

**CHAPTER 13 PROJECT IMPLEMENTATION
SCHEDULE AND COST
ESTIMATES**

CHAPTER 13 PROJECT IMPLEMENTATION SCHEDULE AND COST ESTIMATES

13.1 General

This chapter explains the implementation schedule and cost estimates of the short-term development project based on the preliminary design in Chapter 9.

13.2 Implementation Schedule

The next stage of the project implementation to this Study is the financial arrangement for the project. The detailed design, preparation of tender documents, tender and contracting will follow the financial arrangement prior to the commencement of the construction work.

The construction schedule of the short-term development project is estimated as shown in Figure 13.2.1 based on the expected work volume and general procedures of airport projects implemented in the South Pacific region.

The construction work will take approximately 18 months to complete including test operations and flight check. It will be commenced with the runway overlay and construction of access road, new taxiway and apron, followed by the construction of passenger terminal building, fire station, terminal roads and car parking, etc. The air navigation system works will take about 12 months including factory fabrication, transportation and installation.

13.3 Project Cost Estimates

(1) Assumption to the Cost Estimates

The costs are estimated on the following assumptions:

- a) The costs are based on July 1991 index.
- b) The exchange rates were Japanese Yen 140 per US Dollar and Japanese Yen 50 per Solomon Islands Dollar.

Figure 13.2.1 Construction Schedule

Items	Year 1												Year 2					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A. Construction Work	-----																	
1. Runway Overlay (Priority I)	-----																	
2. Terminal Facilities (Priority I)	-----																	
- Access Road and Site Preparation	-----																	
- Taxiway and Apron	-----																	
- Passenger Terminal Building and Fire Station	-----																	
- Terminal Roads and Car Parking	-----																	
3. Air Navigation Systems (Priority II)	-----																	
B. Test Operations, Flight Check etc.	-----																	

Note: The construction of air navigation systems will require 12 months including 9 months for fabrication, 1 month for transportation and 2 months for installation. This schedule is produced assuming that both Priority I and II work items will be constructed simultaneously. However, the implementation of Priority II work items may be postponed depending on the available budget to the Government of Solomon Islands.

- c) The costs are estimated in US Dollars (\$US) since most components of the project cost are foreign portion except locally available sand, aggregate, cement, wooden materials and labor.
- d) No price escalation is considered for cost estimates in US Dollars.
- e) The cost estimates in SI Dollars are shown, but it should be regarded as a reference cost at fixed 1991 prices. The actual construction cost in terms of SI Dollars will inflate due to declining exchange rate of SI Dollars to major foreign currencies and local price inflation.
- f) The facilities to be provided by the oil company and the airlines such as the fuel farm and ground services equipment are not included in the project cost.
- g) The cost of the engineering services consisting of basic design, detailed design and construction supervision is estimated as 15% for the runway overlay and terminal facilities, and 10% for the air navigation systems.
- h) All the costs are subject to $\pm 10\%$ error.

(2) Cost Estimates for the Short-term Development Project

The cost of the short-term development project is shown in Table 13.3.1. The total cost of the project is estimated to be US\$ 22.0 million (SI\$61.7 million). The Priority I works and Priority II works determined in Chapter 8 will cost US\$17.9 million (SI\$50.0 million) and US\$4.2 million (SI\$11.6 million) respectively.

Table 13.3.1 Cost Estimates for the Short-Term Development Project

Category	Work Items	Price in US\$	Price in SI\$ (for reference)
		(Thousand US\$)	(Thousand SI\$)
Priority I	1. Runway Overlay	5,660	15,860
	2. Terminal Facilities	9,880	27,640
	Access Road	350	980
	Site Preparation	530	1,480
	Drainage	220	620
	Taxiway and Shoulders	550	1,540
	Apron and Shoulders	1,130	3,160
	Taxiway and Apron Lighting	160	460
	Passenger Terminal Building	5,790	16,200
	Remodeling of Existing Terminal Building	210	580
	Fire Station	250	700
	Power House and Power Supply System	290	800
	Terminal Road and Car Parking	240	660
	Car Parking Lighting	60	180
Fencing	100	280	
	Total Construction Cost	15,540	43,500
	Engineering Services	2,330	6,530
	Subtotal	17,870	50,030
Priority II	1. Air Navigation Systems	3,760	10,540
	ILS	2,310	6,460
	NDB	170	480
	ALS	1,290	3,600
	2. Incinerator	10	20
	Total Construction Cost	3,780	10,560
	Engineering Services	380	1,060
	Subtotal	4,160	11,620
Total Project Cost		22,030	61,650

Note: Exchange rates US\$1.00=Japanese Yen 140=SI\$2.80

**CHAPTER 14 ECONOMIC AND
FINANCIAL ANALYSES**

CHAPTER 14 ECONOMIC AND FINANCIAL ANALYSES

14.1 General

This chapter examines economic and financial feasibility on the short-term development of Henderson International Airport. The purpose of the economic analysis is to judge whether the short-term development of Henderson International Airport is feasible or not from the viewpoint of the national economy, while the financial analysis are carried out to investigate on the financial impact by the implementation of the project on the Civil Aviation Division.

14.2 Economic Analysis

14.2.1 Basic Concept of Economic Analysis

The Economic analysis is carried out methodologically based on "benefit/cost analysis" which compares the benefits and costs accompanied by the project implementation. If the construction cost and incremental operations and maintenance costs of the project produce an enough economic profit, the project is judged to be economically feasible. The concept of the "benefit/cost analysis" and the formula to calculate the rate of economic profit (economic internal rate of return-EIRR) is shown in Table 14.2.1.

Table 14.2.1 Concept of Benefit/Cost Analysis

	"with the project" (1)	"without the project" (2)	Difference (1) - (2) = (3)	Evaluation Criterion (EIRR)
Cost	C _n	C _o	$\Delta C = C_n - C_o$	EIRR = i, Satisfying the following formula : $\sum_t \frac{(\Delta B - \Delta C)_t}{(1+i)^t} = 0$ where, t: Year
Benefit	B _n	B _o	$\Delta B = B_n - B_o$	

Note : If Economic Internal Rate of Return (i) comes out equal to or over 10%, the implementation of the project is regarded to be feasible in general.

