

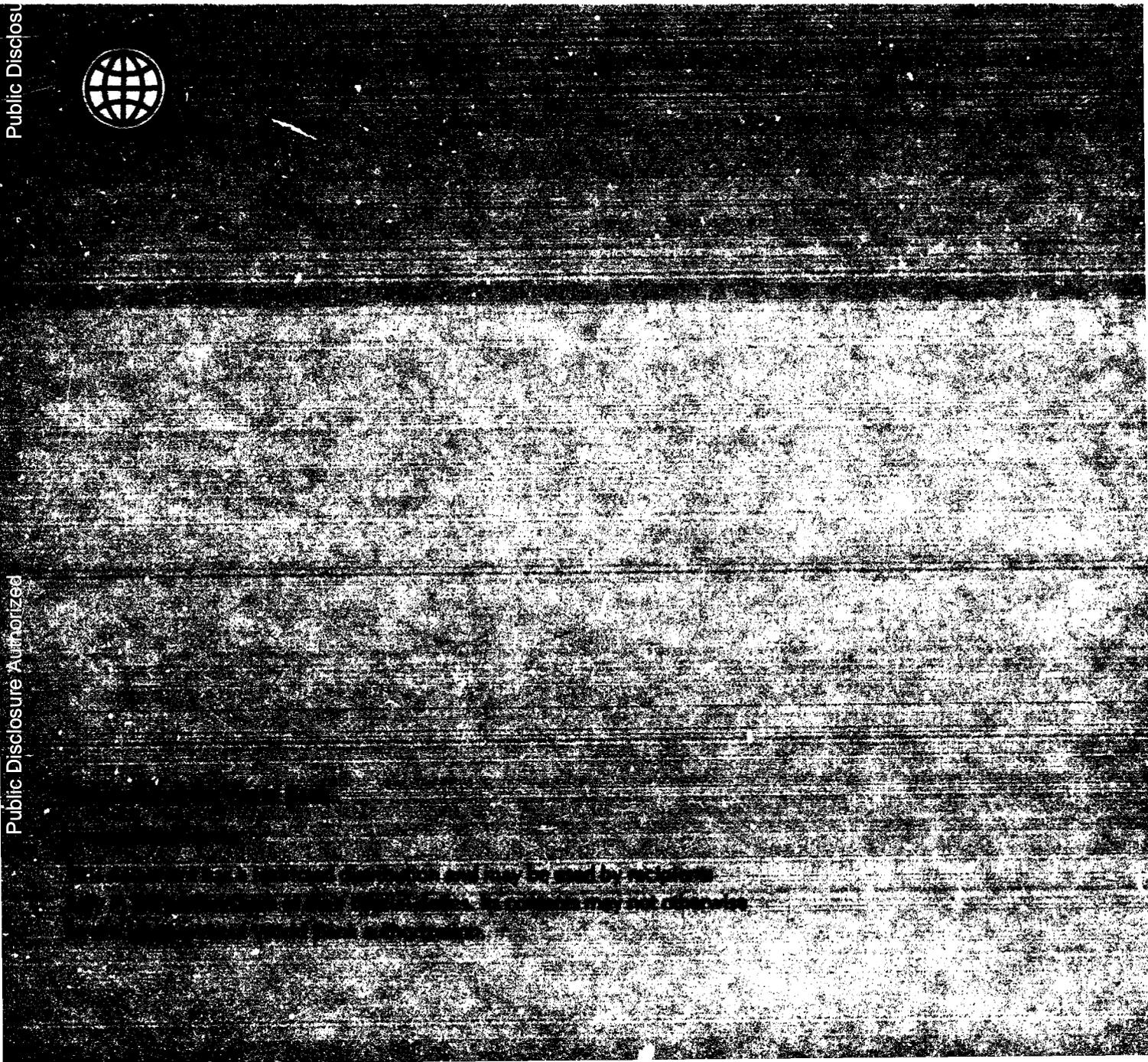
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Pacific Islands Transport Sector Study

(In Seven Volumes) Volume II: Vanuatu — Transport Sector Survey
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Infrastructure Operations Division
Country Department III
East Asia and Pacific Region

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ACRONYMS AND ABBREVIATIONS

ADB	-	Asian Development Bank
AIDAB	-	Australian International Development Assistance Bureau
IMF	-	International Monetary Fund
NPSO	-	National Planning and Statistics Office
PMCs	-	Pacific Island member countries
PITSS	-	Pacific Islands Transport Sector Study

PREFACE

The Pacific Islands Transport Sector Study (PITSS) reviews the status of the transport sectors in the six Pacific Island member countries (PMCs) of the World Bank.

The PITSS is reported in two volumes: **Volume One - A Regional Perspective on Transport Issues** - presents an analysis of transport issues across the region. **Volume Two - Country Surveys** - provides a detailed examination of the transport sector in each PMC.

This survey of the transport sector in Vanuatu, is one in the series for the PMCs which, as a whole, represent Volume Two. Each sector survey presents an overview of transport, identifies areas of concern and suggests priorities for consideration by Government.

Maintenance of transport infrastructure is identified as a common major problem area. Therefore, for this particular area, a separate Maintenance Annex is attached to the country sector survey.

The PMCs share several areas of common concern with their transport sectors, including strategic planning, project evaluation, regulation, modal coordination, pricing and cost-recovery, commercialization, private sector participation, as well as the management of infrastructure and its maintenance. These areas are reviewed briefly in this survey and, on the basis of the surveys for all PMCs, subjected to comparative analysis in Volume One of this study.

PITSS was undertaken by the World Bank with financial support for consultants from the Australian International Development Assistance Bureau (AIDAB) South Pacific Facility. The study was structured and managed by Colin Gannon (Senior Economist). Major contributions to the sector surveys were made by David Bray and Ian Gordon (consultants).

The kind cooperation of the many government officials and industry representatives who assisted the mission is gratefully acknowledged.

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SELECTED DATA

Vanuatu

Geography

Land Area		12,000 sq km
Sea Area	680,000 sq km	

Population

Population (1987)/(1991) est.	145,000/151,000
Population Growth (1980-87)	3.0% per annum
Population Density (1987)	12 persons per sq km
Population of Capital, Port Vila (1991) est.	20,000

Economic

GDP/Capita (1988)/(1991), est.	US\$820/US\$1,120
Exchange Rates:	
1980	Vatu 68.29 = US\$1.00
1985	Vatu 106.03 = US\$1.00
1989 (September)	Vatu 122.14 = US\$1.00
1991 (March)	Vatu 109.72 = US\$1.00

Transport

Registered Vehicles (1938)	4,624
Vehicles/'000 Population (1987)	35
Length of Road (1989)	1,690 km
% Road Sealed (1989)	6.5

CHAPTER 1 INTRODUCTION

A. REVIEW CONTEXT

1.1 This country survey presents an overview of the transport sector in Vanuatu identifies areas of current and emerging concern, indicates priorities and suggests future strategies for the sector.¹

1.2 To facilitate the present study, a desk review² of the transport sector was previously undertaken for each of the Pacific Member Countries (PMCs) of the Bank.³ That review provided preliminary information on each country, including Vanuatu, and working hypotheses on development needs in the transport sector. The present survey builds on this work to develop a current sector overview so as to establish first, directions for the formulation of strategies and priorities for each country, and second, the basis for selection of the specific issues addressed in Volume One of this Report.

1.3 The present survey is complemented with similar surveys for the other PMCs. A regional overview which compares and contrasts transport sector issues across all six PMCs, and indicates priorities for improvements in sector efficiency, is presented as Part I in Volume One of this study.

B. GEOGRAPHY

1.4 Vanuatu is an archipelago of approximately 80 islands located between 12 degrees and 21 degrees south and 166 degrees

and 171 degrees east. It has a land area of 12,000 km² and a sea area of about 680,000 km². The largest island is Espiritu Santo, which together with off-shore islands, is 4,248 km². The capital, Port Vila, is on Efate island which is 915 km². Only 14 of the islands have land area in excess of 100 km². It is some 850 km from the Torres Islands at the northwest of the country to Anatom in the southeast. The highest mountain in Vanuatu is Mt. Tabwemasana (1,877 m) on Santo. While half of the islands are islets and volcanic outcrops, the other half are larger and generally have a terrain with mountains, plateaus and limited coastal plains. There are a number of active volcanos.

1.5 Vanuatu has a typical South Pacific island climate with south-east trade winds in the winter season. Annual rainfall in Vila is 2,300 mm. Cyclones occur (normally in the period January to April) and can cause substantial damage to crops and dwellings. Vanuatu is also subject to earthquakes. The major perennial cash crops are coconuts, coffee and cocoa; some specialty crops (for example, vanilla) are developing. Cattle are increasing in importance and fresh beef is exported to the Solomon Islands and New Caledonia. The principal natural resource of Vanuatu is its land. It is estimated that about 45 percent of the land area is potentially arable; about 15 percent of the total land area is currently being utilized.

C. DEMOGRAPHY AND SOCIAL STRUCTURE

1.6 Preliminary results from the 1989 Census indicate a population of 142,630 (including an estimated 4,000 expatriates). This implies an average annual growth rate of about 2.9 percent among ni-Vanuatu since the previous Census in 1979 (and almost a four-fold increase since the 1930s). The death rate of 12 per thousand may decline further so that if the crude birth rate of 45 per thousand remains stable the population could exceed 200,000 by the turn of the century. However, the more recent reported birth rate of 38 per thousand (IMF, 1989) suggests a slower rate of population growth. About 93 percent of the population are Melanesian. The two principal islands are Efate, which contains the capital, Port Vila, and Espiritu Santo. A little less than 37 percent of the country's population live on these islands, with a further 43 percent living on other islands in the central part of the country. The remaining 20 percent of the population live on the islands at the northwest and southeast of the archipelago. The population is mostly rural and most people live near the coast. Port Vila had a population of only 14,200 in 1986. Assembled literature indicates the 1986 census defined Port Vila in a different manner to that previously used. An exodus of expatriates from Port Vila following independence is likely to have been offset by immigration of ni-Vanuatu seeking employment opportunities. Santo, the next largest town which is located on Espiritu Santo, had a population of 5,600 in 1986.

1.7 Consistent with these demographic patterns, key domestic concerns of Government relate to inter-island shipping and rural transport. Rapid population growth will add to demand for these services. It is possible that a trend to urbanization could impose considerable pressure on transport in the principal centers which are currently little more than modest-sized towns. The population exhibits the usual strong Melanesian characteristic of great affiliation with the land. Accordingly, access to land for

development of agricultural pursuits outside clan areas is not easy. Insofar as internal migration occurs, it is to the two major towns, Santo and Port Vila.

D. ECONOMY⁴

1.8 The Republic of Vanuatu has an estimated GDP per capita of US\$820 (1988) which is slightly above the average for the region. Given the abundance of land and the traditional social system, the incidence of poverty is regarded as relatively low, although available social indications suggest that the quality of life in many rural areas is quite poor. Surveys indicate that about 47 percent of the population suffer from malaria and that there are dietary deficiencies which particularly affect the infant age group.

1.9 External Aid is a dominant feature of the balance of payments and the economy. During the period 1984-1987 Vanuatu received an annual average of some US\$178 per capita in grants and concessional loans. This doubled during 1987 as a result of the devastation of Cyclone Uma, but has now decreased to more normal levels.

1.10 The structure of the economy is highly dualistic. The traditional sector encompasses about 80 percent of the population, but there is a small but growing number of traditional smallholders producing copra or vegetables on a commercial basis. The modern sector is highly diversified for a Pacific Island nation. Services account for about 70 percent of GDP, of which wholesale and retail trade, including tourism, is the most important subsector and accounts for about one-third of GDP. The public sector accounts for one-third of modern sector employment.

1.11 Economic growth averaged 6.8 percent per annum for 1983 and 1984 but subsequently stagnated until 1989; in this year an estimated growth rate of 2.5 percent was achieved.

However, prospects for economic growth are good, though dependent upon appropriate macro-economic policies. Vanuatu has the potential to grow by 4-5 percent per annum during the 1990s. The services sector, particularly tourism and financial services, are expected to provide the primary impetus for growth. Industry is expected to develop rapidly, albeit from a low base, and both the beef industry and cocoa production are expected to grow significantly in the next decade.

1.12 There is a need for significantly higher levels of recurrent financing for operations and maintenance, particularly in the transport, health and education sectors. Official assistance, which is largely restricted to investment projects, is undercommitted due to the lack of economically viable projects and scarce local skilled manpower. It would be desirable for the donor community to consider provision of recurrent cost financing and more technical assistance within the framework of sectoral expenditure strategies.

CHAPTER 2 INSTITUTIONAL STRUCTURE

A. GOVERNMENT STRUCTURE

2.1 Vanuatu (formerly the New Hebrides) was governed by an Anglo-French condominium administration from 1914 until independence in 1980. At independence the country inherited a complex system of Government which involved three sets of administrative units: English, French and common services represented by the condominium. Three official languages were recognized: English, French and Bislama - a local version of pidgin English.

2.2 The Constitution of the Republic of Vanuatu provides for a single-chamber 46 seat Parliament elected by universal franchise. Executive power is vested in a Prime Minister elected by Parliament, supported by a Council of Ministers appointed by the Prime Minister from the members of Parliament.

2.3 A National Council of Chiefs, the pinnacle of a structure that involves chiefs at the village, island and district level is primarily concerned with matters of ni-Vanuatu language and culture. Separately, 11 island Government councils have been established to permit decentralization and local involvement in regional affairs. Municipal Councils, headed by a mayor, were established for the two major urban areas of Port Vila and Luganville in 1975 and continue to be responsible for urban administration.

