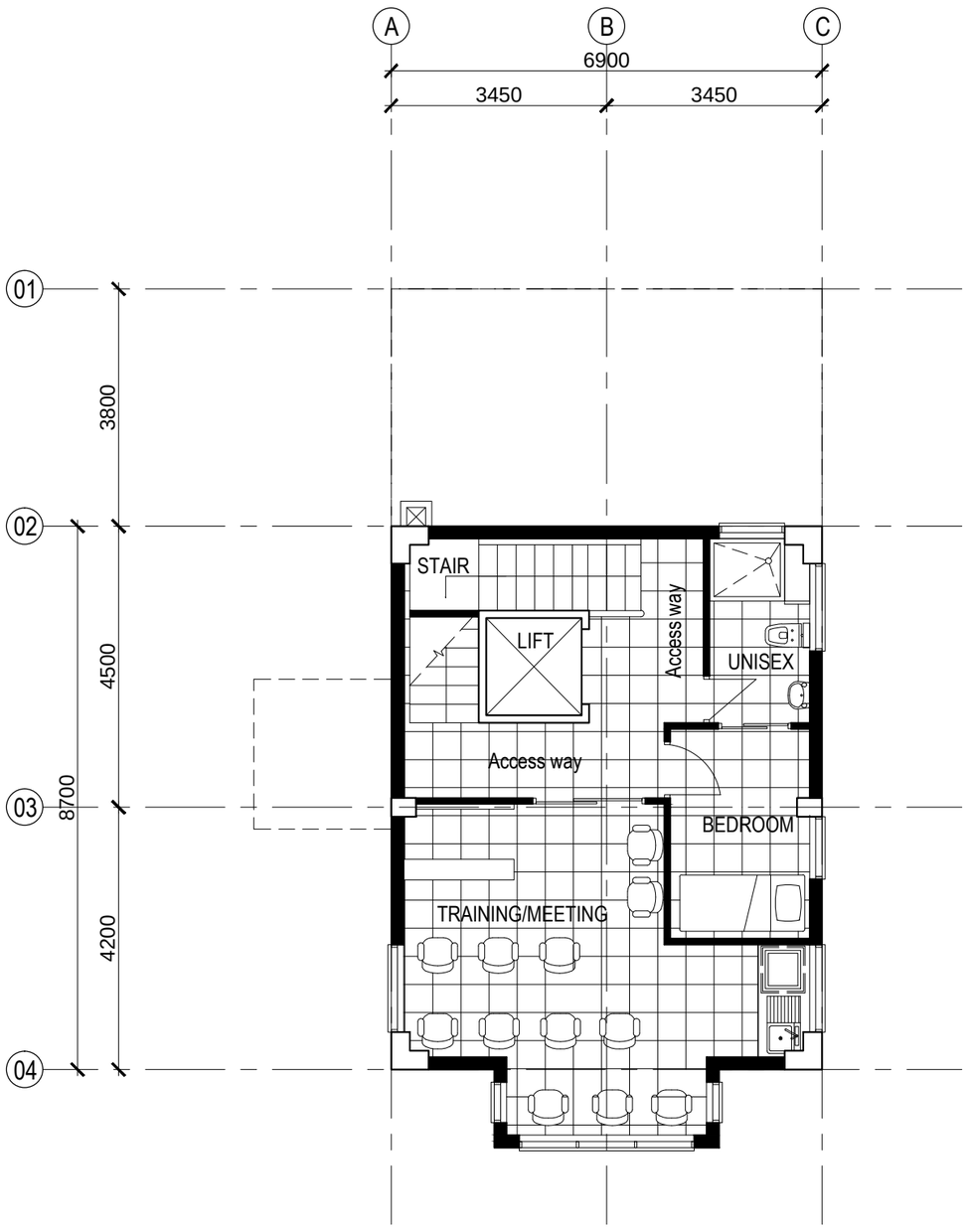
NORTH POINT

NORTH

DRAWING SHEET#

PR.03

REV#



PRELIMINARY PLAN - LEVEL 3

Scale 1:100

Descriptions	Floor area (m2)
STAIR	6.5
LIFT	3.2
ACCESS WAY	9.4
UNISEX	4.6
BEDROOM	7.4
TRAINING/MEETING	24.9

LEGEND:	DESCRIPTIONS
	200mm Pre-Cast concrete walls, render and paint finish
	150mm Pre-Cast concrete walls, render and paint finish
	Commercial grade Aluminium Proprietary partitions with glass panels
	RONDO GRIDs wall framings, lined with 6mm Villaboard internal linings, tape jointed and paint finish
	450 x 450mm selective Ceramic floor tiles
	R.C. Columns, to engineer design, columns are to render and paint finish
	Corner R.C. Columns to engineer design, however, columns are to render and paint finish
	Commercial grade aluminium frame 'Awning' type windows with 'Stormshield' specified glazing
	Corrugated Colorsteel Cladd Service Duct

NOTE:

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REVISION

ISSUE	DATE	DETAILS	CHECK	DRAWN

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EMail: qualitydesign.tupou51@gmail.com

CLIENT'S LOGO:

TONGA AIRPORTS LIMITED

PROJECT TITLE:

NEW TONGA AIRPORT LTD CONTROL TOWER

PROJECT LOCATION:

LOCATED AT FUA'AMOTU AIRPORT COMPOUND, TONGATAPU

DRAWING TITLE:

PRELIMINARY LEVEL 3 PLAN

job no	: QD-001-035-2014
ref	: TAL/WK/B13/04
date	: OCT '2014'
scales	: As Shown
drawn	: QD