14.2.2 General Presumptions

Evaluation of the benefits and costs for the project is carried out based on the following assumptions:

a) Evaluation at Solomon Islands Dollars

Every benefit and cost for the project is evaluated at Solomon Islands dollars (SI\$).

b) Evaluation at 1991 Prices

Every benefit and cost is valued at 1991 prices. No inflation and fluctuation of exchange rate for the future are considered.

c) Evaluation of Procurement Costs for Human and Physical Resources from Foreign Countries

Procurement costs of machine, material, engineering and employment cost of human resources are evaluated at a local currency (SI\$) applying at the foreign exchange rate in July 1991 (See Note 14.2.1).

d) Import Duties

No duties on the imports for the project is included because the duties are returned eventually to the benefits of the local consumers.

e) Terms for E.I.R.R. calculation

Yearly benefit and costs during 1992-2010 are counted for the calculation.

Note 14.2.1 Exchange Rate

The value of the Solomon Islands dollar is derived from a basket comprised of the currencies of the major trading partner - the US dollar, Australian dollar, Japanese Yen and British Pound. The weights assigned to each currency reflects its importance in trade with Solomon Islands. The US\$/SI\$ rate is the mid-rate between the buying and selling rates set by the Central Bank for its transactions with commercial banks. The other rates are determined from the cross rates between the US\$ and the respective currencies.

14.2.3 Economic Benefits of Airport Development

The development of Henderson International Airport, together with the developments in various sectors such as tourism industries, are expected to bring about various benefits to the socio-economy of Solomon Islands.

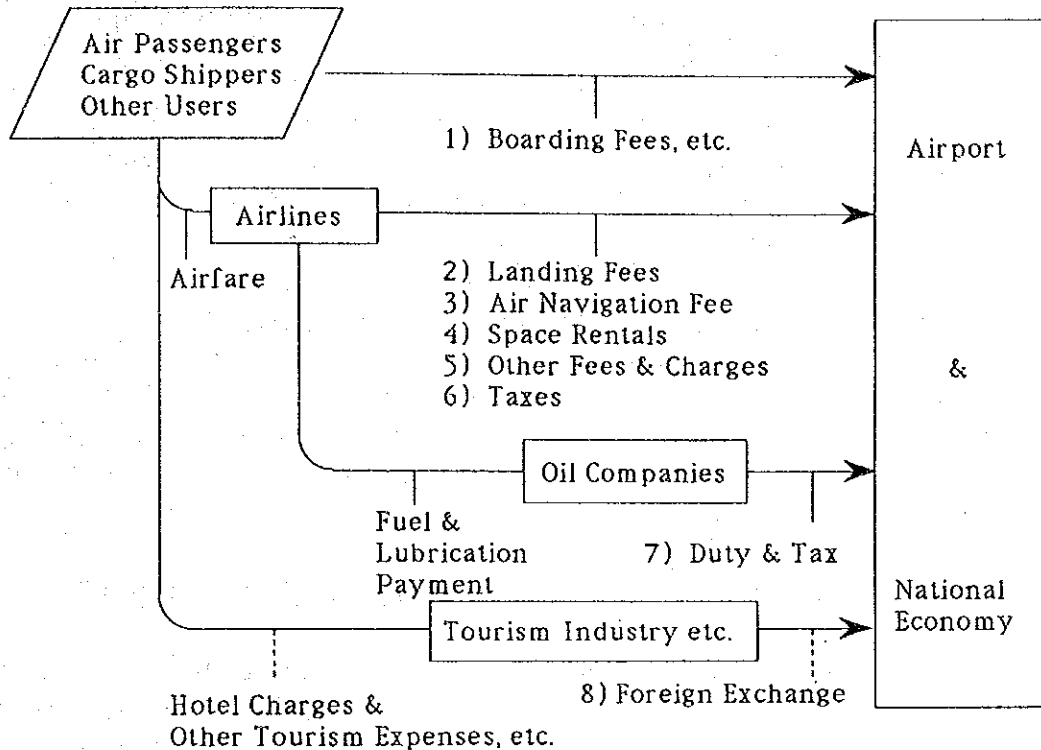


Figure 14.2.1 Typical Money Flow of Airport Users

However the phenomenal and inherent benefits to the airport development, which are not duplicated with each other, are limited to the following benefits:

(1) Eradication of Congestion and Time Saving Benefit

The construction of a new terminal building will make it possible to eradicate the existing serious congestions at the arrival and departure lobbies and bring about time saving benefit for air passengers.

(2) Increase of Airport Revenues

In addition to the construction of new terminal building, the strengthening of runway pavement, construction of the new taxiway and apron, and provision of air navigation systems will make it possible to accommodate larger aircraft and increase the capacity of the airport. As a result, the airport will receive incremental revenues as follows:

- a) Boarding fee
- b) Landing charge
- c) Lighting charge
- d) Air navigation charge
- e) Space rentals
- f) Refueling charge

(3) Increase of Receipts of Import Duty and/or Tax

The increase of receipt of import duty and/or tax on the incremental aircraft fuel and lubrication to be sold at the airport is the benefit accompanied by the project implementation.

(4) Increase of Foreign Exchange Earnings from Foreign Visitors

A part of "multiplier effect" accompanied by the incremental expenditures of growing foreign visitors to Solomon Islands is the benefit accompanied by the project implementation.

(5) Intangible Benefits

In addition to the beforementioned, there are important "intangible benefits" as follows:

- a) Promotion of safety, certainty and punctuality in the aircraft operations and air transportation.
- b) Promotion of convenience and comfortability for the airport users, i.e., air passengers, welcomers, wellwishers and other visitors.
- c) Socio-economic and cultural benefits: With the growing traffic of passengers and goods, the improvement of the airport will contribute to develop the socio-economy and culture of Solomon Islands.

- d) Contribution to the development of the industrial estate:
The airport development will make it easier to promote the development of the industrial estate being planned near the airport

14.2.4 Estimate of Benefits

(1) Quantification of Benefits by Market Price

Among the mentioned benefits, every major benefit, which is possible to be quantified from the view points of the air transportation market, is quantified based on a market price prevailing in Solomon Islands.