2.4 Prior to November, 1990, transport policy and operations were concentrated in one Ministry: the Ministry of Transport,

Communications, Civil Aviation and Tourism. The Transport and Civil Aviation portfolios are now the responsibility of the Prime Minister and the previous Ministry is now the Ministry of Public Works, Ports and Marine, Postal Services and Meteorology. The Land Transport Board, which regulates public transport reports to the Minister of Home Affairs, as does the Director of Local Government. Agency responsibilities are set out in Table 2.1.

2.5 The functions of local Government councils (excluding the two municipal councils) are set out in the Decentralization Act of 1980 and include the preparation and implementation of regional development plans, control of vehicular traffic, location and maintenance of secondary airfields and the levying and collection of specified taxes. Most of the nominated functions have not been devolved although discussions on the transfer of ownership and maintenance responsibilities for transport infrastructure (roads, wharves, airfields) within local Government areas are underway. Such transfer of responsibilities would require strengthening of the institutional, technical and personnel resources of councils and provision of greater financial resources, either by extended local revenue raising capacity or by transfer from the Central Government.

B. AGENCY RESPONSIBILITIES

2.6 Roads. The planning, construction and maintenance of roads is the general responsibility of the *Department of Public*

Table 2.1: VANUATU—AGENCY RESPONSIBILITIES, 1991

	Land	Maritime	Aviation	Inter-Modal
Policy	MOT	MPW	DPM	NPSO
Planning	MPW	MPW, DPM	CAD	NPSO
Construction and Maintenance	PWD	PWD, DPM	CAD	NA
Operations: Infrastructure Services	NA Private	DPM Private	CAD Quasi-Private	NA
Regulation	Police, LTB	DPM	CAD	NA

MOT Ministry of Transport

MPW Ministry of Public Works, Ports and Marine, Postal Services and Meteorology

PWD Public Works Department (in MPW)

LTB Land Transport Board (in Ministry of Home Affairs)

DPM Department Ports and Marine (in MPW)

CAD Civil Aviation Department (responsible to the Prime Minister)

NPSO National Planning and Statistics Office

NA Not Applicable.

Source: Mission consultations.

Works, within the Ministry of Public Works, Ports and Marine, Postal Services and Meteorology. However, there is not a clear definition of the Department's responsibilities for roads of various classifications. Village access roads are not seen by the Department to be their responsibility, but maintenance work is undertaken at Government direction. The responsibility for roads in urban areas has been clarified and roads classified of national importance were transferred to the Department in 1990. The municipal councils retain responsibility for the remainder of the roads in urban areas.

2.7 Land Transport Operations. The road transport industry is a private sector activity. Buses and taxis are privately owned and individual ownership is common. Public transport services in the urban municipalities are regulated by the *Transport Control Board*. Regulation includes fare setting and vehicle safety standards but no market entry restrictions are applied. There is no route control (route licensing, for buses but the Board has indicated an intention to move to route licensing. A Public Service Vehicle License (annual fee in 1991 - 30,000 Vatu) is required to operate a bus and a Business License is a standard requirement for both bus and taxi operators. Commercial freight services are limited and are provided by

privately owned trucks or trucks belonging to villages or cooperatives. Operators of these services must also hold a Business License.

2.8 Vehicle standards (axle loading and vehicle dimensions) have been set by regulation but are not used as a control (or permit) on vehicle import or registration. No on-road weighing devices are in use and there is no real control, therefore, on overweight or over-dimension vehicles. Overloading of vehicles is reported to be clearly evident (for example, some vehicles carrying containers or forest products) but the extent of damage to the road system cannot be quantified at present. Registration fees for heavy vehicles do not reflect the attributable costs of road maintenance at legal loading.

2.9 Shipping. The *Department of Ports and Marine* is responsible for shipping legislation, administration and control. The marine functions include the survey of vessels on the Vanuatu Shipping Register, the issue of marine safety certificates and coastal trading licenses for inter-island vessels. The Department also provides and maintains marine navigation aids within Vanuatu. The provision of safety certificates for inter-island vessels, which are mostly old and under-maintained, is determined by compliance with basic safety standards. As there is no Marine Engineer on staff no authorization can be given of the structural adequacy of vessels surveyed. Evidence from the Department suggests this general area of ship survey is a major concern.

2.10 Ports. The Department of Ports and Marine is responsible for the provision and maintenance of public wharf facilities at the two international ports; Port Vila and the Port of Santo. Port operational responsibilities, other than wharf maintenance, are confined to provision of linesmen, the supply of shoreside services, and the operation of tug services.

2.11 There are an estimated twenty nine further public wharves and jetties at island

locations throughout Vanuatu (Wilbur Smith, 1989), including eight which have been constructed recently with Japanese or ADB Multiproject Loan funding. These are not a Departmental responsibility, nor apparently the responsibility of any Government authority or agency.

2.12 Maritime Training. A Marine Training School is run by the Department and provides elementary training in engine room and deck skills. Teaching is constrained by operational requirements and staff available within the Department.

2.13 Civil Aviation. The *Civil Aviation Department* is responsible for the operation, management and maintenance of airports, the provision of air traffic services and air safety regulation throughout Vanuatu. The Department operates Bauerfield Airport at Port Vila (the international airport), a primary regional airport (Pekoa) at Luganville on Santo (which can be used by international aircraft) and 27 regional domestic airports on outlying islands. An airfield is under construction at Paama (which is expected to be completed in 1993). Two additional airfields have been proposed—one on Tanna and one on Ambrym. The Department reviews requests for variations to domestic air fares, and makes recommendations to Cabinet.

2.14 Policy and Planning. The *National Planning and Statistics Office* (NPSO) in the Office of the Prime Minister is responsible for the preparation of the Five Year National Development Plan. Sector Officers within the Planning Office work with relevant Departments in developing and reviewing projects and preparing submissions for Cabinet consideration. Resource constraints in the NPSO have meant that much of the project initiation has been left to the 'line' Departments and that strategic planning considerations have been subordinated to a project-by-project approach.

C. PRIVATE SECTOR PARTICIPATION

2.15 In addition to the involvement in land transport services referred to in 2.7, the private sector is responsible for the provision and operation of inter-island shipping services throughout Vanuatu. The extent of these services is described in Chapter 4 below.

D. PUBLIC FINANCE

2.16 Domestic revenue for the National Government of Vanuatu is drawn from a very narrow tax base as Vanuatu does not impose corporate or income tax. For the period 1985-1989 taxes on international trade and transactions accounted for 78 percent of Government revenue, whilst taxes on goods and services accounted for the remaining share of tax revenue.

2.17 Deficits on the recurrent budget have occurred for much of the 1980s, but a series of austerity measures, introduced initially in 1985 and extended in 1989, have been successful in reducing the fiscal deficit and producing a balanced recurrent budget. Capital outlays have been constrained during the 1980s, being limited by donor assistance and Government borrowing. Vanuatu has been able to attract substantial grant aid.

E. AID ENVIRONMENT

2.18 Aid has been the source of most developmental expenditure since independence. Vanuatu currently receives about US\$35 million in aid each year (1985-88 average and including substantial STABEX funding in 1987), principally in grant form. Major donors have been France, the United Kingdom, Australia and the European Community. The reconstruction program following Cyclone Uma dominated the short term requirements. Aid more than

doubled in 1987 to some 40 percent of GDP and was planned to remain at that level for the period to the end of 1991 to meet developmental requirements. Over the last five years, approximately one-half of all donor assistance has been invested in the transport sector.

F. HUMAN RESOURCES

2.19 Vanuatu has a shortage of ni-Vanuatu with technical and managerial training and experience. Within the transport sector, senior executive, specialist and professional staff are predominantly expatriate, supplied usually under U.K. or Australian technical assistance programs. Unlike Tonga and Western Samoa, Vanuatu has not experienced an emigration of professional indigenous staff to other countries. Because of salary freezes in the public sector imposed because of Government budgetary problems, there has been a movement of skilled and experienced people to the private sector. A major deficiency, however, has been the small out-turn of professionally and technically trained ni-Vanuatu to meet public and private sector needs. The training, development and advancement of ni-Vanuatu staff was noted as a major need in a recent management review study (AIDAB, 1988).

CHAPTER 3 ECONOMIC CONTEXT

A. DEMAND FOR TRANSPORT SERVICES

3.1 Demand for transport services in Vanuatu is derived primarily from activities in the agricultural and services sectors. Despite an evident potential and some growth in the early period of the 1980s, agricultural production and exports have been impaired by cyclones and declining international commodity prices, especially for copra. As shown in Table 3.1, there has been no sustained growth in any major export commodity in the period 1982-1989. Imports increased over the period 1985-1989 with machinery and transport equipment, and miscellaneous manufactured goods showing the greatest increases (Table 3.2). The figures for 1989 (Table 3.3) reveal that the value of imports exceeded exports by almost five times.

3.2 The imbalance between imports and exports affects the efficiency of port operations, particularly as Vila is the main port for dry cargo and liquid fuel imports, whilst Santo dominates in the movement of export commodities (Table 4.2). Some 75 percent of all copra exports are shipped through Santo. The imbalance in shipping requirements is further reflected in Table 3.3, which shows the Asia/Pacific region (New Zealand and Australia in particular) is the main source of imports, and European countries the main receivers of exports.

3.3 International visitor arrivals fell in the period 1985-1987 after showing sustained growth in the early 1980s, but a reversal to a growth situation is evident for the period 1988-

1991. A combination of events led to this situation. The effects of several severe cyclones, declining economic conditions in tourist originating countries (in particular, Australia and New Zealand), problems with international aircraft connections, and civil and political difficulties in the region contributed to the decline over the 1985-1987 period (Table 3.4).

3.4 No formal data base exists to scale demand for marine and land transport activity in Vanuatu. Some sampling of inter-island shipping cargo manifests and passenger carriage was undertaken as part of the National Transport Development Plan but the results may be distorted (para. 4.20 below).

3.5 Demand for land transport is moderate in and near the urban areas of Port Vila and Luganville and minimal elsewhere. However, the inability of Government to finance the recurrent cost of maintenance for roads, wharves and jetties is seen as a major constraint to medium-term development of the agricultural sector.

3.6 Because of the archipelagic nature of the country, an efficient, low cost, and effective inter-island shipping service is vital to widespread economic development and social integration. Available evidence indicates that inter-island transport costs are high, adding considerably to the cost of consolidation of exports and distribution of imports, and that service levels outside the central regions of Vanuatu are poor. The inter-island fleet is old

Table 3.1: VANUATU—EXPORTS BY MAJOR COMMODITIES, /^a 1982-88

	1982	1983	1984	1985	1986	1987	1988	1989 / ^b
Copra								
Volume	34,798	38,538	46,682	34,930	40,612	31,846	31,704	23,620
Value	7.4	13.2	27.6	13.1	4.2	6.5	9.1	750
Cocoa								
Volume	548	1,232	791	814	1,197	1,243	813	1,573
Value	0.6	1.8	1.4	1.3	1.8	1.9	1.1	174
Beef								
Volume	776	1,054	681	1,134	502	1,044	964	997
Value	1.9	1.9	1.5	1.9	1.2	2.3	2.3	262
Timber								
Volume	652	3,900	19,161	17,423	7,839	19,283	7,001	12,626
Value	0.2	0.3	1.5	1.3	0.6	1.9	1.0	204
Coffee								
Volume	-	-	-	84	22	44	19	-
Value	-	-	-	0.2	0.1	0.1	0.0	-

/^a Value is nominal, in millions of US dollars, and volume in metric tons unless otherwise indicated.

/^b Value in million vatu FOB.

Source: World Bank (1991a) and Office of Statistics.

and reported to be ill-suited to the task, but commercial returns are insufficient to support upgrading of the fleet. Given present demand and price levels, more reliable, and possibly higher cost, service may not be economic for these thin markets.

B. COUNTRY DEVELOPMENT STRATEGY

3.7 A recent examination of economic growth opportunities has concluded that Vanuatu has a brighter outlook entering the 1990s than at any time since Independence (World Bank, 1991).

Increased economic growth in all sectors of the Vanuatu economy is forecast, with a projected overall rate of growth of 4 percent per annum (Table 3.5).

3.8 Growth in the service sector, particularly in tourism and the Finance Center is expected to provide the primary impetus. Copra output is expected to grow only at the rate of population growth, but the beef industry and cocoa production are expected to grow significantly. Tourism growth can be expected to have most impact in the Port Vila area and around the island of Efate generally. Indications are that

Table 3.2: VANUATU—MERCHANDISE IMPORTS, 1985 - 1989
(million Vatu)

Item	1985	1986	1987	1988	1989
Food and Live Animals	1,210	1,089	1,022	1,263	1,213
Beverage and Tobacco	295	252	204	368	331
Crude Materials (exclude fuels)	68	67	226	88	65
Mineral Fuels	651	573	634	584	640
Oil and Fats	38	37	25	31	33
Chemicals	395	364	450	421	540
Basic Manufacture	1,083	1,062	1,624	1,430	1,437
Machines, Transport Equipment	1,387	1,503	1,918	1,797	2,452
Misc. Manufactured Goods	972	820	983	851	934
Goods not specified	286	138	364	233	237
Total	6,385	5,905	7,450	7,066	7,882

Source: Vanuatu Statistical Bulletin.