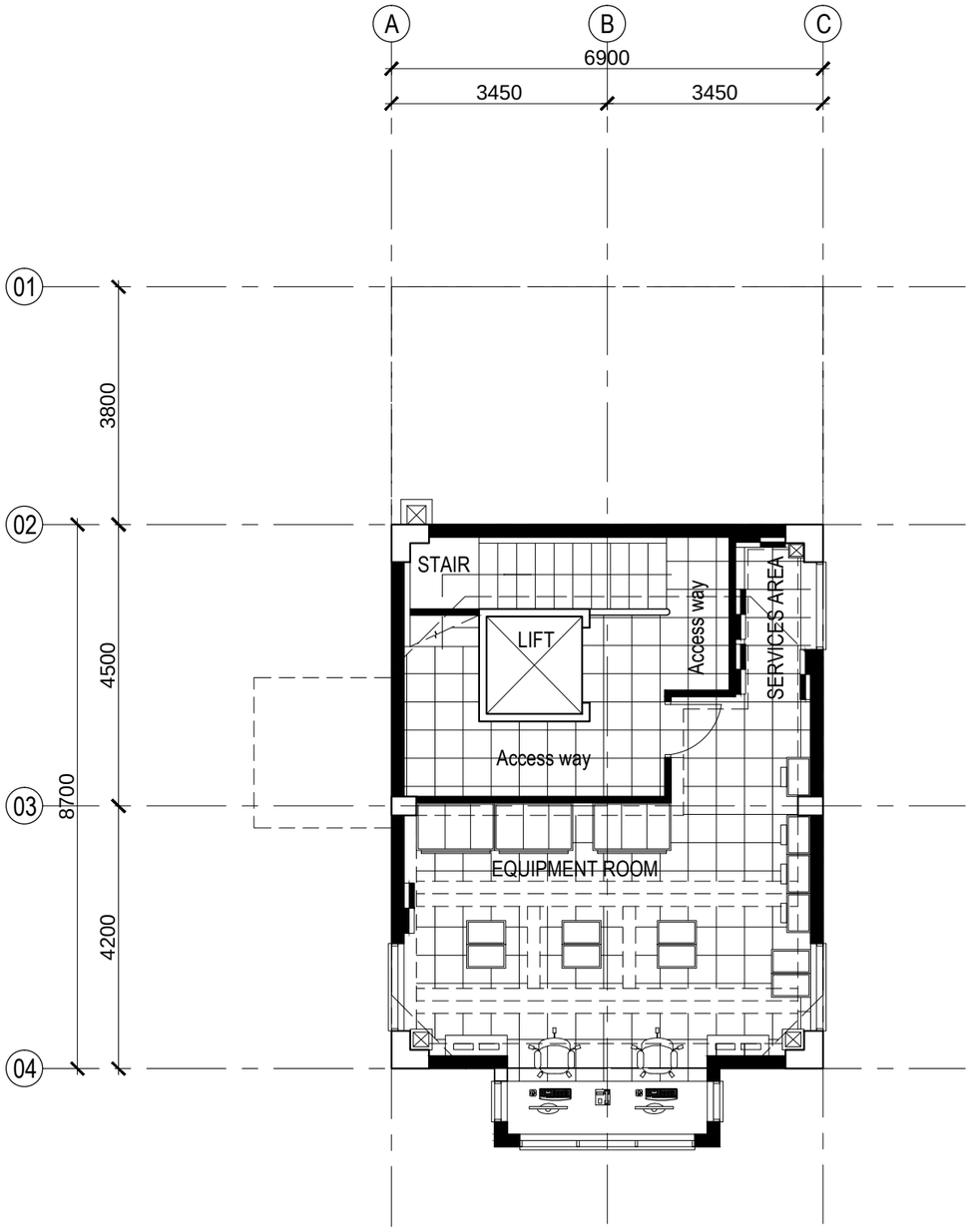
NORTH POINT

NORTH

DRAWING SHEET#

PR.04

REV#



PRELIMINARY PLAN - LEVEL 4

Scale 1:100

Descriptions	Floor area (m2)
STAIR	5.5
LIFT	3.2
ACCESS WAY	10.9
SERVICES AREA	2.9
EQUIPMENT ROOM	33.8

LEGEND:	DESCRIPTIONS
	200mm Pre-Cast concrete walls, render and paint finish
	150mm Pre-Cast concrete walls, render and paint finish
	Commercial grade Aluminium Proprietary partitions with glass panels
	RONDO GRIDs wall framings, lined with 6mm Villaboard internal linings, tape jointed and paint finish
	450 x 450mm selective Ceramic floor tiles
	R.C. Columns, to engineer design, columns are to render and paint finish
	Corner R.C. Columns to engineer design, however, columns are to render and paint finish
	Commercial grade aluminium frame 'Awning' type windows with 'Stormshield' specified glazing
	Corrugated Colorsteel Cladd Service Duct

LEGEND:

REVISION

ISSUE	DATE	DETAILS	CHECK	DRAWN

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EMail: qualitydesign.tupou51@gmail.com

CLIENT'S LOGO:

TONGA AIRPORTS LIMITED

PROJECT TITLE:

NEW TONGA AIRPORT LTD CONTROL TOWER

PROJECT LOCATION:

LOCATED AT FUA'AMOTU AIRPORT COMPOUND, TONGATAPU

DRAWING TITLE:

PRELIMINARY LEVEL 4 PLAN

job no	: QD-001-035-2014
ref	: TAL/WK/B13/04
date	: OCT '2014'
scales	: As Shown
drawn	: QD

