



*Environmental Impact Assessment
Report:*

**Hannam International
Airport,
Niue**

by
Komeri Onorio
SPREP EIA Officer

ENVIRONMENTAL IMPACT ASSESSMENT
HANAN INTERNATIONAL AIRPORT
NIUE

A Report for the Government of Niue

Prepared by
Komeri Onorio
Environmental Impact Assessment Officer
South Pacific Regional Environment Programme

Apia, November, 1994

010 511 000

TABLE OF CONTENTS

1.0	EXECUTIVE SUMMARY	
1.1	Development Proposal	3
1.2	Anticipated Project Impacts and Proposed Mitigation	3
2.0	INTRODUCTION	
2.1	Project Description	5
2.2	Objectives of the Environmental Impact Assessment	5
3.0	OBJECTIVES OF THE PROPOSAL	6
4.0	PROJECT ALTERNATIVES	6
4.1	Alternative A: Increased Passenger and Cargo Load with no Airport Extension	
4.1.1	General Concept	7
4.1.2	Project Benefits	7
4.1.3	Adverse Impacts	7
4.2	Alternative B: Runway Extension towards the Eastern End	
4.2.1	Project Concept	7
4.2.2	Project Benefits	7
4.2.3	Adverse Impacts	7
4.3	Alternative C: Runway Extension towards the Western End	
4.3.1	Project Concept	8
4.3.2	Project Benefits	8
4.3.3	Adverse Impacts	8
4.4	Criteria for Evaluation of Project Options	8
5.0	DESCRIPTION OF THE PROPOSAL	
5.1	Location	12
5.2	Construction Methodology	12
5.2.1	Site Clearance	12
5.2.2	Site Earthworks	12
5.2.3	Pavement Construction	13
5.2.4	Surface Drainage	14
6.0	DESCRIPTION OF THE EXISTING ENVIRONMENT	
6.1	General Characteristics and Existing Land Use	15
6.2	Groundwater	15
6.3	Surface Roads	15
6.4	Social and Economic Environment	16
7.0	POTENTIAL IMPACTS AND MANAGEMENT CONTROLS	17
8.0	REFERENCES	19

Tables, & Maps

Table 1	Project Alternatives Evaluation Sheet	9
	Location & Land Use Map	10
	Site Map	11
Table 2	Estimates of Construction Quantities	13

1.0 Executive Summary & Recommendations

1.1 Development Proposal

The Government of Niue proposes to extend the Hanan International Airport runway a further 715 metres to achieve a total runway length of 2350 metres to fully accommodate Boeing 737 aircrafts and establish a capability for handling 767 aircrafts.

A number of Project Definition Reports have been undertaken regarding the proposed extension of the runway, including a recent Cost-Benefit Analysis Study by the Government of Niue. This report provides further environmental information of the project to assist decision makers to make more informed decisions on the project.

Three project alternatives were considered in this report. The western end extension was considered the best option, supporting the Government's previous decision that the expansion should be to the west of the airstrip. The western end of the airstrip is an area consisting mainly of bush, scrub and secondary growth close to the Tafalalo quarry and PWD depot.

The whole of Niue is a water catchment area. Draught periods in Niue are common and therefore proper management of the water resource is the major concern of the study.

An off-shore contractor is proposed to do the construction work. There should be strong local supervisory role and involvement of the project otherwise technology transfer will not take place, ownership of the project may be lost and the local work force will continue to remain reliant on technical expertise from New Zealand.

The construction time has been planned for May to October period "when the weather is relatively settled, cool and dry". This timing would be nice for an off-shore contractor but because a large quantity of water will be used during construction, consideration should be given to commencing work during and or just after the hot season where there is plenty of rain and the aquifers are charged up.

1.2 Anticipated Project Impacts and Proposed Mitigation

Construction of the runway extension will generate various physical impacts upon the airport site and the surrounding areas due to proposed site clearing, blasting, drilling, grading and fill activities. Before site clearance can begin, there is the required relocation of one household that live within or adjacent to the quarry site. In addition, the excavated makatea, coral fill material and dirt to be carted, on huge trucks along the main road will generate a lot of noise and dust to the homes and the hospital that lined this part of the main road. Overuse of this road by the huge trucks, will degrade the road and may damage the main access to the airport area.