Table 3.3: VANUATU—IMPORTS AND EXPORTS, 1989
(million Vatu)

Country	Imports	Exports	Re-exports ^{/a}
Australia	3,803	163	
Japan	917	298	
New Zealand	1,025	-	
Fiji	733	-	
France	427	155	
New Caledonia	233	124	
Singapore	257	3	
Hong Kong	295	-	
Belgium	-	270	
Holland	-	138	
Other	912	138	
Total	7,882	1,612	951

^{/a} Re-exports are not defined by country.

Source: Vanuatu Statistical Bulletin.

Table 3.4: VANUATU—VISITOR ARRIVALS BY COUNTRY OF RESIDENCE, 1984 - 1991

	1984	1985	1986	1987	1988	1989	1990	1991
A. Total by Air	31,615	24,521	17,515	14,642	17,544	23,864	35,042	39,784
Nationality (%)								
Australia	67.1	60.9	53.2	45.2	54.8	58.3	50.4	53.8
New Caledonia	9.1	13.6	15.4	14.5	10.3	11.6	10.6	8.9
New Zealand	6.7	4.9	8.1	10.1	8.3	8.0	17.9	18.3
Japan	2.6	2.3	3.4	3.0	2.9	2.5	2.1	1.8
USA	1.9	2.3	3.4	5.0	3.6	2.9	2.6	2.8
UK and France	3.0	3.9	4.2	4.5	4.0	3.0	3.5	3.1
Pacific	4.8	5.7	6.1	9.0	9.6	6.3	5.4	5.2
Others/not known	4.7	6.4	6.2	8.7	6.5	6.5	7.2	6.0
B. Arrivals by Cruise Ship ^{/a}								
No. of Ships	58	64	57	62	48	n.a.	n.a.	n.a.
No. Visitors	n.a.	75,742	56,090	49,381	50,932			

^{/a} Includes double counting where ships visited both Vila and Santo.

Source: National Transport Development Plan 1988, Statistical Indicators Vanuatu, and Department of Ports and Marine.

cocoa production will develop on the eastern side of Malekula and possibly in the Santo/Malo region. Realization of the potential for beef production will depend on increased inter-island

shipping capacity for livestock or refrigerated capacity if abattoir facilities are decentralized. The greatest potential generators of beef production are Espiritu Santo and Malekula.

Table 3.5: VANUATU—PROJECTIONS OF GDP GROWTH 1990-1999

	1985-1989	1990-1994	1994-1999
Agriculture	-1.3	3.0	3.5
Industry	8.1	4.1	4.5
Services	0.1	4.6	5.0
Total	0.6	4.2	4.6

Source: World Bank, (1991a).

CHAPTER 4 TRANSPORT SUBSECTORS

A. LAND TRANSPORT

4.1 Road Infrastructure. A road inventory prepared in 1989 as part of the National Transport Development Plan lists 1,690 km of roads in Vanuatu, of which 63 km were sealed, 910 km were graveled, 360 km were earthformed and 357 km were walking or seasonal vehicle tracks. The islands of Santo, Malekula and Efate each have 200-250 km of surfaced road (some 72 percent of the total of sealed or graveled road), with the sealed road

being within or bordering the urban areas of Luganville (Santo Island) and Port Vila (Efate Island).

4.2 Road Investment. The reported total road length increased from 1,062 km in 1981 to 1,760 km in 1991 representing an increase of 66 percent (see Table 4.1). In the same period the sealed length is estimated to have increased from 35 km to 115 km. During the 1980s Government emphasis for capital funding for transport has shifted from land transport to

Table 4.1: VANUATU—ROAD LENGTH BY DISTRICTS, 1981 - 1989

District	Road Length (km)		
	1981	1986	1989
Banks & Torres	30	35	44
Ambae/Maewo	95	107	161
Santo/Malo	250	255	361
Pentecost	112	130	118
Ambrym	50	55	107
Paama	5	5	5
Epi	55	63	76
Shepherds	20	59	52
Malekula	100	190	244
Efate	150	216	281
Tafea	195	203	241
	1,062	1,318	1,690

Source: Government of Vanuatu and National Transport Development Plan, 1989.

marine infrastructure. External funding assistance for road capital investment has amounted to US\$2.5 million in the period 1981-1988, of which some US\$1.0 million was provided in the period 1987-1988 for reconstruction works following Cyclone Uma. In excess of US\$1.3 million of further funding has been used for provision of heavy construction plant and maintenance equipment for the Public Works Department. The improvement of 62 km of rural roads leading to outer island wharves and landings has been funded in the 1989-90 period as part of a multiproject package cofinanced by ADB and IDA.

4.3 The emphasis on *road maintenance* in the National Transport Development Plan reflects the concern that the maintainment of most infrastructure facilities in Vanuatu is inadequate and that road maintenance, in particular, has been badly neglected. The plan estimates that regular maintenance of the existing road assets would require in the order of 850 million Vt per annum, or about nine times the amount budgeted for road maintenance in 1989.

4.4 A similar concern is expressed in other reports. The Vanuatu Development Survey (World Bank, 1991a) refers to the major problem of maintaining rural roads because of the inability of the Government to finance the recurrent costs and the concern that 15-20 percent of these roads will become unusable if there is no increase in the level of maintenance funding over the next several years.

4.5 Existing Government policy is to put all road maintenance on Efate and Santo to contract and to reserve Public Works Department staff and equipment for maintenance work on remote islands to which contractors are reportedly not attracted. Presently about 50 percent of road maintenance work on Efate is contracted out and is regarded as cost effective after initial attempts at overpricing by contractors. Present contractor rates are judged to be satisfactory and the view is that the skill levels in the private sector

provide a basis for extension of contract maintenance. The major constraint is the level of funding made available for road maintenance, which does not meet minimum requirements and precludes the extension to full contract maintenance. Present road maintenance costs by Public Works Department appear lower because of the artificially low plant hire rates applied to the costing of Government maintenance works. New construction work is carried out by the Department as contractors will not bid for work on remote islands and because of alleged problems with the capacity and quality of work undertaken.

4.6 **Road Planning.** An ADB-funded National Transport Development Plan was prepared in 1989 to provide an integrated multi-modal approach to transport planning in Vanuatu. The plan proposes a series of priority transport projects in three periods of five years each, covering the years 1989-2004. The choice of projects within each mode involved the identification of 253 potential projects and the preparation of an economic evaluation for each. Project priorities within each mode were determined by internal rate of return and these priorities were taken into account in preparing the five year programs. The plan identifies 20 land transport projects for the period 1989-1994 of which 10 cover road maintenance, reconstruction and new construction at an estimated cost of 390 million VT. A further 78 million Vt is recommended for improvements to Public Works Department maintenance management capability and 30 million VT to provide basic maintenance equipment to local Government councils.

4.7 **Delivery of Road Construction and Maintenance.** The Public Works Department undertakes all road construction and the majority of road maintenance in Vanuatu. Substantial funding has been provided by aid donors for heavy construction and maintenance equipment used by the Department. The equipment is under-utilized and in poor condition.

4.8 A major review of the Department was undertaken in 1988 through AIDAB to examine the efficiency and effectiveness of the organization. The review confirmed the perception that the service provided by the Department was neither efficient or effective. A major overhaul has commenced in accordance with the study recommendations, involving restructuring of the organization, increased level of staffing, a major overhaul of the costing and financial control systems (including full costing of plant and vehicle hire rates) and upgrading of depots and workshops.

4.9 Ongoing problems exist with the repair and maintenance of plant. The Department has a large inventory of plant but its serviceability is very low. The acquisition and inventory control of spare parts have been major deficiencies and there has been little commitment to maintenance. Since 1990 plant hire rates have been revised to meet all operational costs and to provide for replacement. This rate is now applied to capital works projects but a lower rate is used for maintenance, resulting in potential cross-subsidy from capital to recurrent works. At present, the Department has no maintenance management system and it is not possible to establish past maintenance costs by road link or to prioritize systematically a future maintenance program. The National Transport Development Study strongly recommends that a road maintenance management system be established and operated.

4.10 The Development Study also recommends that Local Government Councils should take up responsibilities for roads within their areas, as provided by the Decentralization Act 1980. The National Government would need to provide technical and financial support if decentralization of responsibility for roads assets was adopted.

4.11 Road design standards based on traffic volume and terrain category have been adopted recently although, the economic justification of these is not clear. Formation widths of 4.0 m are provided where traffic volumes are less than 30 vpd, and range up to 7.5 m for volumes in

excess of 400 vpd. Pavement sealing is recommended for the higher volume levels, which would apply to urban and near urban roads in Port Vila and Luganville.

4.12 Appropriate road cross section and geometric design standards have also been established and are being used for new construction or reconstruction. Greater attention is being given to drainage and road profile during both construction and maintenance. The availability of suitable road construction materials varies from island to island. Efate, for example has adequate supplies of coral which makes a good road base and is an excellent surface for unsealed roads. Other islands (e.g. Tanna, Ambae and Ambrym) have little coral and local materials generally are plastic clays.

4.13 **Vehicle Registration.** Road vehicles are required to be registered and licensed annually. As at 1988 there are 4,624 registered vehicles in Vanuatu of which 434 are Government owned. Cars account for 47 percent and pick-ups for 38 percent of the total registration. Cars dominate the vehicle composition on Efate but, with the exception of Santo (Luganville, in particular), are not used elsewhere. Pick-ups are the dominant vehicle type on the outer islands. The distribution of vehicles by region is shown in Table 4.2. Efate and Santo account for 80 percent of registered vehicles (and 37 percent of total population). The major operators of vehicle trucking fleets are located in the urban centers of Port Vila and Luganville, and generally own, at most, a few vehicles. Construction companies and logging enterprises operate their own vehicles as do commercial enterprises such as Burns Philp. Transport services in the rural areas are provided by individual owner operators or by 4WD vehicles owned by community groups. Vehicles involved in commercial operations are required to have a Business License, however the informal nature of many of the operations in the rural areas often results in operation without a license.

Table 4.2: VANUATU—DISTRIBUTION OF VEHICLES, 1988

Vehicle Types	Regions											Vanuatu Total
	B/T	S/M	A/M	Pe	A	Pa	Ep	M	S	Ef	T	
Cars		446	4	0	0	0	0	5	0	1,717	2	2,186
Pick-ups	2	483	145	31	32	0	22	208	25	7	89	1,733
Trucks		54	0	0	0	0	0	9	0	670	14	184
Buses		23	2	0	0	0	0	12	0	100	24	210
Motor cycles		86	6	1	1	0	2	27	2	144	10	287
Special duty										142		6
Total	2	1,110	157	32	33	0	24	261	27	2,773	139	4,624

B/T Banks/Torres
S/M Santo/Malo
A/M Ambae/Maewo
Pe Pentecost

A Ambrym
Pa Paama
Ep Epi
M Malekula

S Shepherds
Ef Efate
T Tafea

Source: National Transport Development Plan.

4.14 Road Safety. Road safety matters in Vanuatu are the responsibility of the Police. There is no collation or analysis of traffic accident records. Accidents in the Port Vila area are causing concern because of the heavy concentration of vehicle ownership. Learner drivers need to be 18 years of age and are required to display L plates and be accompanied by a qualified driver until they pass a driving test. A Vehicle Inspection Scheme is operated by PWD and applies to public service vehicles - taxis and buses. There is no obvious formal process to ensure vehicles are presented for inspection or that vehicles which fail the inspection are either repaired or taken off the road.

B. PORT AND MARINE FACILITIES

4.15 Vanuatu has two ports which accommodate international as well as inter-island

shipping: Port Vila on Efate and the Port of Santo on Espiritu Santo. Of the two, Port Vila is the main port of the Republic. In addition to the public facilities at Port Vila (the International Wharf and the petroleum anchorage), there are two privately owned wharves, the Star Wharf and the Burns Philp Wharf. Inter-island shipping uses the private wharf facilities. The four wharves in Port Vila are at widely separated harbor locations.

4.16 Port facilities at the Port of Santo comprise an ocean wharf, which is being rebuilt with ADB funding as a result of structural deterioration of the original wharf, and a public inter-island wharf (Simonsen's Wharf). A private wharf to the west of the town (Melcofee Wharf) is also used by inter-island shipping.

4.17 Vila is the major port for imported cargo and fuel, whilst Santo generates higher export levels, principally copra. For the period shown,

international cargo handled through both ports has fluctuated between 110,000 and 137,000 tonnes (excluding fuel), the main variations occurring in movements through Vila. In 1986 export cargo through Vila dropped appreciably whilst in 1987 imports rose substantially, in part the result of rehabilitation requirements following Cyclone Uma in February 1987. Total export figures for 1985-1989, show a decline over the period (55,000 tonnes to 40,000 tonnes) due principally to the reduction in copra exports. International cargo movement and ship visits are shown in Table 4.3.

4.18 Visits by cruise ships are an important component of the developing tourist industry in Vanuatu. Approximately 60,000 passengers a year were handled through Port Vila for the period shown although there have been a decline in ship visits, total passenger numbers, and passenger visit days in recent years.

4.19 There is little information on domestic shipping movements and freight and passengers carried. A sample survey using data from 12 domestic ships in 1987 indicated general cargo (38 percent), building materials (29 percent) and copra (19 percent) to be the principal categories of cargo carried. The survey results may have been affected by the refusal of some operators to carry copra (because of inadequate tariffs - see para. 4.25 below) and the substantial rebuilding works in 1987 following Cyclone Uma. (An inter-island shipping study, financed by ADB, was being completed in 1992.)