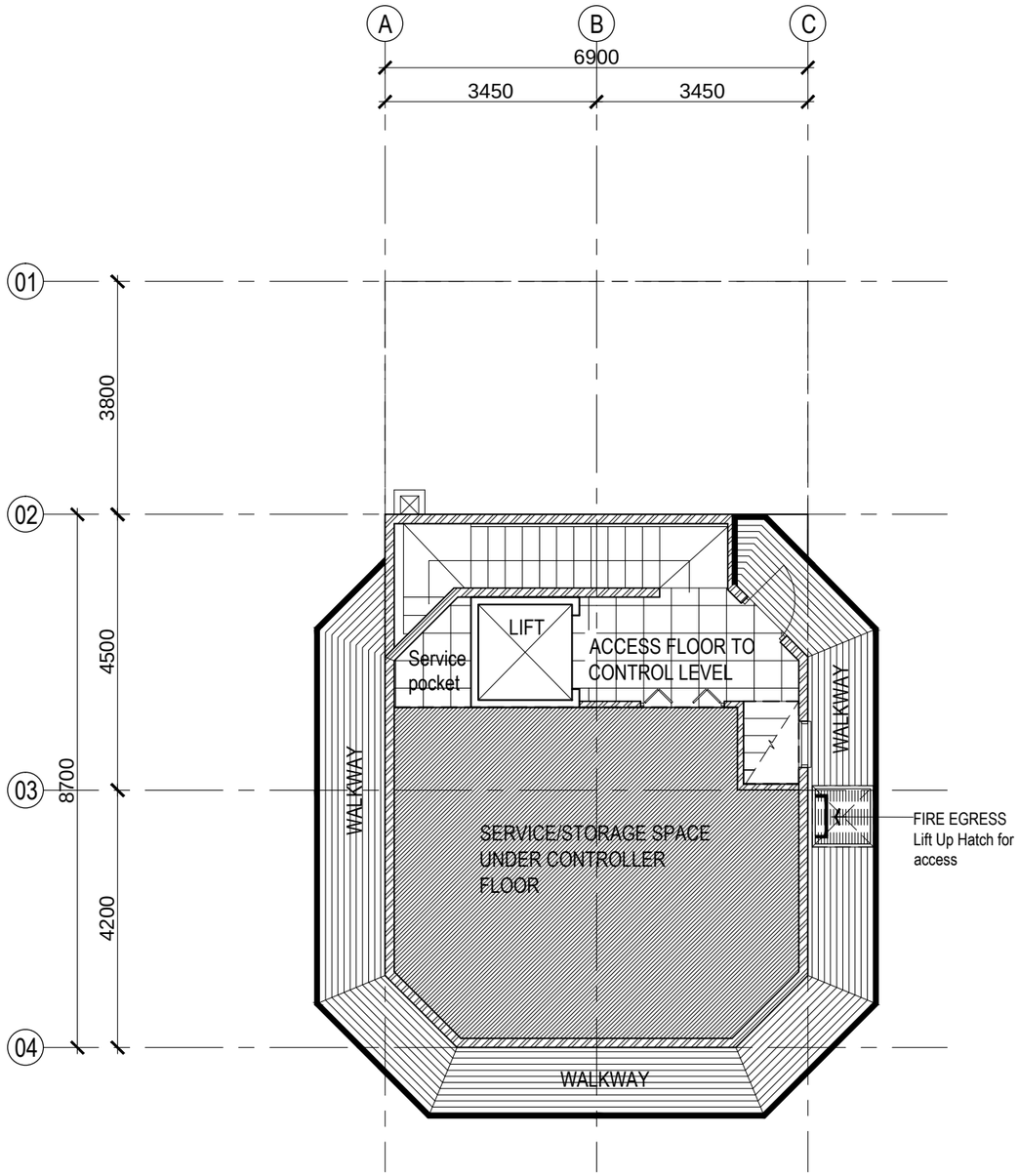
NORTH POINT

NORTH

DRAWING SHEET#

PR.05

REV#



PRELIMINARY PLAN - LEVEL 5

Scale 1:100

Descriptions	Floor area (m2)
VOID	33.1
CONTROLLER LEVEL	5.7
LIFT	3.5
STAIR	7.4
OUTDOOR DECK	27.4

LEGEND:	DESCRIPTIONS
	200mm Pre-Cast concrete walls, render and paint finish
	150mm Pre-Cast concrete walls, render and paint finish
	Commercial grade Aluminium Proprietary partitions with glass panels
	RONDO GRIDs wall framings, lined with 6mm Villaboard internal linings, tape jointed and paint finish
WALKWAY	Hot Dip Galv. steel walkway floor framings, with SS.Steel balustrades and railings
	450 x 450mm selective Ceramic floor tiles
	R.C. Columns, to engineer design, columns are to render and paint finish
	Corner R.C. Columns to engineer design, however, columns are to render and paint finish
	Commercial grade aluminium frame 'Awning' type windows with 'Stormshield' specified glazing
	Corrugated Colorsteel Cladd Service Duct

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EMail: qualitydesign.tupou51@gmail.com

CLIENT'S LOGO:

TAL TONGA AIRPORTS LIMITED

PROJECT TITLE:
NEW TONGA AIRPORT LTD CONTROL TOWER

PROJECT LOCATION:
LOCATED AT FUA'AMOTU AIRPORT COMPOUND, TONGATAPU

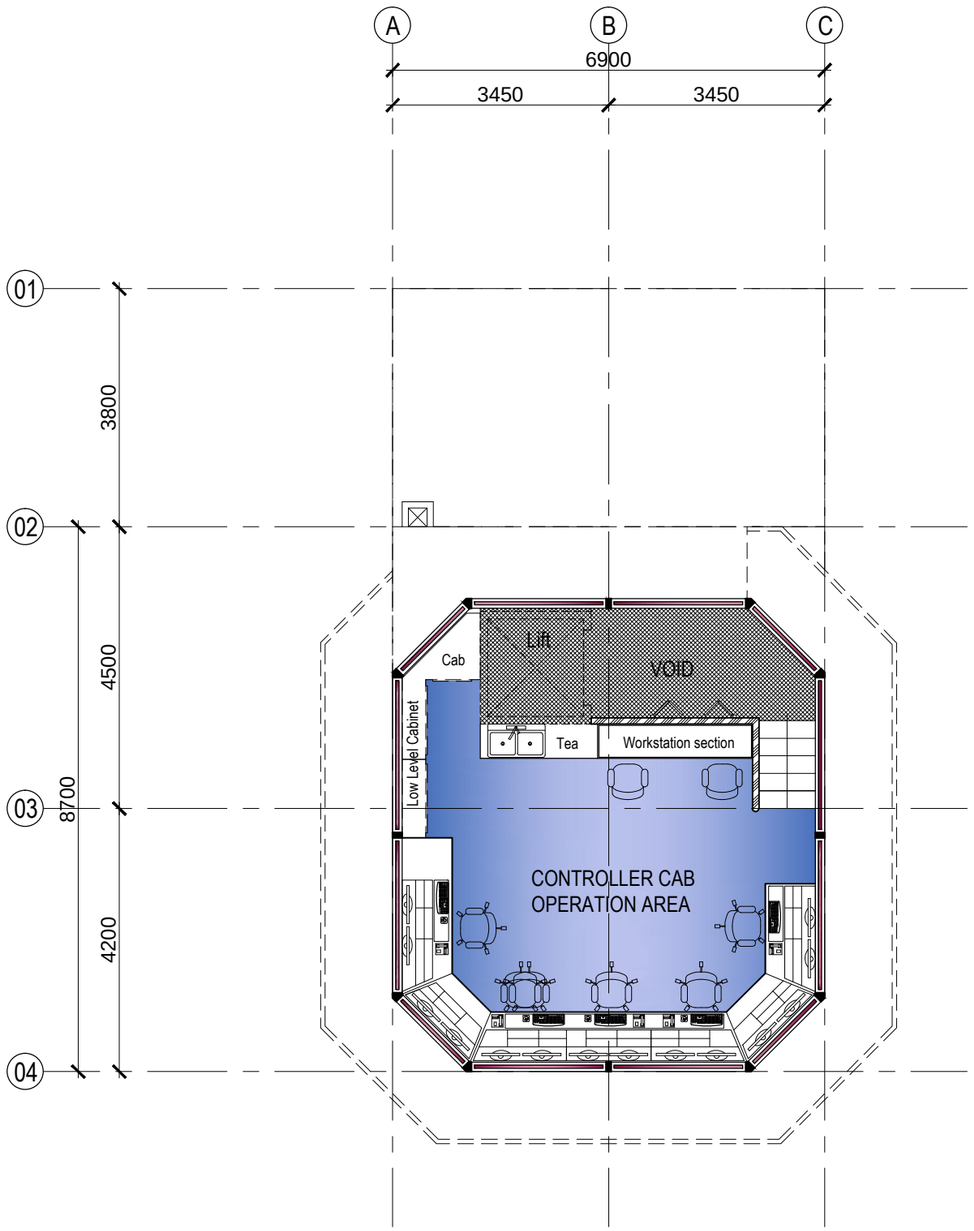
DRAWING TITLE:
PRELIMINARY LEVEL 5 PLAN

job no	: QD-001-035-2014
ref	: TAL/WK/B13/04
date	: OCT '2014'
scales	: As Shown
drawn	: QD