Before construction begins, consideration should be given to upgrading the access road from the PWD depot to the western end of the runway and for the haulage trucks to use it instead of the main road. The recommendation here is to upgrade the dirt road, already in existence, for the use of heavy vehicles and plants during the construction of the project. This will confine, to a significant extent, the physical impacts of the construction work to the airport extension area, the quarry and the depot area.

Burn off should be carefully scheduled to avoid disruption of the airport operations, especially to avoid creating a smoke hazard in aircraft flight paths.

Salt water should not be used because of possible intrusion into the water lens. Consideration should be made to scheduling pavement construction during the rainy season when there should be adequate water supply for the works and for other users. Alternatively, collection of rainwater and or pumping off of surplus bore water into temporary storage should be started early to ensure sufficient water supply is available when the paving process begins thereby easing pressure on water demands from the water lens.

The airstrip surface outside the pavement areas is highly permeable and water rarely ponds, after rains, for any length of time. But to greatly improve the surface drainage of the airstrip area, an open channel drain should be provided along the airstrip boundary to provide additional means of controlling and diverting surface water flows away from the airstrip area.

location map

2. Introduction

This report has been prepared in response to a request by the Government of Niue to the South Pacific Regional Environment Programme (SPREP) to conduct an environmental impact assessment (EIA) of the proposed extension of Hanan International Airport.

The proposed extension of the airport is part of the Government of Niue's medium term development strategy which encompasses the controlled development of tourism as a key element. Hanan International Airport as presently configured appears to be a key impediment to such development.

A field study of the proposed extension site and associated impact areas was undertaken from 21-28 October 1994. The final report was prepared at SPREP for presentation to the Government of Niue.

A comprehensive cost-benefit analysis of the proposal, recently completed, and several other project definition reports, that have been prepared, have been reviewed and are listed in the References list.

2.1 Project description

The Government of Niue has decided to extend its present runway at Hanan International Airport to accommodate bigger Boeing 737 aircrafts and establish a capability for 767 aircraft. This involves the extension of the present runway by a further 715 metres, to a total length of 2350 metres. The larger aircrafts will increase the passenger and freight capacities out and into Niue. The larger passenger and freight capacity out and into Niue will not only facilitate easier movements of Niueans but also enable more rapid delivery of much required and urgent supplies as well as maximising tourism opportunities for Niue.

Recently the New Zealand government indicated its support for the runway extension project and its ability to fund the construction. The engineering/design requirements as well as the actual construction work will be carried out by an offshore contractor. PWD plant and resources, according to Beca Carter Hollings & Ferner Ltd, are fully committed to existing projects and maintenance works elsewhere on the island.

2.2 Objectives of the Environmental Impact Assessment

The purpose of this document is to provide public information on the need for and likely effects of the proposal, and demonstrate that environmental impacts of the proposed airport extension could be managed to protect the environment in an appropriate way. Project impact on the physical and social environment should be within limits perceived as acceptable to the community. Discussion of options, alternatives and mitigating measures are key aspects of this EIA report.

3. Objectives Of The Proposal

The primary objective of the proposed airport extension project is to provide an infrastructure to establish a primary economic base in the private sector of Niue's economy.

The other objectives of the proposal are to extend the present runway to accommodate bigger Boeing 737 aircrafts and to establish the airport's capability for handling 767 aircrafts.

The proposal was designed to meet the following needs:

- the existing jet aircraft services to and from Niue are restricted by the existing airfield dimensions and full cargo and passenger loads are currently not possible;
- Government policy of encouraging and facilitating easier travel for Niueans; and
- providing an important step in the future development of tourism and trade links for Niue.

4. Project Alternatives

Alternatives to the preferred option are discussed here briefly. These alternatives are an outgrowth of informal discussions with some selected representatives of the Government and also the private industry.

Three project alternatives were identified.

- Increased passenger and cargo load with no airport extension;
- Runway extension towards the eastern end;
- Runway extension towards the western end.

To facilitate comparison, the alternatives are presented in terms of, at least, the following:

- general development concept and site locations;
- significant project benefits;
- significant adverse impacts;
- public resource commitments.

4.1 Alternative A: Increased Passenger and Cargo Load with no Airport Extension

4.1.1 General Concept

Alternative A represents the "no project" option, or a continuation of existing airport activities without the proposed airport extension. The project assumes that ongoing airport use and activities will continue.