4.20 The Department of Ports and Marine levies charges for berthage, wharfage, storage, pilotage and use of tugs. Charges for these services were last reviewed in June 1990. Total revenue from these charges amounted to 121.5 million Vt in 1990, with a further 8.4 million Vt in marine fees and vessel charter fees. The Department operates on standard Government budget appropriation and retains no revenues. Its accounting policies and practices reflect the Government's cash-based accounting system in which economic depreciation is not accounted

for and full records of assets are not maintained. There are no figures available, therefore, to determine the extent to which revenues meet all operating and depreciation costs. However, it is the Department's view that full cost recovery is unlikely.

4.21 The level of cost recovery is further confused by the payment to Government of a revenue-related annual fee by the single stevedore company operating under contract at both ports. Stevedoring contracts were awarded through a tender process in 1986 for a five year period, and, as of 1992, were extended under an interim arrangement). The terms of the contracts and the results are under review (with finance through the Commonwealth Secretariat). In essence, the stevedore at each port is required to pay to the Government a minimum annual concession fee plus a percentage of gross receipts over a base revenue level. Cargo handling performance requirements are stipulated together with tariffs to be applied to various classifications of export and import cargo. Performance requirements are modest and any improvement in performance would accrue in increased profitability to the stevedore. There is no incentive or requirement to reduce tariffs to users. It appears that the present contractual arrangement results in neither minimization of stevedoring costs nor throughput efficiency, and does not foster any share of cost savings to the user of the service. An action plan developed as part of the Santo Port Project Agreement sets out the steps to be taken to develop a commercially based accounting system and tariff review procedure to meet agreed financial targets. A similar requirement for operations at Port Vila would be appropriate.

4.22 Port development needs for Port Vila have been identified in the National Transport Development Plan. The proposals result from the need to accommodate cruise ships while not impeding the working of international cargo vessels, the requirement to upgrade the Star Wharf facilities to serve both domestic and overseas shipping, and the need to improve the

**Table 4.3: VANUATU—INTERNATIONAL CARGO MOVEMENT AND SHIP VISITS
(1985-1987)**

Port Vila	1985	1986	1987
Dry Cargo - Imports (tonnes)	43,988	42,709	58,374
Dry Cargo - Exports (tonnes)	22,556	12,403	22,697
Total (tonnes)	66,544	55,138	81,070
Fuel Import (tonnes)	10,312	10,709	10,689
Shipping Calls:			
Dry Cargo	108	124	122
Tanker	24	23	22
Passenger	57	52	53
Santo	1985	1986	1987
Dry Cargo - Imports (tonnes)	23,012	18,809	17,837
Dry Cargo - Exports (tonnes)	32,676	35,713	37,783
Total (tonnes)	55,688	54,522	55,620
Fuel Import (tonnes)	7,723	5,441	4,133
Shipping Calls:			
Dry Cargo	69	65	58
Tanker	11	13	7
Passenger	7	5	9

Source: Ports and Marine Department.

discharge of liquefied petroleum products, which is presently both hazardous and slow. The plan proposes an investment of 510.5 million Vt (inclusive of a new tug) in the 1989-94 period towards meeting these requirements. A further

190 million Vt is identified in the 1989-1994 plan period for 16 marine infrastructure projects on outer islands, involving channel construction, the construction of new wharf facilities and repairs to some existing wharves.

C. INTERNATIONAL AND DOMESTIC SHIPPING

4.23 There has been a reduction in the number of companies providing scheduled international freight services to Vanuatu, though the number of ship calls has remained relatively constant. The Pacific Forum Line service no longer operates and both CGM and Bank/Columbus Line call only by inducement if sufficient quantities of copra are available. Bali Hai, Sofrana, Joint Service Line, and Kyowa Line provide general cargo services on a scheduled basis. Over 40 percent of imports (by value) are sourced from Australia, with Japan and New Zealand being other significant import sources. Europe is the dominant export destination (copra) followed by Japan which imports beef from Vanuatu.

4.24 Inter-island services are provided by vessels typically of around 30 meters with a cargo capacity of some 100 cu.meters. There are 36 ships licensed to operate and, with the exception of 5 vessels under one ownership, are owned individually. The operation of an inter-island trading vessel requires a Marine Safety Certificate, a Coastal Trading License and a Business License. The Coastal Trading License states the route to be operated, but there appears to be no surveillance or enforcement of compliance. Choice of route, therefore, is determined by the availability of cargo, with the major copra producing areas receiving the most intensive shipping services.

4.25 Port Vila and the Port of Santo act as the foci for the consolidation and distribution of cargo for the southern and northern regions of the country. There is substantial movement of imported commodities from Port Vila to the Port of Santo, but exports occur from both ports. The services from the regional centers to outer islands are direct, rather than using subcenters as collection/distribution points. The remoter islands - Torres and Banks to the north, and the TAFEA region to the south - suffer service problems; up to three months between visits by

ships because of the small volumes of cargo on offer. Stocks of imported goods can run out, and export commodities (e.g. copra) spoil if not prepared and stored correctly. Apart from the carriage of copra for which freight rates are set by the Vanuatu Commodities Marketing Board (on a zonal basis), freight and passenger rates appear to be determined by the individual operators.

4.26 The level of profitability of inter-island shipping is unclear. The industry claims that copra freight rates and other rates which can be charged for freight and passengers are insufficient to meet costs. The age and condition of vessels used in the inter-island trade would appear to support this contention. Vessels are claimed to be purchased from the 'scrap' end of the overseas market and run past the end of their effective working life with minimal maintenance.

4.27 Estimated costs of the operation of a 'typical' medium sized copra trading vessel developed in the National Transport Development Plan indicate a potential profit margin of 10 percent on costs, in a perfect operating situation. In practice a slightly better than break even situation might result. Other estimates indicate that secondhand vessels of a 'representative' type trading over a 'representative' route and having a working life of 10 years might just cover full operating costs (including capital) with a modest 2-3 percent margin but with full loadings of passengers and freight.

4.28 Existing efficiency of the interisland shipping subsector is difficult to gauge. However, existing barriers to entry and potential cartel operations indicate shortcomings. A number of *alternative operating policies* have been canvassed (ADB, 1989), ranging from a full deregulation (free entry, exit and pricing) to nationalization of shipping services. Also various forms of subsidy or bidding schemes for defined services have been suggested. One such scheme is to foster the use of smaller vessels

trading on an exclusive route basis from regional subcenters to remote islands with larger vessels confined to main feeder routes. However, the case for regulated segmentation of routes has not been evaluated). A detailed design has been commissioned for a sail powered cargo vessel with auxiliary motor capable of being built in Vanuatu for an estimated cost (1990) of US\$270,000 (30 million Vt). The vessel would be capable of being beached to work cargo and able to carry 130 cu.meters of cargo (up to 50 tonnes). A proposal to construct this ship as a pilot project to serve remote areas has been put forward by the Department of Local Government. The resolution of the most appropriate policies to be applied to inter-island shipping which would result in adequate services at competitive rates remains a central transport issue.

4.29 An advisory technical assistance inter-island shipping study, financed by ADB, is scheduled to be completed in 1992. This study is directed to "formulation of suitable policy and regulatory measures for domestic shipping (in particular to ensure services to outer islands), to assist private sector shipping to become financially, economically and technically sustainable, and to investigate opportunities to develop ship repair and construction facilities". Seminars are also planned to explore means to strengthen the management of privately owned shipping services.

D. AVIATION

4.30 Bauerfield Airport at Port Vila is the international airport for Vanuatu. Extensive construction works were completed in 1991, including a new international terminal, runway extension, new apron, air navigation facilities and security fencing. A new traffic control tower is to be completed and the old terminal upgraded for domestic use. The works have been funded through Japanese and Australian bilateral grant aid and the airport can now handle aircraft to B767 standard. (New airport

management assistance arrangements were under negotiation as of 1992.) Luganville Airport which serves as the northern domestic hub has a sealed runway 2,600 by 30 meters and could handle aircraft to B737 standard if the surface was rehabilitated to eliminate the risk of debris ingestion.

4.31 The 26 other domestic airstrips generally have grassed runways varying in length from 475 m to 1,020 m, but typically around 900 m. Most are equipped with a basic terminal building. The existing airstrips provide a reasonable coverage of the regions within Vanuatu, although not every island has an airfield. The National Transport Development Study proposed only two additional airstrips, one at Gaua (Banks region) and one on the north coast of Ambrym, during the period 1989-1994. Emphasis is given to improving air navigational aids, the maintenance of airfields, provision of security fencing at existing airfields, and some upgrading of runways and approach areas at selected airfields. The total cost of all air transport proposals in the 1989-1994 period is estimated at 256.8 million Vt. Domestic aviation activity is shown in Table 4.4.

4.32 Air transport is important in linking the islands and regions of Vanuatu for commercial, social and political reasons. Until 1989 *domestic air services* were provided by Air Melanesia, a foreign-owned airline, and by Dovair, an airline with both ni-Vanuatu and foreign shareholders. Government action in 1989 resulted in the formation of Vanair, a limited company, fully owned by the Government, which has a domestic monopoly over both route services and charter operations. Vanair operates three Twin Otter and four Britton-Norman Islander Aircraft, a substantial reduction from the combined aircraft register of the two previous companies. (Indicators of efficiency of domestic air services are not readily available.)

4.33 Services are provided to all airfields on both a scheduled and on-demand basis. The summary figures for 1989 and the first nine

Table 4.4: VANUATU—DOMESTIC AVIATION ACTIVITY, 1986 - 1990

	Aircraft Movements /a		Emplanements	
	International	Domestic	International	Domestic
1986	-	13,055	-	87,799
1987	1,236	16,187	37,557	92,182
1988	774	20,264	50,053	n.a.
1989	1,336	36,123	64,863	103,444
1990	1,598	13,195	83,946	193,216
1991	1,809	n.a.	159,498	208,963

/a Commercial traffic only.

Source: Civil Aviation Department.

months of 1990 indicate a comparative reduction in aircraft movements and in emplanements. However, the number of departures appears considerably in excess of the service levels provided by Air Melanesia and Dovair combined prior to 1989. Changes to domestic airfares, which include a domestic departure tax (200 Vt in 1991) are approved by Government after proposals have been reviewed by the Civil Aviation Department.

4.34 International air services to Vanuatu are provided by Air Vanuatu, Air Caledonie, Air Pacific and Solomon Island Airlines. Services are provided to Honiara, Noumea, Nadi, Auckland, Brisbane, Sydney and Melbourne. Air Vanuatu, the national airline, is operated under a management agreement with Australian Airlines. The contract, which commenced in 1987, is for five years. Air Vanuatu operates a B727 aircraft which was purchased with financial assistance from the Australian Government. Air Vanuatu uses the aircraft for

its own purposes on three days of each week and leases it to Australian Airlines on the other four days; this achieves a high level of aircraft utilization. The air services provided are directed to the Australian and New Zealand tourist markets. In addition, Air Vanuatu block purchases seats on Solomon Airlines services between Vila and Nadi and has proposed additional sharing arrangements with other regional airlines. Aircraft servicing is provided by Australian Airlines, though there is concern that the phasing out of B727 aircraft by Australian Airlines may jeopardize this arrangement. Flight crews are expatriates, but cabin, office and ground staff are predominantly ni-Vanuatu.

CHAPTER 5 TRANSPORT SECTOR DEVELOPMENT NEEDS

A. INTRODUCTION

5.1 Vanuatu is the most recent Pacific Member Country of the Bank to gain independence (1980). As a result of an inherited public sector situation and economic problems following independence, the Government has had to adopt an austere fiscal policy stance.

5.2 One effect has been to minimize funding of recurrent maintenance requirements, a situation which has adversely affected the serviceability of transport infrastructure in the country. The maintenance of rural roads and of wharves and jetties has been noted as a particular problem (World Bank, 1991) which, if not addressed, will affect national output and constrain growth in the agricultural sector in the 1990s.

5.3 Given the problems of accessibility and remoteness arising from the archipelagic nature of the country and the geography and geology of many of the islands, the cost of improvements to the transport infrastructure will be high, however, the demand is likely to be substantial. Over the period since 1980 investment in new infrastructure has been modest. Apart from two major projects (namely the construction of new facilities at the Port of Santo and a new international terminal and associated air side facilities at Bauerfield) the greater part of transport investment has been in the reconstruction of facilities following Cyclone Uma. The lack of identification of economically viable projects and the scarcity of local skilled

resources have also contributed to a low level of investment in new infrastructure.

B. INSTITUTIONAL

5.4 **Investment Justification.** The identification of projects in the National Transport Development Plan is the result of consideration of a series of projects which have been identified previously in National Development Plans or by various Government Departments and by local communities. Essentially they comprise a list of projects which have previously been assessed only on the basis of broad socio-economic criteria. The justification of their inclusion in the recommended development plan arises from various perceived benefits - of which increases in the quantity and/or quality of output in the agricultural sector are significant components. The effectiveness of this role of transport has yet to be adequately established. It is an open question whether transport does provide the degree of stimulus presumed, given the social and cultural environment of Vanuatu (and other similar countries in the Pacific region) and the current prospects, especially for agricultural exports.

5.5 **Government Accountability.** As of 1991, departments and organizations of Government in Vanuatu are not required to prepare annual reports, which cover the performance of their functions and responsibilities. Thus, there is no formal accountability to Government and the public and

no publicity and exposure of the effectiveness and efficiency of policies and operations.⁵

5.6 Transport Responsibilities. The role of Provincial Government vis-a-vis National Government in the planning and operation of transport infrastructure and services, and the effect on the functions and objectives of Government departments and authorities with responsibility for transport matters, are not clearly established. The Decentralization Act No. 11 of 1980 sets out the responsibilities of Local Government, which include ownership and maintenance of transport facilities within their area. These have not been taken up and would require considerable strengthening of the financial and technical resources of local Councils if transfer was formalized. The present situation adversely affects the maintenance of roads, wharves, jetties and airfields in Local Government area, as Departments are loathe to accept responsibility, and are unlikely to receive commensurate budget appropriations.