(2) Main Benefits by Category

Benefits belonged to the airport are categorized as shown in Table 14.2.2 according to the mentioned concept of "benefit/cost analysis".

Table 14.2.2 Benefits to be Quantified by Category

Item	Air Passengers "without Project"	Incremental Traffic "with Project"
Time Saving Benefit by Congestion Eradication [14.2.3. (1)]	x	-
Benefit for Boarding Service [14.2.3. (2), a)]	-	x
Benefit by Landing & Airport Facilities, etc. [14.2.3. (2), b) - f)]	-	x
Duty & Tax on Aircraft fuel, and Other Benefits [14.2.3. (3)]	-	x
Benefits accompanied by Foreign Visitors Expenses [14.2.3. (4)]	-	x

Note: "x" means object to be quantified.

(3) Traffic Volume in Case of "Without the Project" and "With the Project"

This project is designed to expand the air transport services at Henderson International Airport by the development of existing facilities. Hence, the "without the project" is specified as the maintenance of the existing airport in the present condition with minimum maintenance and replacement. This Study defines the traffic volume in case of "without the project" and "with the project" as shown in Figure 14.2.2.

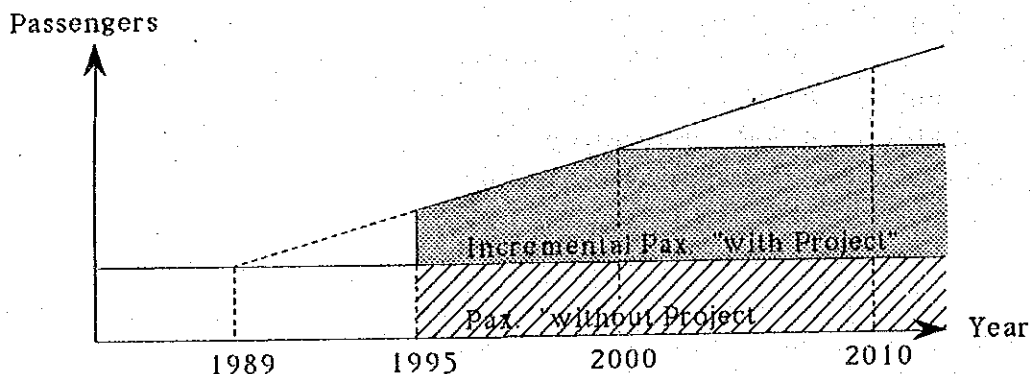


Figure 14.2.2 Classification of Air Traffic Volume in case of "without the project" and "with the project"

The traffic volume of "without the project" is constant and identical to that in 1989, while the incremental traffic volume accompanied by the project implementation ("with the project") is equal to the amount deducting the "without the project" traffic from the projected traffic volume. However, the traffic volume of "with the project" after 2000 will be maintained to that in 2000 because the short-term development project is designed to cope with the traffic volume up to 2000. Estimated results according to the abovementioned are shown in Table 14.2.3.

Table 14.2.3 Traffic Volume in Case of "Without the Project" and "With the Project"

Traffic Demand Projection	Unit: Persons and Numbers																
	1989	1995	1996	1997	1998	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2010	
Passengers																	
- International	33,600	58,300	63,300	66,900	75,000	81,600	88,800	96,100	104,000	112,500	121,700	131,700	142,000	153,200	165,200	178,200	192,200
- Domestic	49,100	74,000	76,500	83,300	88,300	93,700	99,400	104,700	110,300	116,200	122,400	128,300	135,000	141,500	148,400	155,600	163,200
- Total	82,700	132,300	141,300	152,200	163,300	175,300	188,200	200,800	214,300	228,700	244,100	260,000	277,000	294,700	313,600	333,800	355,400
Aircraft Movements																	
- International	940	1,150	1,184	1,221	1,260	1,303	1,350	1,430	1,510	1,590	1,670	1,750	1,830	1,910	1,990	2,070	2,150
- Domestic	0	100	115	132	152	174	200	260	320	390	440	500	560	630	700	780	850
- DHC-6	6,440	10,500	11,027	11,588	12,185	12,822	13,500	14,200	14,900	15,600	16,300	17,000	17,700	18,400	19,100	19,800	20,500
- B737	1,020	2,800	2,848	3,120	3,417	3,743	4,100	4,460	4,820	5,180	5,540	5,900	6,260	6,620	6,980	7,340	7,700
- B767	5,420	7,900	8,188	8,469	8,769	9,079	9,400	9,740	10,080	10,420	10,760	11,100	11,440	11,780	12,120	12,460	12,800
- Total	7,380	11,950	12,212	12,803	13,446	14,125	14,850	15,630	16,410	17,190	17,970	18,750	19,530	20,310	21,090	21,870	22,650
Incremental Traffic in WP																	
- International	24,700	28,700	29,400	30,200	31,200	32,200	33,200	34,200	35,200	36,200	37,200	38,200	39,200	40,200	41,200	42,200	43,200
- Domestic	24,900	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100
- Total	49,600	77,800	78,500	79,300	80,300	81,300	82,300	83,300	84,300	85,300	86,300	87,300	88,300	89,300	90,300	91,300	92,300
Aircraft Movements																	
- International	210	244	244	261	320	363	410	410	410	410	410	410	410	410	410	410	410
- Domestic	100	100	115	132	152	174	200	200	200	200	200	200	200	200	200	200	200
- DHC-6	4,060	4,587	4,587	5,148	5,740	6,382	7,060	7,060	7,060	7,060	7,060	7,060	7,060	7,060	7,060	7,060	7,060
- B737	1,530	1,828	1,828	2,100	2,397	2,723	3,080	3,080	3,080	3,080	3,080	3,080	3,080	3,080	3,080	3,080	3,080
- B767	2,430	2,760	2,760	3,049	3,349	3,653	3,980	3,980	3,980	3,980	3,980	3,980	3,980	3,980	3,980	3,980	3,980
- Total	4,270	4,832	4,832	5,429	6,066	6,745	7,470	7,470	7,470	7,470	7,470	7,470	7,470	7,470	7,470	7,470	7,470
"Without Project" Traffic																	
- International	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600
- Domestic	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100
- Total	82,700	82,700	82,700	82,700	82,700	82,700	82,700	82,700	82,700	82,700	82,700	82,700	82,700	82,700	82,700	82,700	82,700
Aircraft Movements																	
- International	940	940	940	940	940	940	940	940	940	940	940	940	940	940	940	940	940
- Domestic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- DHC-6	6,440	6,440	6,440	6,440	6,440	6,440	6,440	6,440	6,440	6,440	6,440	6,440	6,440	6,440	6,440	6,440	6,440
- B737	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020
- B767	5,420	5,420	5,420	5,420	5,420	5,420	5,420	5,420	5,420	5,420	5,420	5,420	5,420	5,420	5,420	5,420	5,420
- Total	7,380	7,380	7,380	7,380	7,380	7,380	7,380	7,380	7,380	7,380	7,380	7,380	7,380	7,380	7,380	7,380	7,380