NORTH POINT

DRAWING SHEET#
PR.06

REV#



PRELIMINARY PLAN - LEVEL 5a

Scale 1:100

Descriptions	Floor area (m2)
VOID	16.8
CONTROLLER LEVEL	35.0
STAIR	1.3

LEGEND:	DESCRIPTIONS
	RONDO grid wall system, with 6mm Villaboard linings
:RATION AF	Commercial Carpet floor finish, fixed ontop of structural steel framed controller floor
	VOID from controller floor level to Floor Level 5a (Lift & Stair access level)
	17.5mm Grey Linled Laminated Hush Glass, 25° Inclined. Mullions of specialized commercial heavy duty aluminium frames, to very high wind speed resistance grade. Window are to set upon 200mm Precast concrete walls to engineer design
	Corrugated Colorsteel Cladd Service Duct

NOTE:

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Ph : 21-493 or 874-1011
EMail: qualitydesign.tupou51@gmail.com

CLIENT'S LOGO:

TAL TONGA AIRPORTS LIMITED

PROJECT TITLE:
NEW TONGA AIRPORT LTD
CONTROL TOWER

PROJECT LOCATION:
LOCATED AT FUA'AMOTU AIRPORT COMPOUND, TONGATAPU

DRAWING TITLE:
PRELIMINARY LEVEL 5a PLAN

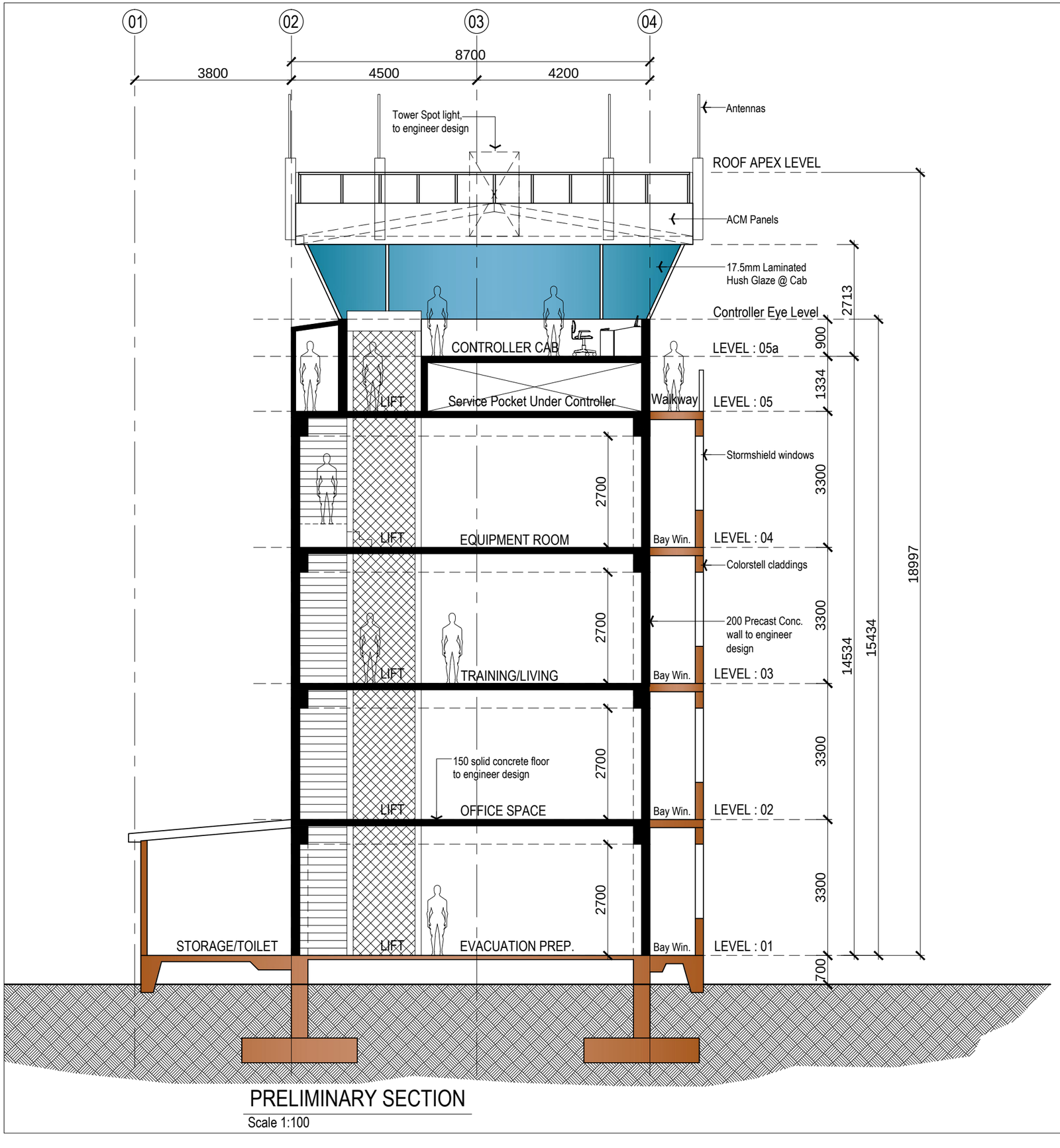
job no	: QD-001-035-2014
ref	: TAL/WK/B13/04
date	: OCT '2014'
scales	: As Shown
drawn	: QD

NORTH POINT

NORTH

DRAWING SHEET#
PR.07

REV#



PRELIMINARY SECTION

Scale 1:100

NOTE:

LEGEND:

REVISION

ISSUE	DATE	DETAILS	CHECK	DRAWN

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Bldg, Taufa'ahau Rd
Downtown, NUK.

Ph : 21-493 or 874-1011
EMail: qualitydesign.tupou51@gmail.com

CLIENT'S LOGO:

TAL TONGA AIRPORTS LIMITED

PROJECT TITLE:

NEW TONGA AIRPORT LTD
CONTROL TOWER

PROJECT LOCATION:

LOCATED AT FUA'AMOTU AIRPORT COMPOUND, TONGATAPU

DRAWING TITLE:

PRELIMINARY SECTION

job no	: QD-001-035-2014
ref	: TAL/WK/B13/04
date	: OCT '2014'
scales	: As Shown
drawn	: QD

NORTH POINT

DRAWING SHEET#

PR.08

REV#

Appendix B

MECC Draft EMP Approval Letter

Government of Tonga

SAVINGRAM

FROM: Director for Environment & Climate Change

TO: Secretary for Transport

CC: Lasale Cocker

DATE: 17 September 2010

SUBJECT: Submission of Draft Final Environmental Management Plan as part of the Transport Sector consolidation project

With reference to the Draft Final Environment Management Plan (EMP), we would like to inform you that after reviewing the plan, together with the ongoing consultations with our Ministry, we would like to inform you that approval for the EMP is granted.