5.7 Transport Strategy. The need for an integrated multi-modal approach to transport planning had been identified at the commencement of the Second Five Year Development Plan (1987-1991) which has been completed recently. The National Transport Development Plan identifies a number of policy matters which will need to be addressed, and constraints which will need to be reduced, if the effectiveness of the transport system is to be improved. The manner in which the recommendations are dealt with will be an important issue. Some fragmentation of transport responsibilities has occurred since November 1990, and the role of the NPSO has been seen as reactive rather than pro-active in the development and implementation of policy and project initiatives.

C. GENERAL TRANSPORT SECTOR ISSUES

5.8 Human Resource Development. The development of human resources is seen as a key

element in the future development of Vanuatu. Because of austerity requirements, since 1985 the Government has pursued a policy of a freeze on civil service salaries and constraints on staffing. The result has been a loss of trained middle level staff to private enterprise. In addition, technical departments, such as those with transport responsibilities, remain dependent upon expatriates to fill senior executive, professional and specialist technical positions. The training, development and retention of competent local officers at executive, professional and managerial levels remains a major problem which is not being overcome through present Staffing Assistance arrangements. Use of "winning" arrangements with similar overseas organizations warrants exploration.

5.9 Policy and Practices. No policies have been enunciated on user charges or cost recovery. With the exception of the requirements set as part of the port development at Santo, there appear to be no explicit objectives or requirements of a commercial nature which Government organizations or enterprises need to achieve. Given the importance of economic efficiency and the necessity to generate funds for operations and maintenance, the development of such policies should be given high priority. The feasibility of establishing user charges will increase as the tax base is widened.

5.10 Maintenance has been identified as a problem of major proportions and should be given urgent attention in setting budget priorities. The National Transport Development Plan concluded that the needs of safety and maintenance in the transport system ranks higher in importance than improvement works and new construction. The need for significantly higher levels of financing for maintenance has been supported in various studies. Provision of recurrent cost financing and technical assistance within an agreed framework of sectoral expenditure strategies warrants high priority consideration by donors. The first step to

address this matter is a review of all infrastructure to establish the most valuable assets which warrant maintenance. This would allow the development of maintenance priorities and financing requirements.

5.11 Private Sector Participation. The private sector is fully involved in the provision of land transport, marine services and domestic shipping services. There are few substantial entry controls (subject to ownership by a ni-Vanuatu), nor route restrictions in either transport mode. Price regulation applies in the land public transport area but not elsewhere except tariffs for inter-island movement of copra. There are currently two areas of concern, the efficiency and effectiveness of the inter-island shipping services and of the stevedoring services at the Ports of Vila and Santo. Examination of both areas is recommended under the National Transport Development Plan.

D. LAND TRANSPORT SECTOR

5.12 Management Systems. The need to establish a road maintenance management system is identified as a priority requirement in the National Transport Development Plan. The lack of such a system does not allow establishment of maintenance priorities and inhibits attraction of the funding levels necessary for effective road maintenance. In this same vein, consideration also needs to be given to the life cycle costs in relation to road standards, and the potential to modify standards to reduce ongoing maintenance needs. In addition, the management of plant and equipment should be reviewed. Increased plant serviceability and utilization would allow lower holdings of plant and reduced plant hire rates. Consideration should be given to the use of full cost recovery plant hire rates for maintenance works to avoid cross-subsidization from construction projects and to better provide for future funding of plant replacement items.⁶

5.13 Human Resource Development. Since independence, there are very few ni-Vanuatu in senior, professional and technical positions. Whilst technical assistance programs relieve the situation, the solution is temporary. Lack of counterpart staff, high turnover and relatively short term appointments of expatriate staff in key positions, changes in leadership and variability in the number and quality of personnel supplied under technical assistance reduces prevailing effectiveness and makes the development of a cohesive and motivated organization very difficult.

5.14 Private Sector Involvement. Existing Government policy is to put all maintenance work on Efate and Santo to private contract, leaving the remaining maintenance and construction works to the PWD. Implementation has so far extended to three-quarters of the roads on Efate (undertaken by four contractors). The use of maintenance contracts to develop a private sector construction capability is highly desirable and should assist in providing a service capacity to local Councils, when maintenance responsibilities are assumed under the decentralization policy. At the same time it is important for private contractors to secure sound technical skills and adequate plant.

5.15 Road Safety and Traffic Operations. Road safety and traffic operations are emerging issues in the main urban centers of Luganville and Port Vila. The continued development of the tourist industry will require a better level of signing and traffic management, particularly if most tourists continue to be drawn from countries which use right-hand drive vehicles. The location of the Port at Vila, which is accessed by road through the town center, is giving rise to the need for improved traffic management.

E. MARITIME SUBSECTOR

5.16 Strategy and Policies. Effective maritime strategies and policies are crucial to the development of the Vanuatu economy. Four

areas of principal concern have been identified in the National Transport Development Plan - rehabilitation and provision of wharves and jetties, policies relating to inter-island shipping, provision of ship repair facilities and provision of stevedoring services at the international ports.

5.17 Wharves and Jetties. There is no authority responsible for the provision, maintenance and cost recovery of public wharves and jetties outside of the main ports. The National Transport Development Plan proposes the allocation of this responsibility to local communities, with financial support from the National Government. This proposal is consistent with the decentralization policies adopted by Government.

5.18 Inter-Island Shipping. The efficiency and effectiveness of inter-island shipping is a crucial element in the transport sector. Present services appear deficient, with high prices; the fleet is old and in poor repair. The National Transport Development Plan canvasses a number of regulatory and operational policy options and recommended that a contract route licensing system should be introduced. Further evaluation of this option would be highly desirable. (An ADB study of inter-island shipping, scheduled for completion in 1992, is addressing many of these policy, institutional and technical matters, as well as port costs.)

5.19 Regulation. The present system of licensing which requires a Marine Safety Certificate, a Coastal Trading License and a Business License does not appear restrictive in practice. A Marine Safety Certificate is a normal requirement in most countries and a Business License applies to all business enterprises in Vanuatu. The Coastal Trading License, which sets out the routes to be serviced (for which fees were increased by 50 percent in 1990), in practice is not enforced—desirably it should be revoked.

5.20 Port Investments. The investment needs in the ports area are confined mainly to the Port

of Vila and are directed to improving berth availability for international cargo vessels and improving the safety and efficiency of unloading petroleum products. Total cargo throughput has been generally static during the 1980s but is expected to increase in line with growth in the economy.

5.21 Port Operations. There is a need to better maintain existing infrastructure in the main ports, in addition to the outer island jetties and wharves. Improvements to the accounting system and a more commercial approach to the fixing of charges is required as part of the Port of Santo improvement. The adoption of commercial accounting procedures and specifying performance objectives to be met in both ports should be considered. Following the recent review of the stevedoring contract arrangements, a future system should ensure that there are strong incentives to improve the efficiency of operations and to ensure that port users share in productivity increases through price reductions.

F. AVIATION SUBSECTOR

5.22 Strategy of Policies. Air transport is regarded as crucial to fostering growth in tourism development. Vanuatu has secured substantial donor assistance for the development of the Bauerfield International Airport near Port Vila and this project is nearly complete. Resurfacing of Pekoa airport (Santo) warrants attention. Upgrading and expansion of airstrips requires careful assessment of the net benefits. The National Transport Development Plan proposes that priority should be given to the improvement in air navigation aids during the 1989-1994 period.

5.23 Airport Maintenance. As in other transport sectors, appropriate maintenance of existing infrastructure assets is a problem of major proportions. The National Transport Development Plan recommends the development of specific programs for airport maintenance and

the consideration of devolution of responsibilities and maintenance contracts for airstrips to local communities. Consideration needs to be given to the means of funding the increased recurrent expenditure which will be required to maintain recent and proposed developments in this subsector and in placing the operation of airports on a more commercial basis.

5.24 Airline Operations. The provision of international air services to Vanuatu appears to have been developed satisfactorily and Air Vanuatu is developing toward a commercial base. The results of the recent Government decision to nationalize air services by forming Vanair, a totally Government owned airline, are not clear. From statistics available, service levels have increased, but no returns are available on financial performance.

5.25 Regulation. Entry is closed for potential operators to the domestic aviation market; Vanair has a monopoly on the provision of all services within the country. The consequences of this policy for users and the country as a whole are not clear; nor is the full justification of the policy. The relative cost-effectiveness of alternatives for the selection and provision of service on routes that are commercially not viable, but deemed politically necessary, warrants examination.

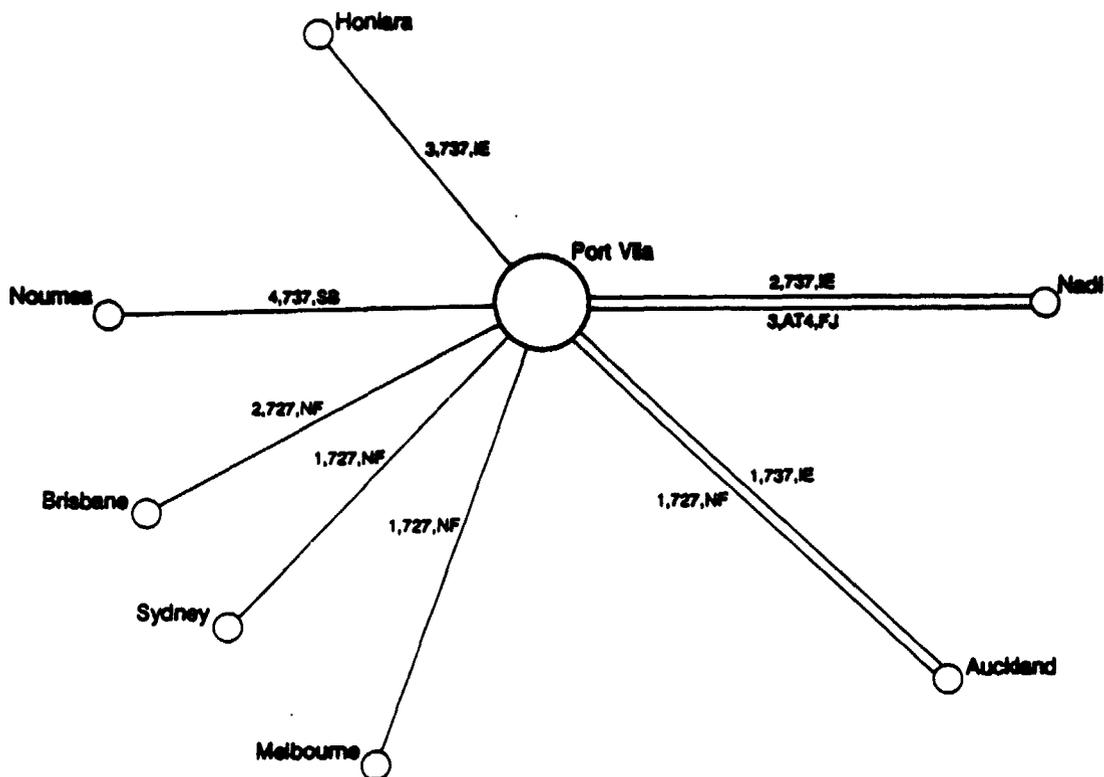
Endnotes

1. **This transport sector survey is based on a mission to Vanuatu during March 19-22, 1991. The mission members were Colin Gannon (Senior Economist and mission leader), and Ian Gordon (consultant). A draft of this report was discussed with the Government of Vanuatu June 30 - July 3, 1992.**
 2. **See World Bank (1989).**
 3. **The five other South Pacific island countries which were members of the World Bank at the time of this study were Kiribati, Fiji, Tonga, Solomon Islands and Western Samoa.**
 4. **The World Bank country study of the Pacific Island economies (World Bank, 1991a) presents a more detailed review of the Vanuatu economy and its development prospects.**
 5. **Elections held in November 1991 resulted in a change in Government, thus new policies are likely to emerge.**
 6. **Fully-funded internal plan hire rat are scheduled to be introduced in January 1993.**
-

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Vanuatu



SB Air Caledonie International
 FJ Air Pacific
 NF Air Vanuatu
 IE Solomon Island Airways

← One-way only
 2, 737, IE — Airline
 — Aircraft type
 — No. of weekly flights in each direction

INTERNATIONAL AIR SERVICES

VANUATU

TRANSPORT SECTOR SURVEY

ANNEX 1

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CHAPTER 1 INTRODUCTION

A. CONTEXT

1.1 This annex provides documentation of a survey of the maintenance situation in Vanuatu.¹ This survey, along with similar surveys for other PMCs, represents the background for the regional analysis of transport infrastructure maintenance presented in Volume One (Part II) of this report.

1.2 The National Transport Development Plan (ADB, 1989) and the Vanuatu Development Survey (World Bank, 1990) identify the inadequacy of maintenance of transport infrastructure in Vanuatu, and maintenance of roads in particular as noted in the Country Survey. Maintenance of existing assets in these reports is considered to rank higher in importance than improvement works or new construction. At present, government policy does not appear to reflect these concerns for a systematic approach to the assessment of maintenance needs and priorities to assist recurrent budget planning and for the provision of adequate funds.