(4) Quantification of Benefits

a) Time Saving Benefits

Time saving benefit enjoyable for the air passengers is quantified by the formula (14.2.1).

$$BST = STP \cdot ATVI \cdot PIWO \quad (14.1.1)$$

where, BST : Total amount of time saving benefit
STP : Average quantity of saving time per passenger:
STP is assumed to be 1/3 hour/passenger

ATVI : Average time value of passengers :
ATVI = SI\$33/hour
(See Appendix-14.2.1 for estimation method)

PIWO : No. of international air passengers in case of "without the project"

b) Benefit from Increase of Boarding Fee

The benefit from increase of boarding fee is quantified by the formula (14.2.2).

$$BOAB = BFE \cdot \frac{1}{2} \cdot PIWT \quad (14.2.2)$$

where, BOAB : Total amount of the benefit for the boarding service

BFE : Amount of boarding fee per international passenger: BFE = SI\$20

PIWT : No. of Incremental international air passengers (inbound + outbound) with the project

c) Benefit from Increase of Aircraft Landing Charge

The benefit from increase of aircraft landing charge is quantified by the formula (14.2.3).

$$ALB = \sum_i LFE_i \cdot \frac{1}{2} \cdot NLWT_i \text{ ----- (14.2.3)}$$

where, ALB : Total amount of the benefit for the aircraft landings

LFE_i : Amount of aircraft landing fee of aircraft type (i):

B767 -----	SI\$ 1,335 (2,000)
B737 -----	SI\$ 535 (800)

() indicates landing charge after the introduction of the ILS.

NLWT_i : No. of incremental aircraft movements (landing + take-off) of aircraft type (i) with the project

d) Benefit from Increase of Lighting Charge

The benefit from increase of lighting charge is quantified by the formula (14.2.4).

$$LTB = ALF \cdot NAIWT \text{ ----- (14.2.4)}$$

where, LTB : Total amount of the benefit for the lighting service

ALF : Average receipt of the lighting fee per international aircraft movement: ALF=SI\$ 6.7

NAIWT : No. of incremental international aircraft movements with the project

e) Benefit from Increase of Air Navigation Charge

The benefit from increase of the air navigation charge is quantified by the formula (14.2.5).

$$NAB = NAF \cdot OFWT \text{ ----- (14.2.5)}$$

where, NAB : Total amount of the benefit for the air navigation service

NAF : Average air navigation charge: SI\$378/B747-200 overflying

OFWT : No. of incremental overflying aircrafts after the project implementation

No. of overflying aircraft:

1989	-----	8/week
1995	-----	12/week
2000	-----	16/week

f) Benefit from Increase of Space Rentals

The benefit from increase of the space rentals is quantified by the formula (14.2.6).

$$SRB = \sum_i RT_i \cdot SPC_i \text{ ----- (14.2.6)}$$

where,

SRB : Total amount of the benefit for the space rentals

RT_i : Unit rental charge for the space (i)

- : 1. New terminal building ----- SI\$200/sqm
- 2. Existing building -- SI\$70/sqm

SPC_i : Space area (i):

- 1. New terminal ----- 700 sqm
- 2. Existing terminal ----- 425 sqm

g) Benefit from Increase of Aircraft Refueling Charge

The benefit from increase of the aircraft refueling charge is quantified by the formula (14.2.7).

$$RSB = RSR \cdot QFWT \text{ ----- (14.2.7)}$$

where,

RSB : Total amount of the benefit for the aircraft fuel supplying service

RSR : Unit charge: $RSR = 0.02 \text{ SI\$/liter}$

QFWT : Incremental quantity of aircraft fuel with the project implementation (See Appendix-14.2.2)

h) Benefit from Increasing Revenue of Duty or Tax

The benefit for the incremental revenue of the import duty on the aircraft fuel and lubrication is quantified by the formula (14.2.8).

$$TXB = TXR \cdot VFWT \text{ ----- (14.2.8)}$$

where,

TXB : Total amount of the benefit of increasing revenue of the duty on aircraft fuel (See Appendix-14.2.2)

TXR : Duty rate against the sales prices of the aircraft fuel: $TXR = 20 \%$

VFWT: Incremental value of aircraft fuel to be sold with the project implementation (See Appendix-14.2.2)

i) Benefit of Increasing Foreign Earnings from Foreign Visitors

The benefit for the contribution of the foreign visitors' expenses to the increase of the national income is quantified by the formula (14.2.10).

$$ICB = CTR \cdot MLP \cdot EXP \cdot FVST \text{ ----- (14.2.10)}$$

where,

- ICB : Benefit of increasing foreign earnings from foreign visitors attributed to the airport development
- MLP : "Income Multiplier" of the foreign visitors expenditure: $MLP = 0.5$ (See Note 14.2.2)
- CTR : Contribution ratio of this project: $CTR = 0.6$ (See Note 14.2.3)
- EXP : Average expenditure of the foreign visitors: $EXP = SI\$ 1,600$ per visitor based on the passenger interview survey conducted at the airport (See Appendix-3.4.2)
- FVST : No. of incremental foreign visitors by airway with the project

Note 14.2.2 Income Multiplier of Tourism Industry

A number of studies have assessed the economic significance of tourism in terms of the impact of tourist expenditure on income generation. For instance, the income multiplier of tourist expenditure in Vanuatu has been estimated at 0.56 and in Tonga at 0.42. In other words, every 100 dollars of tourist expenditure generates an income of \$56 and \$42 to the local economies of Vanuatu and Tonga. (Source: The Courier No. 122, July-August, 1990, P82). This study assumed income multiplier for Solomon Islands to be 0.5 taking a rough average between Vanuatu and Tonga.