4.1.2 Project Benefits

No additional benefits are expected of this Option.

4.1.3 Adverse Impacts

There will be no direct adverse environmental impacts as this Option offers no physical change to the environment. But this Option has direct implications for Niue's efforts to expand its export trade and develop its tourism potential. Without the airport extension, operation of bigger Boeing 737 aircrafts at maximum expected payloads, and the operation of B767 aircrafts will not be possible.

4.2 Alternative B: Runway Extension towards the Eastern End

4.2.1 Project Concept

A second option is to extend the runway at its eastern end. The project concept will be fully discussed in the third alternative.

4.2.2 Project Benefits

The national benefits arising out of this option are similar to those of the third option and will be discussed in detail later.

4.2.3 Adverse Impacts

The eastward extension of the runway poses several difficulties. The eastern end of the runway traverses an area where the ground slopes relatively steeply downwards and would require a considerable amount of fill material to raise the area to the required height and slope. It will also mean losing a road, shifting of power lines and a lot of inconvenience, dust and noise, to the nearby households who would be too close to the runway clearance area if the extension is going in that direction. The eastern extension will be further away from the allocated government quarry and makatea source. The private land that may be required has not been made available. The extension will be sitting next to the existing water bore-hole. Dust and noise will affect the houses downwind of the eastern extension.

4.3 Alternative C: Runway Extension towards the Western End

4.3.1 Project Concept

This option would essentially represent a relocation of Alternative B to the western end of the existing runway.

4.3.2 Project Benefits

The western extension of the runway provides a closer access to the fill material and PWD supply lines. The project site is far from dwelling houses, it will utilise land that has already been released by private landowners.

4.3.3 Adverse Impacts

There is no major adverse impacts predicted.

4.4 Criteria for Evaluation of Project Options

The evaluation of the three alternatives correlated the three development options with the project objectives identified in Section 3 and the primary issues influencing government's prior decision to extend the runway at its western end.

The assessor has used a simple matrix evaluation technique, at Table 1, to better reflect the assessor's understanding of specific project issues. Ideally, several individuals would be included in this evaluation but because of time constraints and the prior decision to extend at the western end, only one evaluator was used. He has ranked the three development alternatives in the following order of desirability:

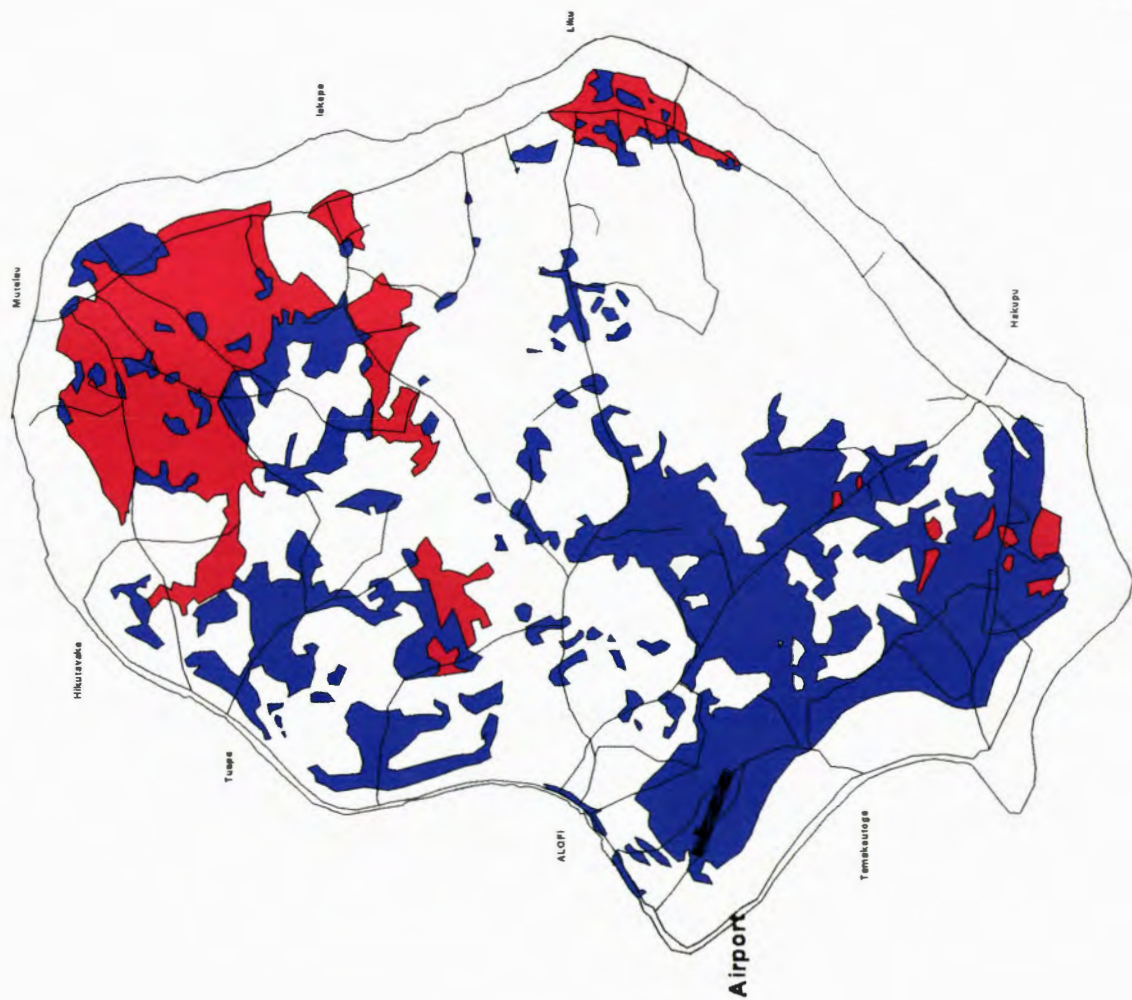
- Alternative C: Runway Extension towards the Western End
- Alternative B: Runway Extension towards the Eastern End
- Alternative A: Increased Passenger and Cargo load without Airport Extension