1.3 At present, the Government is giving emphasis to decentralization of responsibility for maintenance of regional transport infrastructure to local government (local roads, airfields, jetties). The Government is also considering the establishment of Government Authorities (Ports, Aviation), as means of developing a commercially oriented management approach and extending financial capacity. These initiatives are important but are not directed to the establishment of overall maintenance policy.

1.4 Evidence of inadequate maintenance of transport infrastructure as a major issue, is generally circumstantial. The present, rudimentary asset inventories held by the responsible Departments contains no information on asset conditions, nor historical data (other than an estimate of the total length of road in the country). Evidence of insufficient maintenance generally consists of descriptive observations of the present poor condition of infrastructure. Little analysis has been undertaken of the need for cost effective maintenance. The National Transport Development Plan (ADB 1989) estimated that outlays nine times budgeted maintenance expenditure in 1989 were required to adequately maintain existing road assets.

B. MAINTENANCE MANAGEMENT FRAMEWORK

1.5 Tables 1 to 3 indicate the extent of management information available for each transport subsector.²

1.6 The tables illustrate the almost complete lack of information available which would assist in the development, operation and maintenance of the road system. The best information available at the sectoral level is that prepared for the National Transport Development Plan, which reflects the situation in 1988. Some further information is available in the aviation subsector, directed mainly to meeting international operational and air safety requirements. The major deficiencies relate to information useful to

the development of adequate maintenance management strategies and systems.

**Table 1: VANUATU—MANAGEMENT INFORMATION INVENTORY
ROADS**

Functional Level	Purpose	Technical Grouping ^{/a}						
		Road Inventory	Pavement	Structures	Traffic	Finance	Activity	Resources
Sectoral	Overall budgetary and statistical information	P	U	U	P	P	P	P
Network	Traffic demand and physical characteristics by link	P	U	U	P	U	U	P
Project	Specific information related to construction, betterment and maintenance	— Not Applicable —						
Operations	Maintenance of the system to provide effective service	U	U	U	U	U	U	U
Research and Development	Used for specific investigations of development of the system or its operational efficiency	U	U	U	U	U	U	U

^{/a} See para 1.1.7.

A - acceptable basic information available

P - partial basic information available

U - information unavailable.

Source: Mission review.

**Table 2: VANUATU—MANAGEMENT INFORMATION INVENTORY
PORTS**

Functional Level	Purpose	Technical Grouping /a						
		Structures	Civil Works	Buildings	Plant & Equipment	Traffic	Finance	Resources
Sectoral	Overall budgetary and statistical information	U	U	U	U	P	P	P
Network	Traffic demand and physical characteristics by location	U	U	U	U	P	U	U
Project	Specific data	----- Not Assessed -----						
Operations	Maintenance of the system to provide effective service	U	U	U	U	U	U	U
Research and Development	Used for specific investigations	U	U	U	U	U	U	

/a See para 1.1.7.

A - acceptable basic information available
 P - partial basic information available
 U - information unavailable.

Source: Mission review.

**Table 3: VANUATU—MANAGEMENT INFORMATION INVENTORY
AIRPORTS**

Functional Level	Purpose	Technical Grouping /a						
		Civil Works	Buildings	Plant & Equipment	Communi-cations	Traffic	Finance	Resources
Sectoral	Overall budgetary and statistical information	P	P	P	A	A	P	P
Network	Traffic demand and physical characteristics by location	P	U	P	A	A	U	U
Project	Specific data	----- Not Assessed -----						
Operations	Maintenance of the system to provide effective service	U	U	U	A	A	U	U
Research and Development	Used for specific investigations	U	U	U	U	A	U	U

/a See para 1.1.7.

A - acceptable basic information available
 P - partial basic information available
 U - information unavailable.

Source: Mission review.

CHAPTER 2 NATURE OF THE MAINTENANCE ISSUE

A. TRANSPORT INFRASTRUCTURE INVENTORY

2.1 There are limited data available on transport infrastructure in Vanuatu. Such information which does exist is presented below.³

2.2 The value of major transport assets in Vanuatu has been established using estimates of the replacement cost of identified assets. Where projects have been completed recently, the replacement cost is assumed equal to the construction cost, adjusted to present prices. For older assets the replacement costs have been calculated by comparison with the recorded value of similar recent assets.⁴

Road Inventory

2.3 The Public Works Department does not maintain a comprehensive formal road inventory. As set out in Table 4, there are only limited data which would assist with the strategic planning, work programming, project development or operational control of the road system.⁵ The best information available is that prepared for the National Transport Development Plan, which reflects the extent and general condition of the road network in 1988. Road links are listed by location and classified by construction class and pavement width. The length of each link is given and a general comment is made on the condition of the running surface. A separate register is provided for bridges and culverts but without comment on

conditions or load capacity. This inventory is broadly consistent with the requirements at the sectoral level but provides no information beyond this. Moreover, the information is now (December 1991) some 3 years old and has not been updated by the Department. The inventory includes 17 km of urban sealed roads in Port Vila and 15 km of urban sealed roads in Luganville. Responsibility for some 28 kilometers of sealed road in Port Vila and 18 kilometers of sealed road in Luganville was transferred from the Municipal Councils to the Public Works Department in 1990. These roads appear to comprise approximately half the urban road system in Port Vila and all roads in Luganville. The road lengths in the inventory for Efate and Santo, therefore, have been increased by 39 kilometers and 3 kilometers respectively.

2.4 Construction of some *new roads* has taken place since 1988, as listed below, and these have been added to the inventory which is shown in Table 5. There are no reports of roads being eliminated since 1988.

2.5 The *replacement cost* of the road assets is estimated on the basis of road construction costs prepared for the National Transport Development Plan adjusted to 1991 values (an average inflation rate of 8 percent is used), and recent costs for two roads constructed in the northern region. The unit rates derived in the National Transport Plan used plant hire rates which reflected commercial costs, rather than Public Works Department rates which were significantly lower than full costs in 1988.

Table 4: VANUATU—ESTIMATED ROAD LENGTH, 1991
(km) /a

District	Seasonal Vehicle Track	Earth Formed Road	Surfaced Road	Sealed Road	Total
Torres/Banks	24	14	13	-	51
Santo/Malo	16	47	287	27/b	377
Ambai/Maewo	60	40	61	-	161
Pentecost	25	53	48	-	126
Ambryn	49	37	21	-	107
Paama	5	-	-	-	5
Efi	35	21	20	-	76
Shepherds	-	36	16	-	52
Malekula	-	13	231	-	244
Efate	48	8	176	88/b	320
Tafea	95	93	53	-	241
Total	357	362	926	115	1,760

Source: Vanuatu National Transport Development Plan (1989).

/a Excludes walking tracks.

/b Revised figures prepared by Mission.

(These costs appear lower than those estimated for other countries, but it is not possible to distinguish the reasons for the differences.)

2.6 Based on these estimated construction costs (see Table 6), the calculated replacement cost of road assets is 8,206 million Vatu (1991 prices). This estimate does not include bridge and major drainage structures, for which no inventory or estimated value is available. In

total, therefore, the replacement cost of all assets is likely to exceed 9 billion Vatu (1991 prices).

Marine Infrastructure Inventory

2.7 The Ports and Marine Department does not maintain an inventory of assets, use an asset depreciation system, or prepare commercially oriented financial accounts.

Table 5: VANUATU NEW ROAD CONSTRUCTION, 1989-1991

Road	Length/Width	Type
Malo	13 km 5 m	Coral surface
Vanua Lava	5 km 6 m	Coral surface
Gaua	2 km 3 m	Earth with drainage structures
Pentecost	8 km 6 m	Coral surface

Source: Public Works Department.

Table 6: VANUATU—ROAD CONSTRUCTION COSTS, 1991
(million Vatu, 1991 prices)

Road Type	Average Construction Costs/km			Road Length (km)	Cost
	3-5 m width	5-7 m width	Weighted Average		
Main urban roads <u>/a</u>	n.a.	22.0	22.0	50	1,100
Sealed rural roads	n.a.	8.5	8.5	65	552
Surfaced roads	3.9	5.9	5.6 <u>/b</u>	926	5,183
Earth formed roads	2.3	3.4	2.8 <u>/c</u>	362	1,114
Seasonal track	1.0	n.a.	1.0	357	357
Total Road Replacement Cost					8,206

Source: Mission estimates.

/a Includes drainage, footpaths, curbing, junctions, signing. A total of 50 km is included in this category.

/b Assumes 70 percent of length is 5-7 meters in width.

/c Assumes equal lengths of 3-5 m and 5-7 m widths.

2.8 However, a basic asset depreciation register was set up for the Port of Santo as part of the project agreement with the ADB for the construction of a new overseas wharf and ancillary facilities. The existing facilities at Santo, including the existing overseas wharf, Simonsen's Wharf, pilot boat, weighbridge and transit sheds were revalued at 1 January 1987, in aggregate, in line with the project cost estimates for the new facility. The 1987 value has been inflated by 8 percent per annum to give a 1991 replacement cost and added to the cost of the new works (790 million Vatu). General estimates of the replacement cost of government marine assets at Port Vila have been based on the project costs at Santo.

2.9 The National Transport Plan identified 29 wharves and jetties in outlying areas. Of these, 6 were constructed through ADB Multiproject Loan Funding during 1988-1989 and 2 through Japanese aid during 1987-1988. The project

costs for these facilities, inflated by 8 percent per annum, have been used to derive a 1991 replacement cost estimate. Of the other 21 facilities, 9 appear to be privately owned and a further 4 are only minor structures.⁶ A nominal value of 30 million Vatu for each of the remaining 8 facilities has been assumed. The estimated replacement cost of marine facilities is set out in Table 7.

Aviation Infrastructure Inventory

2.10 The Civil Aviation Department has not developed an asset inventory in a form which provides the basis for an asset management system. A listing of assets has been compiled for insurance purposes and the insurance valuations have been used as the replacement cost. However, these valuations do not include the runway and apron area at Santo nor the civil works and runway surfacing at the outer island airstrips.

**Table 7: VANUATU—ESTIMATED REPLACEMENT COSTS
GOVERNMENT MARINE FACILITIES, 1991 /a
(million Vatu, 1991 prices)**

Location	Facility	Replacement Cost
Santo	• Overseas wharf, Simonsen's Wharf, pilot boat, weighbridge, transit sheds	1,166
	• New wharf and ancillary facilities	790
	Subtotal	1,956
Port Vila	• Wharves and hardstand	1,037
	• Buildings and sheds	98
	• Tugs and workboats	168
	Subtotal	1,303
Wharves and Jetties		
	(a) ADB Multiproject:	
	- Nduindui	40
	- Narovorovo	49
	- Lolopuepue	47
	- Liro	18
	- Lamén Bay	67
	- Sola	12
	(b) Japanese aid:	
	- Litzlitz	293
- Lenakel	277	
(c) Other wharves and jetties	eight facilities	240
Subtotal		1,043
Total Marine Infrastructure Replacement Cost		4,302

Source: Ports and Marine Department and Mission estimates.

/a Excludes navigational aids.

2.11 The replacement cost of the outer island airstrips have been based on costs of similar projects listed in the National Transport Development Plan. An estimated replacement cost of 50 million Vatu has been assumed for grassed strips and 70 million Vatu for coral surfaced strips. For the 26 airstrips the assumed replacement value is 1,580 million Vatu. The runway, taxiway and apron replacement costs at

Luganville have been estimated by a pro rata of the assessed value of the runway and associated areas at Bauerfield. The total replacement value of government aviation assets is estimated at 6,418 million Vatu (1991 prices) (see Table 8).

**Table 8: VANUATU—ESTIMATED REPLACEMENT COSTS
GOVERNMENT AVIATION FACILITIES, 1991
(million Vatu, 1991 prices)**

Location/Item	Facility Cost	Plant and Content Cost	Total Cost
Bauerfield			
Runway	1,011	-	1,011
Terminals	1,381	85	1,466
Control Tower	24	62	86
Other Buildings	52	6	58
Fire Tenders	-	88	88
Subtotal	2,468	241	2,709
Santo			
Runway	556	-	556
Terminal	25	1	26
Control Tower	8	4	11
Other Buildings	20	2	23
Fire Tenders	-	25	25
Subtotal	609	32	640
Navigation, Radio Equipment and Beacons	8	1,356	1,364
Outer Islands Airfields			
Airstrips	1,580	-	1,580
Terminals	106	19	125
Subtotal	1,686	19	1,705
Total Aviation Infrastructure Replacement Cost	4,771		6,418

Source: Vanuatu Civil Aviation Department and mission estimates.

B. ASSESSED MAINTENANCE

Roads

2.12 Annual average road maintenance costs are estimated by using costs per kilometer reported in the National Transport Development Plan, inflated to 1991 values. These are:

	Cost/Kilometer (million Vatu)
• Sealed roads and graveled roads	0.77
• Earth roads formed roads	0.23
seasonal track (provisional estimate)	0.36
	<u>0.10</u>

Separate unit maintenance costs for sealed and graveled roads were not available. The average unit cost for these two classes of road of 0.77 million Vatu (or US\$6,800) per kilometer

is inordinately high and is suspected to stem from incomplete disentanglement of maintenance and rehabilitation expenditures.

Seasonal tracks are defined in the National Transport Development Plan as being roads which are only passable during the dry season of the year. The resulting average annual maintenance cost for the network is estimated at 968 million Vatu (1991 prices).