Note 14.2.3 Contribution Ratio of Airport Development

The Contribution ratio of the airport development to the increase of national income on the tourism sector is estimated based on the size of investment requirements. The short-term development of Henderson Airport will require some SI\$60 million, while the construction cost of the additional 440 hotel rooms required up to 2000 is approximately SI\$40 million, therefore, the contribution ratio is estimated to be $60/(60+40) = 0.6$.

14.2.5 Economic Cost of Airport Development

The cost of the airport development consists of the construction cost and operations and maintenance costs.

(1) Construction Cost

The annual fund requirements for the construction of the short-term development are estimated as shown in Table 14.2.4 from the project implementation schedule and construction cost estimate in Chapter 13. The construction costs have been estimated for two cases, i.e., the simultaneous construction of both Priority I and II work items and the construction of Priority I work items with five year postponement of Priority II work items. (Refer to Chapter 8 for Priority I and II work items)

Table 14.2.4 Annual Fund Requirements for
Construction Works (Unit: Million SI\$)

Year	Simultaneous Construction of All Work Items	Five Year Postponement of Priority II Work Items
1992	5.0	4.3
1993	37.8	30.5
1994	18.9	15.3
1997	-	0.7
1998	-	7.3
1999	-	3.6
Total	61.7	61.7

(2) Operations and Maintenance Costs

The operations and maintenance costs are estimated in accordance with the organizational reform plan in the airport management study in Chapter 12. The operations and maintenance costs consists of personnel, administration & training cost and inspection & maintenance cost which are considered proportional to the number of staff and size of airport facilities respectively. The annual personnel cost is estimated by multiplying the number of staff in the new organization (97) by the average personnel related expenditure per staff (SI\$12,000). The annual inspection and maintenance cost is roughly estimated as 1% of the

construction cost of civil and architectural works and 5% of the construction cost of air navigation system works. The additional operations and maintenance costs by the short-term development is estimated in Table 14.2.5.

Table 14.2.5 Annual Operations and Maintenance Cost
(Unit: Thousand SI\$)

Items	Priority I and II Work Items	Priority I Work Items Only
Personnel, Administration & Training	1,160	1,160
Inspection & Maintenance	960	430
Operations and Maintenance Cost (1)	2,120	1,590
Present Operations and Maintenance Cost* (2)	1,150	1,150
Additional Operations and Maintenance Cost (1)-(2)	970	440

Note:* The present operations and maintenance costs of the CAD is 819 thousand SI\$. However, if operations and maintenance costs of Technical & Maintenance Division of MTA and Royal Police of Solomon Islands at the airport are added to the above amount, the costs would be around SI\$1,150 thousand.

14.2.6 Results of Economic Analysis

The benefits and costs described in the previous sections are tabulated in a cash flow as shown in Tables 14.2.6 and 14.2.7. The Economic Internal Rate of Return (EIRR), Benefit Cost Ratio (B/C) and Net Present Value (NPV) of the project are calculated and summarized in Table 14.2.8.

Table 14.2.8 Evaluation Indicators

Items	Simultaneous Construction of All Work Items	Five Year Postponement of Priority II Work Items
EIRR (%)	12.1%	13.5%
B/C Ratio*	1.16	1.26
NPV (Thousand SI\$)*	8,943	12,943

*Note *:* At discount rate of 10%

The results of the economic analysis show that the short-term development of Henderson International Airport is feasible from the national economic viewpoint since the EIRRs are

Table 14.2.6 Cash Flow of Benefits and Costs
(Simultaneous Construction of Priority I and II Work Items)

Unit: Person, 1,000 Sig. etc.

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
International Pax																				
Incremental Pax in UP Case																				
No. of Pax. in WOP Case																				
Domestic Pax																				
Incremental Pax in UP Case																				
No. of Pax. in WOP Case																				
Incremental Aircraft Mvts.																				
International-Total																				
8757																				
9737																				
Domestic-Total																				
BHC-6																				
81																				
Foreign Visitors																				
Incremental No. of Visitors																				
Ave. Expense/Visitor(\$10)																				
JET-ai																				
AUGAS																				
Benefits																				
a) Time Saving																				
b) Boarding Service																				
c) Aircraft Lending Service																				
d) Lighting Service																				
e) Navigation Service																				
f) Aircraft Refuel Service																				
g) Space Rentals																				
h) Aircraft Fuel Duty																				
i) Tourism Foreign Exchange																				
Total Benefit																				
Costs																				
a) Construction Cost																				
b) Add. Ops & Maint. Costs																				
Total Costs																				
Salvage Value																				
Net Benefit (Benefits - Costs + Salvage Value)																				
Discounted Value at the Beginning of 1992																				
At the Rate of 5%																				
At the Rate of 10%																				
At the Rate of 15%																				
At E.I.R.R. (%)																				
Benefit/Cost Ratio																				
At the Rate of 5%																				
At the Rate of 10%																				
At the Rate of 15%																				

Table 14.2.7 Cash Flow of Benefits and Costs
(Construction of Priority I Work Items with Five Year
Postponement of Priority II work Items)