We sincerely apologise for the delay with the approval process and hope that we will continue working collaboratively with your organisation.

For your further action.

Yours sincerely

MINISTRY OF ENVIRONMENT & CLIMATE CHANGE

.....

'Asipeli Palaki

Appendix C

Mitigation Measures

Appendix C Mitigation Measures

POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS[4]	EXECUTING AGENCY	SUPERVISING AGENCY
DETAILED DESIGN/ PRE-CONSTRUCTION MOBILISATION STAGE					
Road traffic safety	Provide for Traffic Management Plan (TMP) to be developed by Contractor, to include signage, flag operators, personnel protective equipment (e.g. high visibility vest), and specific actions to be implemented around sensitive receptors (e.g. residential dwellings, schools, hospital). TMP to include vehicle and pedestrian traffic. Include transport of materials and equipment from the Port and quarry to construction lay down area (located at the airport) in the TMP e.g. covering of loads, maximum speed, designated travel times and notification of police and other required departments (e.g. hospital and schools). Any road upgrades required to enable safe transport of materials and equipment must be assessed for environmental and social impacts and mitigation measures devised to reduce the impacts. This ESMP and the PAIP ESMF should be used to guide the assessment. Details are to be included in the Contractor's ESMP. Additional approval by MECC may be required.	From port to airport (delivery of equipment) To and from the construction lay down area and the quarry	Minimal (requirement of bidding documents)	Contractors	TAL

[4] Costs are estimates only and will be calculated during the detailed engineering design.

POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS[4]	EXECUTING AGENCY	SUPERVISING AGENCY
Aviation traffic safety	Each investment within an operational airport is to have a Methods of Works Plan (MOWP) which is to be included in all bid and contract documents. The Contractor is to develop a Safety Management Plan as an addendum to the MOWP. The MOWP will include details of site works scheduling around known flight timetables and procedures for emergency response for all workers. Restricted areas are to be clearly defined which include a clearance area around the DVOR where access is limited.	Operational airports	Minimal (requirement of bidding documents and standard construction practices)	Design Consultant and Contractors	TAL
Soil erosion	Minimize erosion and design erosion protection measures according to international good practice standards, including incorporation of effective drainage systems (soakage pits) and consideration of surface flow paths. Schedule earthworks and construction activities during dry season (May to October).	All locations	Minimal (part of standard design practices).	Contractors	TAL
Dust/Air Pollution	Identify and locate waste disposal sites, stockpile sites and equipment (e.g. bitumen plant) to minimize impacts on the environment and nearby population. Ensure all equipment is serviced and issued with warrant of fitness (as required). Any machinery deemed to be polluting the air must be replaced (or fixed) on instruction by the TAL.	Construction camp	Minimal (part of standard design practices).	Contractors Design Consultant	TAL

POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS[4]	EXECUTING AGENCY	SUPERVISING AGENCY
Water and soil pollution	Minimise risk to groundwater and surrounding soil by developing a spill response plan and provide training to all contract workers on how to implement the spill response plan. Ensure bunded areas and hard stands are allocated at construction lay down area for the storage of fuel, lubricants and other potential substances required for the project. Water tight bunds to be able to contain 110% of volumes being stored or 25% if total volume greater than 1,000L. Ensure wash down areas with respective collection and treatment systems are designated within the construction camp (e.g. settling pond or tank and concrete slurry treatment) prior to works commencing. Sanitation treatment system (e.g. compost or proprietary treatment system) is to be approved by the TAL, MOI and MOH prior to implementation. Septic tanks for the new ATCT are to be located more than 5m from the rain water harvesting tanks.	All components	Minimal (part of standard design and construction practices).	Contractors Design Consultant	TAL

POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS[4]	EXECUTING AGENCY	SUPERVISING AGENCY
Water supply	Include maximum rainwater reclamation and water conservation/ efficiency in design of terminal and new ATCT. The Contractors will also need to ensure adequate supply of water for construction and personnel which does not adversely affect the community's water supply (e.g. mobile desalination plant or organise a reservoir supply specifically for construction). Prior to any site establishment or construction activities the Contractor shall sample groundwater at specified bores (e.g. Terminal, ARFF) adjacent to work areas (to be coordinated with TAL and MECC) to determine base line conditions. Measure depth to groundwater and analyse samples for concentrations of pH, electrical conductivity, total petroleum hydrocarbons (for potential petroleum contamination), and total nitrogen (for potential sewage contamination), or as agreed with TAL and MECC.	Airport terminals All components	Minimal (part of standard design practices).	Design Consultant and Contractors	TAL
Sourcing aggregate material	Ensure aggregate is sourced from an approved/ permitted quarry and are operating in accordance with the Tongan law. If the quarry is to be operated by the TAIP contractor they are responsible for seeking operating and environmental permits as required. As a minimum the IFC Environmental, Health, and Safety Guidelines for Construction Materials Extraction should be adopted. Materials extraction is likely to begin prior to construction on site to ensure enough material is available for the works. If Ahononou Quarry is to be mined, ensure fencing is installed to define the boundary, protect the coastal margin and prevent creep toward the ocean by quarry activities. Site runoff and wastewater is prohibited from being discharged directly to the coast. Site processing and stockpiles should be located inland.	All components	Minimal (part of standard design and construction practices).	Contractor	TAL

POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS[4]	EXECUTING AGENCY	SUPERVISING AGENCY
Solid waste generation	Allow for re-use of as much material as possible either within the TAIP, other projects, or for community use. The Waste Authority Limited should be consulted for approval to receive material that cannot be recycled or reused at the Tapuhia Landfill. When planning the construction lay down area ensure temporary waste dump areas are allowed for and approved waste disposal sites / methodologies identified for removal of all solid waste.	All locations	Minimal (part of standard design and construction practices).	Design Consultant and Contractors	TAL
Hazardous substances	Where possible fuel shall be obtained from local commercially available sources. Prior arrangement regarding quantity and type will need to be organised (TAL to provide details of providers). Confirm the presence of asbestos containing material on any buildings to be demolished and develop an asbestos management plan addressing the necessary EHS and disposal arrangements (Tapuhia Landfill) to deal with demolition and transport.	All locations	Minimal (part of mobilisation and construction planning).	Contractors	TAL
Importation of equipment and materials	Obtain import permits and quarantine certification prior to export from country of origin. Certificate of fumigation required.	All components	Minimal (part of mobilisation and construction planning)	Contractors	TAL
CONSTRUCTION STAGE					
Traffic (vehicle and pedestrian) and construction safety	Implement the traffic management plan (TMP) to ensure smooth traffic flow and safety for workers, passing vehicles and pedestrian traffic. Where appropriate, employ flag operators on the road to prevent traffic accidents. The workers shall have relevant safety equipment.	Route from quarry and port to airport	Safety equipment included in construction cost.	Construction Contractors	TAL

POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS[4]	EXECUTING AGENCY	SUPERVISING AGENCY
Soil erosion	Minimise time and size of ground disturbing activities to workable size at any one time. Vegetation to be removed manually, strictly no use of herbicides/ pesticides. Stockpiles are to be positioned on impermeable surfaces (e.g. geotextile or concrete hard stand). Keep construction vehicles on defined tracks. Revegetate disturbed areas that are not being paved as soon as practicable (loosen ground; apply topsoil; seed or plant as necessary).	All locations	Minimal (part of standard construction practice).	Construction Contractors	TAL
Waste disposal	Ensure all construction waste material is reused, recycled or packed up for transport to Tapuhia Landfill. Ensure areas for waste collection, recycling and off-site disposal are clearly marked/sign posted. Segregate waste to avoid cross contamination, such as with contaminated material (hazardous substance). Install waste collection facilities at construction lay down area to allow for collection and packing of waste. Strictly no dumping of rubbish. Include awareness training in general environmental training. Workers must be provided with a sanitary system to prevent fouling of surrounding soils.	All locations	Minimal (part of standard construction practice).	Construction Contractors	TAL

POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS[4]	EXECUTING AGENCY	SUPERVISING AGENCY
Water and soil pollution	Lubricants shall be collected and recycled, or disposed of according to Tongan regulations. Spill response plan training completed for all construction workers. Zones for preliminary accumulation of wastes are designated in areas that will cause no damage to the vegetation cover or leach into groundwater (e.g. within construction lay down area on hard surface). Excavations are bunded to prevent ingress of water runoff and clean water diversion (e.g. sand bags, clay bund, or shallow trenches) are used to direct overland flow away from active work and storage areas. Sediment laden runoff from excavations or stockpiles must be directed to a settling area (e.g. pond or decant pond to be sized for area covered) or collected for dust suppression provided the runoff is not contaminated with any chemicals (e.g. fuel). The area around the fuel hydrant pipes on the apron has potential to be contaminated with hydrocarbons. While excavation of the apron in the vicinity of the fuel hydrant system is not required any material encountered which has a PID reading of 10 ppm shall be treated as contaminated fill and must be disposed of at an approved facility able to deal with contaminated fill (e.g. Tapuhia Landfill with approval from WAL). During construction activities, including establishing the construction laydown area and at completion of all physical works, sample groundwater at specified bores (e.g. Terminal, ARFF) adjacent to work areas (to be coordinated with TAL and MECC) to indicate whether construction activities have adversely affected groundwater quality. Measure depth to groundwater and analyse samples for concentrations of pH, electrical conductivity, total petroleum hydrocarbons (for potential petroleum contamination), and total nitrogen (for potential sewage contamination), or as agreed with TAL	All locations	Minimal (part of standard construction practice).	Construction Contractors	TAL and MECC

POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS[4]	EXECUTING AGENCY	SUPERVISING AGENCY
	and MECC.				

POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS[4]	EXECUTING AGENCY	SUPERVISING AGENCY
Generation of dust	Use closed/covered trucks for transportation of construction materials. Any vehicle which is overloaded (exceed designed load limit) or is not covered properly shall be refused entry to the construction lay down area or material shall be refused delivery (if not to the construction lay down area). Cover stockpiles containing fine material (e.g. sand and topsoil) when not actively being used. Keep work areas clean with regular sweeping. Due to freshwater supply constraints large scale water sprinkling should be kept to a minimum and only as required. Only small areas should be cleared of vegetation at any one time and revegetation should occur as soon as practicable. Dust masks and personnel protective equipment must be available for workers during dust generating activities (e.g. pavement milling). Asphalt mix plant to be fitted with a dust scrubber.	All locations	Minimal (part of standard construction practice).	Construction Contractors	TAL

POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS[4]	EXECUTING AGENCY	SUPERVISING AGENCY
Noise and vibration disturbances	Minimise nuisance from noise, especially closer to residential areas, through establishment and communication to affected parties of standard working hours (07:00 to 18:00, Monday to Friday) and avoid increase of noise and number of work equipment at peak hours. Any work outside prescribed hours of operation requires approval by the TAL and notice to affected peoples provided at least one week prior to out of schedule works starting. Work on Sunday is restricted and is likely to only be approved in emergency situations. Regularly check and maintain machinery, equipment and vehicle conditions to ensure appropriate use of mufflers, etc. Workers in the vicinity of sources of high noise shall wear necessary protection gear rated for the situation they are being used. Signage to outline complaints procedure and contact details of recipient of complaints (e.g. phone number, physical address and email). The WB/IFC EHS Guidelines[5] section 1.7 Noise Management shall be applied (if no local limits are prescribed). Noise impacts should not exceed the levels for industrial commercial activities for one hour LAeq of 70 dB at any point of the day or night within the airport boundaries. At residential or school receptors the limit shall not exceed 55 dB during daytime hours (07:00 – 22:00) and 45 dB during night time hours (22:00 – 07:00). Alternatively noise impacts should not result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site (e.g. residential house).	All locations	Minimal (part of standard construction practice).	Construction Contractors	TAL

[5] International Finance Corporation, Environmental Health and Safety Guidelines, General Guidelines: Noise Management

POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS[4]	EXECUTING AGENCY	SUPERVISING AGENCY
Accident risks/Impacts on traffic safety	Arrange necessary measures for pedestrian and passer-by safety and all means of transportation safety (e.g. establish protection zones, by-pass these areas during transportation of materials, etc.) Relevant safety elements such as guardrails, road signs and delineators, pavement markings, barricades and beams, warning lights shall be installed. In some cases a flag operator or traffic control supervisor could be engaged around the specific work site.	All locations	Safety equipment included in construction cost. Minimal (part of standard construction practice).	Construction Contractors	TAL
Loss of archaeological artefacts or sites	Work to stop in specific location of unearthed artefacts or site. Fence the area to limit access and notify TAL and Ministry of Education, Women's Affairs and Culture (MEWAC) immediately for instruction to proceed.	All locations	No marginal cost	Construction Contractors	TAL and MEWAC
Landscape degradation	Restoration of landscape after completion of rehabilitation works; restore the vegetation cover in accordance with the surrounding landscape and any required design (e.g. grass land or shrubs). Use plant species characteristic for the landscape in the course of restoration of the vegetation cover.	All locations	Minimal (part of standard construction practice).	Construction Contractors	TAL

POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS[4]	EXECUTING AGENCY	SUPERVISING AGENCY
Hazardous substances and safety and pollution	Store and handle hazardous substances in bunded, hard stand or designated areas only. Bunded areas to drain to an oil water separator which will need to be constructed or a mobile proprietary unit imported specifically for use on the TAIP. Bunds to contain 110% of total volume required to be stored or, 25% of total volume if total volume is over 1,000L. Provide hazard specific personnel protective equipment to workers directly involved in handling hazardous substances (e.g. chemical or heat resistant clothing, gloves). Complete list, including MSDS for each chemical stored or used shall be accessible at all times. Signage to be posted in storage areas identifying all chemicals present. Spill kits and training of use to be provided to all workers during toolbox meetings. Spill kits to contain PPE gear for the spill clean-up (e.g. gloves and overalls), material to contain the spill and absorbent pads, and a heavy duty rubbish bag to collect absorbent pads or material. Used oil to be collected and taken to an approved facility (for disposal or cleaning) at completion of works if no on island disposal or recycling facility available material is to be taken off island and disposed of at an approved facility. Asbestos containing material (ACM) to be removed from buildings by trained workers wearing full asbestos suitable PPE gear (overalls, respirators, booties, etc.) in accordance with the Contractor's approved asbestos management plan (refer IFC EHS Guidelines). Asbestos to be disposed of at the Tapuhia Landfill (minimum 24hours notice required to be given to Waste Authority Limited (landfill operators)).	All locations	Safety equipment included in construction cost. Minimal (part of standard construction practice).	Construction Contractors	TAL

POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS[4]	EXECUTING AGENCY	SUPERVISING AGENCY
Loss of biodiversity	If during course of construction work, particularly vegetation clearance and excavations any bird, reptile or mammal species is identified as being potentially impacted (e.g. nesting bird in area of proposed vegetation clearance) work is to stop in the specific location of the find and the MECC and TAL notified immediately for instruction to proceed.	All locations	No marginal cost	Contractors	TAL and MECC
Health and safety	Construction lay down area to be fenced to prevent access by unauthorised personnel. First aid training to be provided as required to site workers with basic first aid services to be provided by Contractor e.g. stretcher, vehicle transport to hospital. Only personnel trained in asbestos handling may be involved in any demolition works involving ACM. Full PPE to be used when handling the material ready for transport. While constructing the new ATCT worker safety is essential as the tower height increases. Training and use of temporary fall prevention and arrest devices (e.g. rails, full body harness) to be used when working at heights greater than 2m (reference WB/IFC EHS Guidelines[6] section 4.2 Occupational Health and Safety). Falling objects and debris can pose a significant hazard and mitigation measures such as exclusion zones should be implemented.	All locations	Security included in construction cost. Included in construction costs	Contractor	TAL
Damage to assets and infrastructure	As a result of TAIP construction activities any damage to assets or infrastructure must be reported to the TAL and rectified at the expense of the Contractors.	All locations	Dependent on asset/ infrastructure and level of damage	Contractors	TAL

[6] International Finance Corporation, Environmental Health and Safety Guidelines, General Guidelines: Noise Management

POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS[4]	EXECUTING AGENCY	SUPERVISING AGENCY
OPERATION STAGE					
Hazardous substance management	Strictly apply and enforce manufacturer's recommendations for handling and storage. These measures include sealing of drums, and avoiding extreme heat. Compliance with international good practice. Security of storage areas to facilitate transport, handling and placement to be maintained (e.g. fences and locks fixed immediately if broken or vandalised). Complete list, including MSDS for each chemical stored or used shall be accessible at all times. Signage to be posted in storage areas identifying all chemicals present. Staff to wear manufacturers recommended personnel protective equipment (e.g. gloves and overalls) when handling or mixing hazardous substances. Emergency vehicles are to be serviced and maintained at existing workshop areas.	All airport compounds	No marginal cost (standard operating procedure).	TBU Management	TAL
Water or soil pollution	Workshops or maintenance areas to be fitted with bunded areas for storage of oil and fuel drums (and any other hazardous substances). Used oil drums should be returned to the suppliers or, after being cleaned, sold in secondary local market if there is demand for this. Used oils may be used for emergency drills/preparedness exercises as appropriate by ARFF.	All locations	No marginal cost (standard operating procedure).	TBU Management	TAL

POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS[4]	EXECUTING AGENCY	SUPERVISING AGENCY
Maintenance of drainage and soakage systems	Drainage systems shall be periodically cleared of sediment and organic matter build up to ensure appropriate flows and soakage. Material to be disposed at approved site (e.g. landfill or used as cleanfill) or composted if organic. Vegetation to be cleared from drainage channels and soakage pits and composted through the Tapuhia Landfill.	All locations	No marginal cost (standard operating procedure).	TBU Management	TAL
Wastewater management	Septic systems of the terminal to be cleaned regularly and sludge disposed or treated in accordance with requirements of WAL. Sludge can be disposed of at Tapuhia Landfill	Terminal	No marginal cost for current practice of disposal.	TBU Management	TAL

Note: "All locations" refers to all areas in Tongatapu which will be impacted by TAIP activities, namely the airport (runway, terminal, control tower), the road corridor (transport of materials), the port (for delivery of equipment and material), and the construction lay down area.

Appendix D

Monitoring Plan

Appendix D Monitoring Plan

PARAMETER TO MONITOR	LOCATION	MONITORING	FREQUENCY	RESPONSIBILITY
DETAILED DESIGN/ PRE-CONSTRUCTION PHASE				
Traffic safety	Design documents	Ensure TMP drafted and approved.	Prior to sign off of final designs	Design Consultant
Aviation safety	Design documents	MOWP complete with details of flight schedules and emergency procedures.	Prior to sign off of final designs	Design Consultant
Soil erosion	Design documents	Construction scheduled for between May and December. Designs include erosion protection measures.	Prior to sign off of final designs	Design Consultant
Water supply	Design documents	Water reclamation systems included in designs (particularly terminal and new ATCT design).	Prior to sign off of final designs	Design Consultant
Quarry operations	Quarry	Upon confirmation of which quarry is to supply aggregate verify quarry operations to ensure any required permits or approvals are in place. Ensure TMP is included in procurement documentation for transport of materials from the quarry to the airport.	Prior to contract award	TAL
Importation of equipment and materials	Importation permits	Ensure inclusion in design and material specifications that material and equipment to be fumigated and free of contamination. Approval to import material and equipment is given prior to material and equipment leaving country of origin.	Contractor to organize prior to export from country of origin.	Contractors
CONSTRUCTION				
Agreement for waste disposal	Construction Contractor's records	Permits and/or agreements with local waste disposal providers (e.g. Tapuhia Landfill) and licensed recycling operators. Inspection of disposal sites.	Documentation viewed prior to construction works starting Weekly as applicable to schedule of works.	TAL
Soil erosion	Areas of exposed soil and earth moving	Inspections at sites to ensure silt fences, diversion drains etc. are constructed as needed. Inspection to ensure replanting and restoration work completed.	Weekly inspection as applicable to schedule of works and after site restoration.	TAL