2.13 The estimated annual maintenance cost assumes that the road system is in good maintainable condition and that maintenance is directed at preserving design standards. This is not the case, although no pavement or structure inventory exists from which to calculate the backlog of the rehabilitation or reconstruction costs. However, inspection of the National Transport Development Plan inventory indicates that less than 20 percent of the road system (excluding seasonal tracks) was rated as good, with about equal proportions of the remainder rated as fair or poor. If the condition rating is assumed as 20:40:40 corresponding to good:fair:poor, and that half of the roads classed as fair require rehabilitation and all roads classed as poor require rehabilitation or reconstruction in equal proportion, the cost of bringing the road system to a good maintainable standard is some 2,160 million Vatu (1991 prices). This figure is approximately 25 percent of the estimated

replacement cost of the road system. To clear the backlog of rehabilitation needs in five years and to adequately maintain the system during the period would require an annual expenditure of 1,289 million Vatu (1991 prices). This is equivalent to 7 percent of GNP in 1991 (the latter being estimated at 18 billion Vatu).

Marine Infrastructure

2.14 Annual average maintenance costs for the marine subsector have been calculated by applying industry wide guideline percentage factors to the estimated replacement values of marine structures and equipment. Because costings of replacement value are aggregated, rather than individually detailed, general percentages have been used (see Table 9). On the basis of these data, the estimated average annual maintenance cost is 48 million Vatu (1991 prices) for facilities at the main ports of Port Vila and Santo and 11 million Vatu (1991 prices) for outer island wharves and jetties (see Table 10). This represents a total annual maintenance requirement of 59 million Vatu (1991 prices).

2.15 There is evidence of a backlog of maintenance and rehabilitation needs in the marine subsector, but the requirements cannot be fully quantified. The National Transport Development Plan notes some corrosion of the

Table 9: VANUATU—ANNUAL AVERAGE MAINTENANCE COST AS A PERCENTAGE OF REPLACEMENT VALUE FOR MARINE FACILITIES

Facility	Percent of Capital Cost
• Quay, wharf structures	
- reinforced concrete deck with steel piles	1.0
- hardwood deck and steel or reinforced concrete piles	
- mass concrete	1.5
• Buildings, offices, sheds	0.15
• Mobile equipment and boats	1.5
	10.0

Source: Ports Authority of Fiji and UNDP.

**Table 10: VANUATU—ESTIMATED AVERAGE ANNUAL MAINTENANCE COST
GOVERNMENT MARINE FACILITIES, 1991
(million Vatu, 1991 prices)**

Item	Value	Factor (percent)	Average Annual Maintenance
Major ports:			
- structures	2,993	1.0	29.93
- buildings	98	1.5	1.47
- equipment	168	10.0	16.80
Outer ports:			
(a) ADB	233	1.0	2.33
(b) Japanese Aid	570	1.0	5.70
(c) Other	180	1.0	1.80
	60	1.5	0.90
Total	4,302	-	58.93

Source: Ports and Marine Department and mission estimates.

steelwork and spalling of concrete and broken piles at the Ocean Wharf, Port Vila. The Star Wharf is reported to be in a poor state of repair with corroded steelwork and concrete showing extensive spalling. The new wharf at Santo has been completed recently but the structural condition of the other facilities is not clear. The outer island wharves constructed through ADB and Japanese funding are less than five years old and are presumed to be in reasonable condition. Of the other government-owned wharves only two appear to be in good condition. The remainder are in poor condition or have deteriorated to the extent of requiring replacement. The National Transport Development Plan indicates an amount of 50 million Vatu for outer island wharf rehabilitation, and 270 million Vatu for repair and upgrading of the Star Wharf, Port Vila (1989 prices). It is likely therefore, that the backlog of maintenance and rehabilitation needs exceeds 400 million Vatu at current prices.

Aviation Infrastructure

2.16 Annual maintenance costs for the aviation subsector also have been calculated by applying

percentage factors to the estimated replacement cost of facilities. No specific source document has been identified which provides indicative values, as is the case for marine infrastructure. Percentage values have been based on general figures for building maintenance, building plant maintenance and civil works maintenance in the case of major airports. For regional airports the annual costs of maintaining the runway and general cleared area have been estimated as a lump sum amount per airfield of 0.4 million Vatu (1991 prices). These figures include periodic as well as routine maintenance (see Table 11). The estimated average annual maintenance requirement for aviation infrastructure at the two major airports, Bauerfield and Santo, is 76 million Vatu (1991 prices) and for the twenty six regional airstrips 10 million Vatu (1991 prices). The total for all facilities is 87 million Vatu (1991 prices).

2.17 Runway and drainage rehabilitation needs have been identified by the Civil Aviation Department at seven of the regional airfields and a further three airfields require repair or replacement of terminal buildings. The estimated cost for initial repairs (excluding

**Table 11: VANUATU—ANNUAL AVERAGE MAINTENANCE COST
GOVERNMENT AVIATION FACILITIES, 1991
(million Vatu, 1991 prices)**

Facility	Value Vatu million	Factor (percent)	Average Annual Maintenance Vatu million
Major Facilities: Bauerfield and Santo			
• Terminal and other buildings			
• Terminal and other building plant	1,510	1.0	15.1
• Runway/aprons/taxiways	160	3.0	4.8
• Navigation, radio equipment	1,567	1.5	23.5
• Fire tenders, mobile equipment	1,364	2.0	27.2
	113	5.0	5.6
Subtotal	4,713		76.2
Regional Airfields			
• Lump sum estimate	1,705	n.a.	10.4
Total	6,418		86.6

Source: Mission estimates.

major upgrading) is about 12 million Vatu (1991 prices). Rehabilitation costs resulting from previous inadequate maintenance at Bauerfield and Santo has not been assessed. Major new construction and refurbishment works have been completed recently at Bauerfield and outstanding rehabilitation needs are unlikely to be significant. The runway at Santo was overlaid in 1978 and is showing signs of stress. It will require rehabilitation in the next several years.

C. MAINTENANCE PRACTICES

Roads

2.18 Readily available data pertaining to the Public Works Department consist of aggregate expenditure for all of its functions, including water supply and electricity in addition to roads. The line budgeting procedures of Government separate expenditure on materials for maintenance in individual functional areas, but,

for example, combine all expenditure on labor. An estimate of total expenditure on road maintenance has been prepared (see Table 12), but a more detailed examination is required to fully delineate costs. The estimates indicate that actual expenditure has been relatively constant in nominal terms since 1988; given average annual inflation of about 8 percent, expenditure on maintenance has declined significantly in real terms during the period. Estimated maintenance expenditure in 1991 of 168 million Vatu compares with 968 million Vatu estimated as being required to sustain the existing road system in good condition (para. 2.12).

2.19 The maintenance of the road system is generally undertaken by the Department of Public Works. The responsibility for the maintenance of roads in the urban areas of Port Vila and Luganville was clarified during 1990. The Department is now responsible for specified roads in the urban networks which are generally of an arterial nature. The urban councils are

**Table 12: VANUATU—RECURRENT INCOME AND EXPENDITURE FOR
PUBLIC WORKS DEPARTMENT, 1988-1991
(‘000 Vatu, current prices)**

	1988	1989	1990 (budget)	1991 (budget)
Income:				
• Water Charges	44,184	..	81,000	104,000
• Electricity Charges	7,349	..	7,000	2,400
• Other	1,581	..	..	..
Total	53,114	..	..	..
Expenditure:				
• Staff and Labor Costs	119,304	114,355	112,600	122,902
• Office and Staff Support	7,680	7,077	6,700	6,885
• Fuel and Utilities	18,994	14,569	16,800	16,553
• Spare Parts and Plant Maintenance				
• Building Maintenance and Minor Works	156	819	1,000	1,043
• Maintenance of Houses				
• Maintenance of Buildings	196	61	200	209
• Maintenance of Water Supply	34,918	20,024	13,000	13,750
• Maintenance of Roads	35,542	6,856	7,000	7,303
• Mobile Roads Unit	45,264	45,139	38,000	48,089
• Hire Charges, Vehicles and Plant	85,990	86,714	94,000	118,860
• Other Purchases and Incidentals	16,774	12,004	13,000	14,291
	3,183	2,051	2,000	2,618
Total	10,462	8,172	8,200	7,825
Of which road maintenance is estimated as:	378,463	317,841	312,500	360,328
	..	..	..	168,420

Source: Public Works Department.

responsible for the remainder, although in practice the maintenance of council roads in Luganville is carried out by the Department. The responsibility for the maintenance of rural access roads requires clarification. Government policy is that maintenance of local roads is the responsibility of Local Councils. Some roads have been constructed and are maintained by local councils using labor-intensive methods. In practice, most of the maintenance which is done on rural roads is carried out by the Department.

2.20 The allocation of available maintenance funds to the two regions (Northern Region and Southern Region) is determined centrally. The regions are responsible for the allocation of funds to their maintenance programs. In the Northern Region maintenance is carried out by two Departmental mobile teams. In the Southern Region maintenance work is carried out by Departmental labor from regional depots or by contracting out, using period maintenance contracts. The use of private contractors is confined to Efate (the main island) but is

proving an effective means of providing routine and periodic maintenance services. Expansion of the contract maintenance system is inhibited by the level of funding for maintenance, available contractor resources, and the 'unattractiveness' of work in the outer islands to private contractors due to the isolation of these areas and the difficulties in transporting equipment and materials to work sites.

2.21 The present system of budget allocation and cost reporting does not provide information on a program or project cost basis and the actual expenditures attributable to road maintenance cannot be defined. In addition the plant hire rates for maintenance works, historically, have been set at levels well below real operating costs. Until 1991 rates were set at 67 percent of rates used for construction purposes, which were less than full operating costs. In 1991 hire rates for plant were increased by 90 percent but the discount for equipment used for maintenance was increased to 50 percent. The Department has completed a major review of plant hire rates as part of a review of the plant hire scheme. Rates proposed for 1992, which are based on full cost recovery, would increase present rates by up to 80 percent for construction works.

Ports

2.22 The Ports and Marine Department is responsible for the maintenance of port facilities at Port Vila and Santo but there is no clear authority responsible for the maintenance of public wharves and jetties outside of the main ports. Funds for maintenance of the main facilities are appropriated to Ports and Marine. The Public Works Department undertakes maintenance of fixed facilities on request from Ports and Marine Department. Other general maintenance works are carried out by Ports and Marine personnel.

2.23 During the period 1988 to 1991, income to the Department of Ports and Marine is expected to be 76 percent greater than recurrent

expenditure (see Table 13). Income and expenditure for port operations is not readily separated from operations of the government fleet and other activities of the Department. Expenditure on maintenance cannot be derived from the line budgeting and accounting system used by the Department, but has been estimated by the Department at 9.6 million Vatu in 1991. This compares with an estimated average annual 59 million Vatu required to adequately maintain existing infrastructure (para. 2.14).

2.24 Total Departmental expenditure declined substantially in 1989, but was budgeted to rise in subsequent years at a rate of little less than inflation. No significant change in maintenance policy occurred in this period, and the estimated maintenance expenditure in 1991 is likely to be typical, if a little less in real terms, than in previous years. Income from port dues, wharfage, storage fees and pilotage has been erratic, increasing in one year and declining the next.

2.25 Past maintenance of port infrastructure has been inadequate. Design faults, together with negligible maintenance, have left all but two of the older jetties (excluding recent ADB and Japanese funded facilities) on outer islands in poor condition. A new international wharf in Santo is nearing completion. Its construction was necessitated by observation in the early 1980s of severe deterioration of the existing wharf which was built in 1955. Major wharves should have effective lives of at least 40 years. The shorter life of the international wharf in Santo is attributable in part to damage resulting from major earthquakes in 1965 and 1971, cumulative damage from other minor seismic activity and major berthing accidents in 1973 and 1974. Data are not available on maintenance of the wharf during its lifetime, but it is believed to have been minor, and its absence has contributed to the rapid deterioration of the wharf.

**Table 13: VANUATU—RECURRENT INCOME AND EXPENDITURE FOR
DEPARTMENT OF PORTS AND MARINE
(’000 Vatu, current prices)**

	1988	1989	1990 (budget estimate)	1991 (budget estimate)
Income:				
• Port and Berthing Dues and Line Handling Fees	28,094	22,439	26,630	25,300
• Wharfage Tax <u>/a</u>	34,884	31,515	37,110	34,660
• Storage Fees	11,591	14,159	16,950	15,200
• Subtotal (Income from Fixed Assets)	74,569	68,113	80,690	75,160
• Pilotage and Tug Hire	26,876	25,481	32,850	29,600
• Other <u>/b</u>	16,509	13,160	25,550	15,050
Total	117,954	106,754	139,040	119,810
Expenditure:				
• Staff and Labor Costs	36,026	34,770	33,732	36,327
• Office and Staff Support	1,714	1,328	1,480	1,598
• Fuel and Utilities	8,438	6,987	7,660	7,992
• Spare Parts and Plant Maintenance	15,198	12,126	13,000	14,055
• Building Maintenance and Minor Works				
• Hire Charges, Vehicles and Plant	2,646	1,996	2,200	2,953
• Marine School Running Costs	640	488	710	929
• Other Purchases and Incidentals	514	659	900	939
	6,914	4,467	7,200	7,432
Total	72,090	62,821	66,882	72,225
Of which maintenance is estimated as:				
- Wharves and Hardstand				3,276
- Buildings				121
- Tugs and Workboats				234
- Labor	..	..	..	6,000
Total Maintenance	..	..	..	9,631

/a Levied at rates of 359 Vatu per tonne of import cargo and 179 Vatu per tonne of export cargo.

/b Includes Freight and Passages, Marine Fees, Vessel Charter Fees and other miscellaneous income.