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
International Pax																				
Incremental Pax in WP Case																				
No. of Pax. in WP Case	24,700	29,700	35,300	41,400	48,000	55,200	62,000	69,000	76,000	83,000	90,000	97,000	104,000	111,000	118,000	125,000	132,000	139,000	146,000	785,300
Domestic Pax	39,500	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600	527,500
Incremental Pax in WP Case	24,900	29,400	34,200	39,200	44,500	49,100	53,900	58,800	63,800	68,800	73,800	78,800	83,800	88,800	93,800	98,800	103,800	108,800	113,800	725,500
No. of Pax. in WP Case	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	49,100	785,500
Incremental Aircraft Rvts.																				
International-Total	210	244	281	321	363	410	410	410	410	410	410	410	410	410	410	410	410	410	410	5,929
8767	180	115	132	152	174	200	200	200	200	200	200	200	200	200	200	200	200	200	200	2,873
8737	110	129	149	169	189	210	210	210	210	210	210	210	210	210	210	210	210	210	210	3,055
Domestic-Total	4,050	4,588	5,149	5,746	6,382	7,060	7,060	7,060	7,060	7,060	7,060	7,060	7,060	7,060	7,060	7,060	7,060	7,060	7,060	103,585
DHC-6	1,582	1,828	2,180	2,397	2,723	3,080	3,080	3,080	3,080	3,080	3,080	3,080	3,080	3,080	3,080	3,080	3,080	3,080	3,080	44,500
BM1	2,468	2,760	3,049	3,349	3,659	3,980	3,980	3,980	3,980	3,980	3,980	3,980	3,980	3,980	3,980	3,980	3,980	3,980	3,980	59,077
Foreign Visitors																				
Incremental No. of Visitors	8,750	10,300	12,220	14,440	17,060	20,150	20,150	20,150	20,150	20,150	20,150	20,150	20,150	20,150	20,150	20,150	20,150	20,150	20,150	284,460
Ave. Expense/Visitor (\$)	1,520	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	25,580
Incremental Fuel (1,000 KL)																				
JET-A1	1,000	1,200	1,400	1,600	1,800	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	29,000
AUGAS	1,000	1,100	1,200	1,300	1,400	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	22,500
Benefits																				
a) Time Saving	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	5,914
b) Boarding Service	247	287	353	414	488	552	552	552	552	552	552	552	552	552	552	552	552	552	552	7,863
c) Aircraft Landing Service	96	111	128	147	167	184	184	184	184	184	184	184	184	184	184	184	184	184	184	3,773
d) Lighting Service	1	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	40
e) Navigation Service	79	93	104	119	137	157	157	157	157	157	157	157	157	157	157	157	157	157	157	1,858
f) Aircraft Refuel Service	40	46	52	58	64	70	70	70	70	70	70	70	70	70	70	70	70	70	70	1,050
g) Space Rentals	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	2,715
h) Aircraft Fuel Duty	640	730	820	920	1,010	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	16,220
i) Tourism Foreign Exchange	4,200	4,963	5,866	6,931	8,189	9,672	9,672	9,672	9,672	9,672	9,672	9,672	9,672	9,672	9,672	9,672	9,672	9,672	9,672	136,541
Total Benefit	5,843	6,779	7,864	9,131	10,598	12,377	12,377	12,377	12,377	12,377	12,377	12,377	12,377	12,377	12,377	12,377	12,377	12,377	12,377	174,253
Costs																				
a) Construction Cost	4,300	30,500	15,300																	61,700
b) Add. Ops & Maint. Costs	440	440	440	440	440	440	440	440	440	440	440	440	440	440	440	440	440	440	440	12,870
Total Costs	4,300	30,500	15,300	440	440	440	440	440	440	440	440	440	440	440	440	440	440	440	440	74,570
Salvage Value																				
Net Benefit (Benefits - Costs + Salvage Value)	-4,300	-30,500	-15,300	5,403	6,339	6,724	1,391	6,548	11,407	11,407	11,407	11,407	11,407	11,407	11,407	11,407	11,407	11,407	11,407	23,240
Discounted Value at the Beginning of 1992	-4,995	-27,684	-13,217	4,445	4,967	5,217	980	4,432	7,353	7,003	6,670	6,350	6,050	5,761	5,487	5,225	4,977	4,740	4,511	48,203
At the Rate of 5%	-3,980	-25,287	-11,495	3,690	3,936	3,795	714	3,055	4,838	4,398	3,998	3,635	3,304	3,004	2,731	2,483	2,257	2,052	1,865	12,943
At the Rate of 10%	-3,739	-23,862	-10,860	3,069	3,151	2,907	523	2,141	3,243	2,822	2,452	2,129	1,854	1,612	1,402	1,219	1,060	922	805	-3,501
At E.I.R.R. (2%)	-3,739	-23,684	-10,468	3,258	3,368	3,148	574	2,381	3,655	3,221	2,830	2,501	2,204	1,942	1,711	1,508	1,329	1,171	1,024	-6
Benefit/Cost Ratio																				
At the Rate of 5%																				
At the Rate of 10%																				
At the Rate of 15%																				

greater than the opportunity cost of capital of 10% which is usually used as a criterion for economically viable projects by the World Bank and the Asian Development Bank.

The EIRR for the case of five year postponement of Priority II work items will be improved by 1.4 percent points. This is because the additional investment for Priority II work items (provision of radio navigation aids and lighting system for the precision approach operations) is mainly for the improvement of air safety and does not generate quantifiable monetary benefit. An explanation on the economic indicators is included in Appendix-14.2.3.

Sensitivity tests are carried out to provide probabilistic judgement on the investment. The E.I.R.R.s are calculated for various projections and summarized in Table 14.2.9:

Table 14.2.9 Sensitivity Tests

Projections	EIRR (%)	
	Somultaneous Construction of All Work Items	Five Year Postponement of Priority II Work Items
Original Case	12.1%	13.5%
Cost up by 10%	10.9%	12.1%
Cost down by 10%	13.6%	15.2%
Traffic up by 10%	13.4%	15.0%
Traffic down by 10%	10.8%	12.0%

It is noted that the EIRRs are still greater than the opportunity cost of capital of 10% even for possible cost overrun and low air traffic demeaned cases.

14.3 Financial Analysis

The financial analysis examines the financial impact of the project on the Civil Aviation Division. Although the CAD is not a financially independent organization at present, the Civil Aviation Corporation is planned to be established in the near future as aforementioned in Chapter 11. Therefore, this Study focuses on the financial possibility of this corporation.

14.3.1 Revenues of the Civil Aviation Corporation

The revenues from the operation of the airport consist of the following items:

- a) Boarding fees
- b) Landing charge
- c) Lighting charge
- d) Air navigation charge
- e) Space rentals
- f) Aircraft refueling charge
- g) Others (air service licenses and sundry fees)

At present, boarding fee, landing charge, lighting charge, air navigation charge, air service licenses and sundry fees are collected by the CAD. Space rentals and aircraft refueling charge are planned to be introduced by the Civil Aviation Corporation.