PARAMETER TO MONITOR	LOCATION	MONITORING	FREQUENCY	RESPONSIBILITY
Waste disposal	At construction sites	Inspection to ensure waste is not accumulating and evidence waste has been stockpiled for removal to licensed landfill. Inspection to ensure waste streams are sorted for re-use, recycling or waste to landfill.	Weekly inspection as applicable to schedule of works and on receipt of any complaints.	TAL
Water and soil pollution	At construction sites including quarry	Inspection of sites to ensure waste collection in defined area; spill response plan in place and workers trained. Complete spill kits available where hazardous substances sorted and handled. Results from groundwater sampling are submitted to TAL and MECC with remedial action points if background/baseline conditions are exceeded. Inspection of Ahononou Quarry (if operational) to ensure site runoff and wastewater is not discharging to the beach.	Weekly inspection as applicable to schedule of works and on receipt of any complaints	TAL
Dust	At construction sites, quarry and adjacent sensitive areas.	Site inspections. Regular visual inspections to ensure stockpiles are covered when not in use and trucks transporting material are covered and not overloaded.	Weekly inspection as applicable to schedule of works and on receipt of any complaints.	TAL
Noise	At work sites and sensitive locations	Site inspections to ensure workers wearing protective equipment when required. Measurement of noise level with hand-held noise meter not to exceed 70dB within airport property. Public signage detailing complaints procedure and contact people/person on display. Noisy machinery is replaced or fixed as soon as problem arises or on instruction by TAL.	Weekly inspection as applicable to schedule of works and on receipt of any complaints.	TAL
Air pollution	At work sites (including quarry)	Site inspections to ensure equipment and machinery operating without excessive emissions. If an issue is reported the contractor is responsible for replacing or fixing the equipment to the satisfaction of TAL.	Weekly inspection as applicable to schedule of works and on receipt of any complaints.	TAL

PARAMETER TO MONITOR	LOCATION	MONITORING	FREQUENCY	RESPONSIBILITY
Storage of fuel, oil, bitumen, etc.	At work sites and construction camp. Contractors training log.	Regular site inspections to ensure material is stored within bunded area and spill response training for workers completed. Visual inspection of spill kit for completeness and accessibility.	Weekly as applicable to schedule of works and on receipt of any complaints.	TAL
Vehicle and pedestrian safety	At and near work sites	Regular inspections to check that TMP is implemented correctly (e.g. flags and diversions in place) and workers wearing appropriate personnel protective gear.	Weekly inspection as applicable to schedule of works and on receipt of any complaints.	TAL
Construction workers and staff safety (personal protective equipment)	At work sites	Inspections to ensure workers have access to and are wearing (when required) appropriate personnel protective equipment (e.g. for handling hazardous materials and working at height). WB/IFC Guidelines have been implemented.	Weekly inspection as applicable to schedule of works and on receipt of any complaints.	TAL
Community safety	At work sites	Inspections to ensure signs and fences restricting access are in place and pedestrian diversion routes clearly marked (whether for access to a building or home or particular route).	Weekly inspection as applicable to schedule of works and on receipt of any complaints.	TAL
Materials supply	Quarry and work sites	Inspections to ensure permits in place for transporting loads over 3 tonnes (if applicable). Evidence that trucks are not overloaded and loads are covered e.g. complaints register, evidence of debris on the road. For Ahononou Quarry boundary fences are in place preventing creep into coastal environment.	Weekly visual inspection as applicable to schedule of works and on receipt of any complaints.	TAL
OPERATION				
Accidents with hazardous materials or wastes	Airport sites	Accident report	Immediately after accident	TAL
Wastewater management	Terminal, control tower and ARFF	Proper maintenance of septic system, no reports of odour or seepage	Quarterly inspection (observation) at connection to septic system.	TAL
Solid waste collection and disposal (non-hazardous)	Terminal and control tower	Solid waste being collected and taken to approved disposal site (e.g. landfill)	To be arranged with Waste Authority Limited as required	TAL

Appendix E

Inspection Checklist

Appendix E Inspection Checklist

ESMP Monitoring Plan Checklist

Location:	
Auditor:	
Audit Date/Time (Start):	
Audit Date/Time (Finish):	

Environmental Issue:	Inspection areas:	Requirements met?
1.0 Construction Phase		
1.1 Soil Erosion	- Silt fences and diversion drains in place - Replanting and restoration work completed	Yes ☐ No ☐ If No, details:
1.2 Waste accumulation and Disposal Agreements	- Good housekeeping around the work sites - Waste stockpiled in defined areas with signage ready for removal - Waste/recycling permits/agreements in place	Yes ☐ No ☐ If No, details:
1.3 Soil and Water Pollution	- Waste collected in defined area on impermeable ground - Appropriate spill response plan/kit in place for waste area - Groundwater quality results sighted, and any remedial actions implemented.	Yes ☐ No ☐ If No, details:
1.4 Dust	- Stockpiles covered or kept wet when not in use - Visual inspection of ambient dust conditions - Truck transports are covered	Yes ☐ No ☐ If No, details:
1.5 Noise	- Workers wearing ear protection as required - Noise level maximum of 70dB within airport boundaries	Yes ☐ No ☐ If No, details:

Environmental Issue:	Inspection areas:	Requirements met?
1.0 Construction Phase		
1.6 Hazardous Substance Storage (fuel/oil/bitumen)	- Hazardous substances within bund on impermeable surface - Spill kit complete and accessible - Spill training completed	Yes ☐ No ☐ If No, details:
1.7 Traffic Management Plan Implementation	- Traffic Management Plan (TMP) implemented - PPE is being worn by workers	Yes ☐ No ☐ If No, details:
1.8 Personal Protective Equipment Use	- Workers have access to, and using appropriate, PPE for the task.	Yes ☐ No ☐ If No, details:
1.9 Community Safety	- Public signage of complaints procedure - Signs and fences restrict or direct pedestrians and public where appropriate	Yes ☐ No ☐ If No, details:
2.0 Operational Phase		
2.1 Drainage Maintenance	- Inspect to check for blockages and debris, particularly after storm events	Yes ☐ No ☐ If No, details:
2.2 Septic System Maintenance and Upkeep at Terminal/ Control tower	- *Quarterly inspection* of connections to system, for leaks	Yes ☐ No ☐ If No, details:
2.3 Solid Waste Collection/ Disposal from Terminal/ Control Tower	- Solid non-hazardous waste being removed to council approved disposal site (Tapuhia Landfill)	Yes ☐ No ☐ If No, details:

Actions Required:

Issue No.	Action Required? By Whom?	Date Action Required?

Signoff

Signature: ..... Date: .....