Reviewers of this report are encouraged to evaluate the alternatives themselves using the tables below as a guide.

**TABLE 1
PROJECT ALTERNATIVES EVALUATION SHEET**

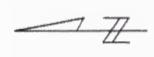
EVALUATION CRITERIA	Relative Weight (1-10)	A	B	C
1. Increased air transportation will be maintained.		1	5	5
2. Increased tourism will be maintained.		1	5	5
3. Government revenues will increase.		1	5	5
4. Government operating costs will decrease.		1	5	5
5. Growth of local businesses will increase		1	5	5
6. Land use conflicts will be limited		8	3	5
7. Dust and noise impacts will be limited		8	3	5
8. High quality of water lens will be maintained		8	3	5
Total Score		29	34	40

In the table above, a relative weight was assigned (1 through 10) for each project issue (evaluation criteria). For example, a relative weight of 1 represented "limited importance" for a given criterion; a weight of 5 suggested "moderate importance". In contrast, a relative weight of 10 indicated "considerable importance". The relative weights that were assigned for each project issue should be averaged (if two or more evaluators were involved) to determine a cumulative weight for the overall project team.



Airport >>
 Roads >>
 Landuse
 Bush
 Scrub
 others

2



Location and Landuse Map



Site Map

5. Description of the Proposal

The Government of Niue has decided to extend the Hanan International Airport. The airport runway, including its turning bay, will be extended by 690 metres, to a total length of 2335 metres. The extension included the construction of a taxiway loop from the park area to the east, widening of existing taxiway and widening of the current park area to the north, with dimensions suitable for handling 767 type aircrafts. All surfacing of the extensions will be in chip seal.

Beca Carter Hollings & Ferner Limited have recommended to the Niue Government that the extension be constructed by an offshore contractor with PWD as a nominated contractor. All heavy plants and vehicles required for the construction phase, presumably from New Zealand, will be brought into Niue by the contractor and taken back after the completion of the extension work.

5.1 Location

The main extension is towards the western end of the airstrip. The area consists mainly of smallholder cultivation and areas of bush, scrub and secondary regrowth. The regrowth vegetation is particularly dense immediately west of the runway, in the vicinity of Tafalalo quarry. The proposed changes in the landuse of the site have been successfully negotiated. See location and site maps.

5.2 Construction Methodology

This section outlines a method of construction for the extension works.