This analysis assumes that the existing rates of airport charges will be maintained except the landing charge. This charge is assumed to be raised as mentioned in section 14.2.4 (4) c) when the ILS is provided at the airport. The rate for space rentals is set at SI\$200/sq.m/year for the new terminal building based on prevailing rental rate in Honiara and SI\$ 70/sq.m/year for the existing terminal building as planned by the CAD. A surcharge of SI\$0.02/liter of aviation fuel sales at the airport is also considered based on the CAD plan.

The calculation method of the airport revenues may be referred to section 14.2.4 (4) b) through g). However, it is noted that the financial analysis accounts the gross revenue from the airport operations, but incremental revenue as considered in the economic analysis.

14.3.2 Expenditures of the Civil Aviation Corporation

The expenditures of the Civil Aviation Corporation consist of the construction cost and operations and maintenance costs. They have been shown in section 14.2.5.

Table 14.3.1 Cash Flow of Revenues and Expenditures
(Simultaneous Construction of Priority I and II Work Items)

Year	Unit: Person, 1,000 S\$ etc.																					
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total		
Air Passengers																						
International																						
Domestic																						
Total	58,300	62,300	68,900	75,000	81,600	88,800	88,800	88,800	88,800	88,800	88,800	88,800	88,800	88,800	88,800	88,800	88,800	88,800	88,800	88,800	1,323,900	
Aircraft Movements																						
International																						
8767	100	115	122	126	133	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	2,373	
8737	1,950	1,059	1,059	1,129	1,129	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	18,096	
Domestic	10,500	11,259	11,589	12,186	12,822	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	206,685	
DHC-8	2,000	2,848	3,120	3,417	3,743	4,100	4,100	4,100	4,100	4,100	4,100	4,100	4,100	4,100	4,100	4,100	4,100	4,100	4,100	4,100	60,833	
BNI	7,000	8,100	8,469	8,769	9,079	9,400	9,400	9,400	9,400	9,400	9,400	9,400	9,400	9,400	9,400	9,400	9,400	9,400	9,400	9,400	145,797	
Total	11,950	12,212	12,810	12,447	14,125	14,850	14,850	14,850	14,850	14,850	14,850	14,850	14,850	14,850	14,850	14,850	14,850	14,850	14,850	14,850	227,594	
Aircraft Fuel Consumption																						
JET AT (KL)	5,200	5,400	5,600	5,800	6,000	6,200	6,200	6,200	6,200	6,200	6,200	6,200	6,200	6,200	6,200	6,200	6,200	6,200	6,200	6,200	90,800	
RUGES (KL)	2,500	2,700	2,800	2,900	3,000	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100	48,100	
Total	7,700	8,100	8,400	8,700	9,000	9,300	9,300	9,300	9,300	9,300	9,300	9,300	9,300	9,300	9,300	9,300	9,300	9,300	9,300	9,300	138,900	
Revenues																						
a) Boarding Fee	583	633	669	750	815	888	888	888	888	888	888	888	888	888	888	888	888	888	888	888	13,239	
b) Landing Charge	520	543	568	586	625	658	658	658	658	658	658	658	658	658	658	658	658	658	658	658	10,113	
c) Lighting Charge	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	9	
d) Air Navigation Charge	236	250	265	280	297	314	314	314	314	314	314	314	314	314	314	314	314	314	314	314	4,782	
e) Refuel Service Charge	156	162	168	174	182	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186	2,778	
f) Space Rentals	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	2,720	
g) Air Service Licenses	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	248	
h) Sundry Fees & Receipt	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	32	
Total Revenue	1,690	1,783	1,885	1,995	2,097	2,244	2,244	2,244	2,244	2,244	2,244	2,244	2,244	2,244	2,244	2,244	2,244	2,244	2,244	2,244	34,844	
Expenditure																						
a) Construction Cost	5,200	37,800	19,960																			61,700
b) Ops & Maint. Costs																						
- Personnel, Adm.																						
& Training																						
- Inspection, Maint.																						
etc.																						
Total of Expenditure																						
Revenue - Expenditure																						
1. Case expenditure	-5,000	-37,800	-18,960																			-61,576
including Const. Cost																						
2. Case expenditure	0	0	0																			124
excluding Const. Cost																						

Table 14.3.2 Cash Flow of Revenues and Expenditures
(Construction of Priority I Work Items
with Five Year Postponement of Priority II Work Items)

Year	Unit: Person, 1,200 Sig. etc.																				
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total	
Air Passengers																					
International																					
Domestic																					
Total																					
Aircraft Movements																					
International																					
8767																					
8737																					
Domestic																					
DHC-6																					
BNI																					
Total																					
Aircraft Fuel Consumption																					
JET A1 (KL)																					
AUGAS (KL)																					
Total																					
Revenues																					
a) Boarding Fee																					
b) Landing Charge																					
c) Lighting Charge																					
d) Air Navigation Charge																					
e) Refuel Service Charge																					
f) Space Rentals																					
g) Air Service Licenses																					
h) Sundry Fees & Receipts																					
Total Revenue																					
Expenditure																					
a) Construction Cost																					
b) Ops & Maint. Costs																					
- Personnel, Adm.																					
& Training																					
- Inspection, Maint.																					
etc.																					
Total of Expenditure																					
Revenue - Expenditure																					
1. Case expenditure																					
including Const. Cost																					
2. Case expenditure																					
excluding Const. Cost																					

14.3.3 Comparison of Revenues and Expenditures

The streams of annual revenues and expenditures are shown in Tables 14.3.1 and 14.3.2. The financial cash flow indicates that the expected revenue will not cover the total expenditure including investment cost and operation and maintenance costs.

As is normally expected for airport financial conditions of the similar size of traffic, it is generally difficult to generate sufficient revenues from airport operations to cover the investment requirements. In this case, it is appropriate to plan the airport charging system to cover the operations and maintenance cost.

As indicated in Table 14.3.1, the airport operating revenues cannot cover the operations and maintenance costs up to 1999 in case of the simultaneous construction of Priority I and II work items. However, in case of the postponement of Priority II work items in Table 14.3.2, the operations and maintenance costs will be covered by the revenues from the airport services except in 1995. This difference is caused by the increased operations and maintenance costs for the air navigation systems included in Priority II work items.

The financial deficit of the CAD in 1990 was SI\$368,000. However, if the airport related cost attributed to the Technical and Maintenance Division of MTA and Royal Police of Solomon Islands are added to this amount, the substantial deficit by the present airport operations are estimated to be about SI\$700,000. The expected levels of deficit in Tables 14.3.1 and 14.3.2 are smaller than this present substantial deficit. Therefore, it can be concluded the implementation of the project will increase the airport revenues and improve the financial balance of the CAD.

The planned Civil Aviation Corporation can sustain the airport operations and maintenance from its operating revenues with minimum initial support from the Government.

14.3.4 Revision of Existing Airport Charges

This section describes the possibility of the revision of existing airport charges. The boarding fee and landing charges in the neighboring countries are compared in Table 14.3.3.

Table 14.3.3 Comparison of Boarding Fee and Landing charges (Unit:US\$)

Country	Boarding Fee	Landing Charge	
		B-737-200	B-767-200
Solomon Islands	7.3	195	486
Australia	7.8	401	975
Fiji	6.7	100	439
New Zealand	9.4	312	757
Tonga	3.8	168	409
Vanuatu	12.3	135	511

Note : Converted to US\$ at exchange rate in July 1991.

The existing boarding fee and landing charges at the Solomon Islands situate at the average of the neighboring island countries.

However, the landing charges in Australia and New Zealand are substantially higher than that of the Solomon Islands due to provision of better facilities and services. Upon completion of the ILS and ALS in the short-term development, Henderson International Airport can provide the comparative quality of services to airports in such countries. Therefore, it is rational to increase the landing charge.

As for the boarding fee, it is recommended the increase of the fee be kept to a minimum in order not to discourage the foreign tourists and tour agents. It may be wise, instead of revising existing boarding fee, to plan the passenger terminal building to be attractive for passengers and to be profitable for the airport authority by securing larger concessionary area such as duty-free shop or snack bar. In this respect, the collection of concessional commissions planned by the CAD is a possible way to increase the airport operating revenues.

**CHAPTER 15 CONCLUSION AND
RECOMMENDATIONS**

CHAPTER 15 CONCLUSION AND RECOMMENDATIONS

As a result of the comprehensive study presented in this report, the following are concluded based on the long-term master planning and the feasibility study on the short-term development project of Henderson International Airport in Solomon Islands:

- 1) The urgent necessity to develop the existing airport to cope with the future air traffic demands is confirmed. The needs are identified, particularly for strengthening the existing runway pavement, expanding the capacity of the terminal facilities and providing facilities for precision approach operations.
- 2) The optimal airport master plan is selected through a comprehensive comparison of the alternatives. Which is:

[Short-term Development Plan (Target Year 2000)]

- a) The overlay of the existing 2,200 m long runway for the accommodation of B767;
- b) The construction of the new terminal facilities, including a passenger terminal building, apron and taxiway, roads and car parking, etc., at the west side of the existing terminal
- c) The continuous utilization of the existing terminal facilities for small aircraft parking, cargo handling and airport operations and administration; and
- d) The provision of an instrument landing system (ILS) and precision approach lighting system (ALS) for runway 24 and the replacement of the existing NDB.

[Long-term Development Plan (Target Year 2010)]

- a) The runway extension to 2,500m for the accommodation of B 747;
- b) The expansion of the terminal facilities to cope with the demand increase;
- c) Transfer of remaining functions at the existing terminal area to the new terminal area; and
- d) The construction of aircraft maintenance facilities.

Among the scope of the work of the short-term development, the overlay of the existing runway and the construction of the new terminal area are to be given higher priority (Priority I) than the ILS and ALS (Priority II) in terms of urgency of implementation.

- 3) The preliminary design for the short-term development plan is carried out, and the construction cost is estimated to be US\$22.0 million (SI\$61.7 million). The Priority I work and Priority II work will cost US\$17.9 million (SI\$50.0 million) and US\$4.2 million (SI\$11.6 million) respectively. The construction work is estimated to take approximately 18 months to complete.
- 4) The airport facilities to be completed by the short-term development project can be more properly operated and maintained by the Civil Aviation Division with its organizational reform plan.
- 5) The environmental impact of the airport development on the surrounding natural environment is minimum since the land use around the airport is mainly for agriculture of low intensity. The aircraft noise influence on the surrounding community will decrease due to introduction of new low-noise type of aircraft, and will be within the acceptable level even in the Mbetikama Village located under runway 06 approach path.
- 6) The short-term development plan is judged to be economically feasible from the viewpoint of the national economy of the Solomon Islands. The Economic Internal Rate of Return (EIRR) is estimated to be 12.1% if both Priority I and Priority II work items are constructed simultaneously, and 13.5% if Priority II work items are postponed by five years. The implementation of the project will also have positive impact on the socio-economy of Solomon Islands by:
 - a) Providing indispensable and safe means of transportation for the archipelago state;
 - b) Increasing trade and business opportunities;
 - c) Enhancing foreign investment;
 - d) Promoting tourism development;
 - e) Generating employment opportunities; and
 - f) Securing national integration.

This eventually will increase the national income and enhance income distribution.

- 7) It is difficult to recover the investment cost of the short-term development plan by the operating revenues from the airport. However, if the investment cost is not considered, the implementation of the short-term development plan will increase the airport revenues and improve the financial balance of the airport. The planned Civil Aviation Corporation can sustain the airport operations and maintenance by its operating revenues with minimum initial support from the Government.
- 8) The tentative improvement work for the existing passenger terminal building is desirable to be undertaken to cover the transitional period until the completion of the new terminal building (Refer to Appendix-15.1.1).

As an overall conclusion of the Study, the short-term development project of Henderson International Airport is feasible from technical, environmental, economic and financial aspects. It is recommended that the project be implemented as soon as possible.

The economic development through the enhancement of tourism as intended by the Government of Solomon Islands will effectively be achieved by the simultaneous progress in the airport development and tourism development since they are in an interdependent relationship. Therefore, the Government of Solomon Islands should make an overall effort to promote the tourism policy in developing tourism infrastructure, providing incentives to obtain foreign capital, undertaking promotion activities, developing human resources, preserving natural environment and eradicating malaria.

JICA