5.2.1 Site Clearance

The site of the proposed western extension has an extensive covering of vegetation consisting of scrub, small trees and fern. The ground surface is very rough from outcrops of limerock and boulders. Clearing will require the removal of the existing vegetation and root systems by cutting and felling the vegetation, and eventual disposal of the material by burning. Undercutting will be required where pockets of soil and humus cannot be completely removed from future pavement areas.

5.2.2 Site Earthworks

Excavation work will be required to achieve the design grade levels and to provide a source of Makatea sand for sub-base and filling material. The excavation methods to be used at the western end are bulldozer ripping and drill and blast. The estimated volumes of site earthworks are outlined in Table 2.

TABLE 2 ESTIMATES OF CONSTRUCTION QUANTITIES	
Description	Quantity
1. Earthworks	
Site Clearance	7,800m ²
Strip Topsoil	8,000m ³
Excavating and Undercutting	59,000m ³
Excavate Makatea for fill	12,000m ³
Respread Topsoil	55,000m ²
Grassing	55,000m ²
Drainage Channels	1,700 lin m
2. Pavement Works	
Makatea Sand Subbase	4,650m ³
Crushed Limerock Basecourse	4,650m ³
3. Sealing Works	
Prime Coat	23,250m ²
Binder and First Seal Coat	23,250m ²
4. Painting	
Remove Existing Markings	350m ²
Apply New Markings	2,300m ²
5. Security Fence	
Remove Existing Fence	650 lin m
Construct New Fence	1,460 lin m

5.2.3 Pavement Construction

The pavement structure proposed for the extension work comprises of a 200mm thick basecourse layer consisting of compacted crushed limerock laid upon a sub-base layer of nominal 200mm thickness which consists of compacted Makatea sand. The sub-base will be increased to 400mm thickness in all areas of undercut ash.

Both sub-base and basecourse will be extracted from the existing quarry at the western end but also from an adjacent quarry which will be opened up. All pavement construction materials will be trucked from the PWD depot area to the site using the main Alofi and airport roads.

Pavement compaction would be performed by vibrating steel wheeled rollers and by rubber tyred roller and to the recommended final densities. A lot of water will be required to assist in achieving the design densities. It has been considered that salt water will be used instead of freshwater.

5.2.4 Surface Drainage

Cross falls of 1.5% over the runway pavement and 2.5% over the strip are proposed to ensure that any water that falls over the surface will be directed away from the pavement areas.

The porous granular nature of the coral limerock and coral subsoil results in a high permeability airstrip surface outside the pavement areas. Experience to date and recent site investigation reveals that water rarely ponds for any length of time on the existing airport and that similar drainage characteristics could be expected in the area of the extension.

6. Description of the Existing Environment

This section describes the environment which will be affected by the proposal.

6.1 General Characteristics and Existing Land uses

The area of the extension belongs to landowners who have used it for small scale taro farming mainly. Government has successfully negotiated an area of approximately 8,000 square metres, on the western side of the current airstrip, from the landowners, for this proposed extension. The area consists mainly of bush, scrub and dense secondary regrowth with several vehicle tracks which may need to be shifted.

Investigation of the soil profiles revealed the surface layer consisting of two types of material:

- ash deposits of varying depth interspersed between vesicular lime rock boulders and outcrops of massive limerock material, outside the airstrip boundary; and
- deposits of semi-compacted fill material, within the confines of the airstrip.

The fill material is comprised of a mixture of ash, topsoil and limerock gravel.

These surface materials overly the limerock and coral which form the base materials for the entire island of Niue. The limerock material consists of a matrix of hard and dense limerock with areas of shell and fossil coral.

The Site Map and the Land Use Map have other details.

6.2 Groundwater

The whole of Niue is a rainfall catchment area with water seeping down to and collected in an underground water lens. The nearest bore-hole, approximately 1.5 kilometres east of the extended site, pumps out water for the airport and the main town areas. Currently, water readings have remained at high quality levels.

6.3 Surface roads

Part of the main road stretching from the PWD stockpile area to the airport is sealed road and in good condition except at the incline to the airport road where it is prone to erosion on the side during heavy rains. The project proposes to use these roads to haul truckloads of fill materials. There is a good vehicle track leading from the western end of the runway to the quarry site and PWD stockpile area. This road needs upgrading and maintenance towards the quarry side but if

constructed properly, it could provide an easy and shorter access from the quarry to the extension site.

6.4 Social and Economic Environment

Several households, although far from the extension site, may be affected by dust and odour during the site clearance and earthworks. Dwelling houses, government offices and a hospital line the sides of the road that will be used to haul truckloads of fill material and rocks. Niue still has no traffic congestion during work rush hours.

In the vicinity of the extension area, there is practically no local economic activity. The offshore contractor would bring in specialist operators and use some local labour. Thus, some small additional economic activity will be generated, in terms of labour costs, social amenity uses and other activities.

7. Potential Impacts and Management Controls

This section examines the likely impacts of the proposed extension, and discuss available techniques to control and manage these impacts.

(i) The analysis of tourism and its economic impact is the central element in the cost-benefit study recently undertaken on the development of the Hanan International Airport. The comprehensive report, by the Niue Government, noted that the data available both on tourism and on the Niue economy has proven to be too limited to make definitive forecasts of the future likely path of visitor growth or to be confident of the measures of economic impact.

(ii) The indication, nevertheless, is that the key areas for attention are seasonal visitor patterns. Visitor numbers have been growing very rapidly over recent years and indications are that further very rapid growth is a possibility. The study has highlighted that in the short term, accommodation is likely to be more of a bottleneck than is runway length. The cost-benefit analysis report is available at the Government Planning Department.

(iii) When one talks about social effects, one is referring to the impacts that the proposed development of the Hanan International Airport will have on the people who will work in it and the people who had been using it and or are going to be using it. Social impacts are bound to occur whenever an area undergoes change.

(iv) To answer the question of who will benefit from the proposed development, assumptions had to be made about possible social benefits and negative social benefits. In the case of the airport extension, benefits will be allocated to those who will be employed during the construction phase of the project. Likewise, those who will be operating small tourist businesses and those who will be employed in them. The Government itself should, in the long run, benefit from receiving foreign exchange through increased visitor travels.

(v) Access to increased travel or better airport facility and service is another benefit that the public of Niue will achieve. For those entrepreneurial types, the increased payloads of flights into and out of Niue will provide the opportunity to start up more small commercial ventures while for the ordinary Niuean, there will be more freedom of choice of movement. This project will enhance future economic activity on the island.

(vi) No serious adverse impacts are predicted out of this project. This is because the extension project is into an area that has generally been left unused and which poses no significant environmental concern. The main area of concern of the project is in the construction phase which will produce dust and smoke from clearance, blasting and construction, but also the possibility of contamination of the underground water lens from saltwater intrusion during the paving process. Other possible mitigating measures will be elaborated on in the summary and recommendations.

(vii) Increased tourism always have a long-term bad effects on the local custom through introduction of foreign habits and alterations in work patterns, the way of life or social structure of the village. It is in the interests of the proper authorities to be aware of potential problems, recognise that social changes will be occurring and to ensure that adequate dialogue takes place to accommodate such changes.

(viii) It is vital all regulations and standards control measures pertaining to airport construction are strictly adhered to. An Airport Safety Officer should be nominated to ensure the conduct of the construction work does not endanger the safe operation of aircraft at any time. In particular, the provisions of the empowering Civil Aviation Regulations and the site regulations in the contract for this runway extension are met at all times.

8. References

1. Beca Carter Hollings & Ferner, 1994, Project Definition Report for Hanan International Airport Runway Extension Niue Island.
2. Beca Worley International, April 1988, Niue Airport Extension-Project Definition Report.
3. Beca Worley International, May 1989, Documents for Runway Extension at Niue Airport for Government of Niue.
4. Government of Federated States of Micronesia, 1993, Model EIA for Aviation Development in Pohnpei, Federated States of Micronesia.
5. Douglas and Vandersyp, September 1994, Cost-Benefit Analysis for the Development of Hanan International Airport, Government of Niue.
6. SPREP, 1989, How to Assess Environmental Impacts on Tropical Islands and Coastal Areas.
7. SPREP, 1993, A Guide to Environmental Impact Assessment in the South Pacific.
8. SPREP, 1993, Niue- State of the Environment Report.
9. Waikato Regional Airport Limited, August 1993, Proposal for assistance to Hanan International Airport Niue Island to achieve Aerodrome Certification.