Source: Ports and Marine Department.

Aviation

2.26 Funding for the maintenance of aviation facilities is appropriated to the Civil Aviation Department. Routine maintenance of general facilities is carried out by Departmental staff or in the case of some regional airports by contract with the local agents or the Local Council. Maintenance of navigation aids, communications equipment and electrical services are carried out by in-house personnel or using private enterprise resources in Port Vila. Specific maintenance

and repairs to buildings and civil works are undertaken through the Public Works Department.

2.27 About 93 percent of income collected by the Civil Aviation Department is derived from airport passenger departure taxes and landing fees. In the period since 1988 this income has risen substantially, and has exceeded recurrent expenditure of the Department in each year. As for the other modes, the line budgeting system of Government does not indicate expenditure on

**Table 14: VANUATU—RECURRENT INCOME AND EXPENDITURE FOR
CIVIL AVIATION DEPARTMENT, 1988-1991**
(’000 Vatu, current prices)

	1988	1989	1990 (budget estimate)	1991 (budget estimate)
Income:				
• Airport Taxes	36,942	40,875	56,000	66,653
• Landing Fees	27,238	32,032	56,000	51,840
• Air Traffic Rights and Other Charges				
• Other	3,057	2,982	3,000	7,200
	4,238	811	3,000	2,500
Total	71,475	76,700	118,000	128,193
Expenditure:				
• Staff and Labor Costs	33,589	37,364	37,678	46,505
• Office and Staff Support	6,850	7,838	3,558	1,928
• Fuel and Utilities	7,669	7,805	6,500	9,035
• Spare Parts and Plant Maintenance				
• Airfield Maintenance	2,025	2,288	2,000	2,579
• Communications, Licenses and Standards	6,638	5,918	5,500	5,905
• Other Purchases and Incidentals	5,114	5,145	10,000	9,645
	3,585	2,832	3,200	3,545
Total				
Of which maintenance is estimated as: ^{/a}	65,497	69,190	68,436	82,420
	21,643	22,543	20,820	24,627

^{/a} Includes spare parts and plant maintenance, airfield maintenance, 30 percent of staff and labor, 20 percent of office and staff support, and 20 percent of fuel and utilities.

Source: Vanuatu, Civil Aviation Department.

maintenance of aviation assets. It has been estimated that expenditure on maintenance in 1991 will be 24.6 million Vatu (see Table 14). It is estimated that an annual average of 86 million Vatu is required to adequately maintain aviation infrastructure (para 2.16).

2.28 The Civil Aviation Department is investigating alternative methods of providing maintenance services at regional airfields, because of difficulties experienced at some

locations with serviceability of tractors and mowing equipment, the lack of maintenance effort by some contractors and the generally high cost of meeting basic maintenance needs.

Summary

2.29 The estimated replacement value of transport infrastructure, maintenance overhang, assessed maintenance needs and actual maintenance expenditure derived in this and

preceding sections are summarized in Table 15. Data on replacement cost are drawn from Tables 6, 7 and 8, data on assessed maintenance requirements from Tables 9 and 10 and maintenance overhang from paras 2.13, 2.15 and 2.17. The estimates are derived from a very limited database. The objective of the estimates is to provide an indicative quantified perspective of the present situation for the purpose of illustrating the nature and scale of the transport infrastructure maintenance issue. The current replacement value of transport infrastructure has been based on data assembled on the quantity of infrastructure and unit construction costs. The maintenance overhang (i.e. rehabilitation requirements resulting from past inadequate maintenance) is derived from past studies which have identified infrastructure rehabilitation needs; however, none of these is comprehensive or up-to-date, and rehabilitation needs are greater than presented in Table 15. The expenditure required to adequately maintain current infrastructure, suitably rehabilitated so that it is maintainable, is estimated on the basis of unit maintenance costs for roads and a proportion of the replacement value of marine and aviation infrastructure. This level of expenditure is used as an approximation of the amount assessed as being necessary for optimal maintenance (maintenance expenditure which results in a minimum life cycle cost for the asset at a given design standard). *Assessed maintenance does not imply that it is warranted; this requires a benefit-cost analysis of individual assets.* The optimal level of maintenance expenditure cannot be established. Current maintenance expenditure is derived from budget data.

2.30 The replacement value of Government transport infrastructure is estimated at 136,000 Vatu/capita. The infrastructure has, however, deteriorated considerably, and road rehabilitation needs are equal to 25 percent of the total replacement value of the road system. Current maintenance expenditure on transport infrastructure is only 18 percent of that estimated as being required. If there was no

accrued maintenance liability for the current infrastructure, an additional 910 million Vatu would be required annually for optimum maintenance of the infrastructure. The current maintenance overhang will require expenditure greater than the assessed maintenance need of 1,113 million Vatu per year if the average condition of infrastructure is to be improved.

2.31 Inadequate maintenance results in more rapid deterioration of infrastructure than need be the case. An estimate of the increase in the equivalent annual cost of infrastructure resulting from poor maintenance is also presented in Table 15. This item is discussed in the next section.

D. IMPLICATIONS OF INADEQUATE MAINTENANCE

2.32 The limited maintenance effort applied to roads in Vanuatu has reduced their effective lives to about eight years for sealed roads and much less for unsealed roads. The cost of restoring deteriorated roads has been estimated at three to five times greater than the cost of timely and effective maintenance (World Bank, 1988). Increased expenditure on timely and effective maintenance can reduce the total life cycle replacement, maintenance and user costs for the continuing service of road infrastructure.⁷ The same principle applies to maintenance of infrastructure in the maritime and aviation sectors.

2.33 Reduced expenditure on maintenance is offset by more rapid deterioration of infrastructure than would be the case with assessed maintenance. Indicative estimates of the equivalent annual capital cost of infrastructure with current and optimal maintenance is set out below. The increase in the cost is summarized in Table 15. The cost to the Government of more rapid deterioration of its transport infrastructure is 5 percent higher than the cost of improved maintenance (i.e., 910 million Vatu compared with 870 million Vatu).

**Table 15: VANUATU—SUMMARY OF INFRASTRUCTURE
AND MAINTENANCE COSTS, 1991 /a**
(million Vatu, 1991 prices)

	Road	Marine	Aviation	Total
Replacement Cost	9,025	4,302	6,418	19,745
Maintenance Overhang /b	2,160	40	12/c	2,572
Assessed Average Annual Maintenance Requirements /d	968	59	87	1,113
Estimated Current Annual Maintenance Expenditure	168	10	25	203
as percentage of assessed requirement	17	17	29	18
Additional Expenditure to Achieve Optimal Maintenance /e	800	49	62	910
Additional Annual Capital Expenditure arising from Inadequate Maintenance /f	504	93	64	870

- /a The assessed road maintenance costs indicated here were subsequently regarded by the Government (Public Works Department) as excessive. This issue had been anticipated as is noted in Volume One of this report. The actual maintenance expenditures for aviation are also regarded as inordinately high.
- /b Cost required to rehabilitate infrastructure to a sound standard, i.e. the standard through time which would have been the case with optimal maintenance and for which the assessed annual maintenance expenditure is sufficient to adequately maintain the infrastructure.
- /c Excludes cost of rehabilitation of the runway at Santo.
- /d Expenditure required for optimal maintenance.
- /e Difference between current annual expenditure on maintenance and the equivalent annual expenditure assessed as being optimal.
- /f Difference between equivalent annual capital cost for replacement of assets with optimal and current maintenance - see Annex 1.

Source: Mission estimates.

This differential is reversed in the case of roads, reflecting the very high reported cost of maintaining roads in proportion to their low capital cost and a situation in which traffic volumes are low and the economic life of road is heavily influenced by environmental factors.

2.34 In addition to the higher costs which accrue to the Government from inadequate

maintenance, users of the transport system incur higher costs. For road users, this includes increased vehicle operating costs; these in turn may result in further decline in economic efficiency through reduced accessibility and increased spoilage of products, and suppressed foregone productive economic activity, if the increased costs make a potential industry unviable. The current poor road conditions

increase road user costs by around 13 percent through increased fuel and tire use and additional wear and tear on vehicles (see Box 2.1 on Vehicle Operating Costs). Similarly, increases in port costs which result from inadequately maintained port infrastructure will add to the cost of imported goods and make exports, most of which pass through sea ports less competitive on international markets. For example, inadequate maintenance of wharves and jetties may result in reduced safe working loads for forklifts and vehicles and consequent increases in the costs of handling cargo. Tourism could be severely affected if deficient maintenance results in unreliability and delay of services due to closure of airports - deterioration of the airport terminal could also have an adverse effect on user perception and marketing credibility.

2.35 Passengers pay a considerable premium to travel by air compared with sea to save travel time. It can be concluded that cancellation or

delay of a flight results in economic loss. Airports may be closed for minor maintenance problems, for example, uncut grass. Such deficiencies can be remedied at low cost compared with the loss accruing to aircraft passengers. International tourism is a major economic activity in Vanuatu, with tourism expenditure reported at 2.0 billion Vatu in 1989. Allowing for an import multiplier of 0.55, net foreign exchange earnings were about 0.9 billion Vatu in 1989, and will be higher now given continued growth in tourist arrivals. Deterioration or closure of Bauerfield Airport because of poor maintenance could have a serious effect on tourism earnings both through cancellation of specific flights and loss of confidence in the industry. In contrast, the shortfall in maintenance expenditure for airports in Vanuatu in 1991 is estimated at 60 million Vatu. The implied net benefits to the economy of Vanuatu are higher to the extent that domestic wage levels exceed the shadow wage.

Box 2.1: VEHICLE OPERATING COSTS

Vehicle operating costs rise rapidly as roads deteriorate, more so on gravel than sealed roads as shown below:

Road Condition	Gravel Road	Sealed Road
Good	30.1	28.5 ^{1/}
Fair	33.4 (11%) ^{2/}	29.5 (3%)
Poor	39.0 (30%)	33.9 (19%)

There is an almost complete absence of data on traffic volume by road type and condition. Therefore, it is not possible to estimate, with any measure of accuracy, the total cost of operating vehicles over the road network in its current condition and the cost with roads in good condition. However, working assumptions, based on judgment, have been made to provide an indicative estimate of such vehicle operating costs.

Based on about 4,700 registered vehicles travelling an average of 14,000 km per year (say, 50 percent of which is on gravel roads) and the proportion of road in good, fair and bad condition as indicated in paragraph 2.16, total annual economic vehicle operating costs will be 21.7 billion Vatu. The equivalent cost if roads are in good condition is 1.93 billion Vatu, i.e. current vehicle operating costs are 12 percent higher than would be the case if roads were in good condition. Foreign costs account for 78 percent of these costs. The 240 million Vatu difference between vehicle operating costs on good and poor roads thus represents an incremental import bill of 190 million Vatu per year (equal to 2 percent of estimated current imports).

^{1/} Average economic vehicle operating costs in Vatu/km (see Chapter 4, below).

^{2/} Increase compared with the cost on a road in good condition.

2.36 There are opportunities for agricultural development in Vanuatu, mostly in copra. Transport constraints to increased smallholder development are related mostly to improved accessibility between farms and copra buying points and movement of the copra to export ports. The connection between development of such transport links and economic development needs to be better understood to ensure that agricultural development is sustainable. Moreover, the relative importance of improvement of these two links should be assessed. Development of local transport links will increase producer surplus and may have a significant effect on the propensity to produce. However, the reduction in the total cost of delivery of agricultural output overseas is likely to be small, unless there are avoidable constraints elsewhere in the transport system, and may not secure significantly greater sales.

E. MAINTENANCE FUNDING

2.37 There is no hypothecation of revenue to maintenance of road, marine or aviation infrastructure in Vanuatu; nor is there a formal policy on cost-recovery in the road sector where specific fees for use of the road system are not imposed.

Roads

2.38 There are no specific charges for use of the road system in Vanuatu. Road users contribute to the cost of developing and maintaining the road system indirectly through: (a) annual road tax paid for each vehicle; (b) a tax on purchase or transfer of ownership of a vehicle (equal to one percent of the purchase price of the vehicle); (c) driving license fees; (d) a Public Vehicle License for buses and taxis; and (e) import duty and an associated service tax on vehicles, spare parts and (f) fuel excise. Bus, taxi and truck operators must also hold a Business License—this license must be held by all commercial establishments, and is considered a tax rather than a user charge. Similarly, the

cost of Road Worthiness Certificates is considered in the present analysis a user charge to recoup the cost of the inspection rather than contribute to the cost of providing the road system.

2.39 Revenue from the annual road tax, the tax on purchase and transfer of ownership of vehicles and driving license fees was 52 million Vatu in 1990. Based on data from other countries, it is estimated that collection costs are about 1,000 Vatu per vehicle per annum. With collection costs of a little under 5 million Vatu, net revenue from the taxes is thus estimated at 47 million Vatu.

2.40 The Government of Vanuatu obtains about 57 percent of its income from import duties and an accompanying service tax. The charges are imposed on all imports excepting those exempted for a variety of reasons - in the transport sector for example, vehicles imported for aid projects and vehicles imported for use in rural areas are exempted from the charges. The rate of import duty and service tax varies by item, though the latter is generally at a rate of five percent, except for fuel for which it is five Vatu per liter. Together, import duties and service tax are equal to 60 percent of the value of imports of vehicles and fuel, and 40 percent for all other imports into Vanuatu (see Table 16). The fiscal efficiency of imposing a higher rate of these duties in the transport sector is an open matter; broadening of the tax base would be desirable (World Bank, 1991a). Imposing tax "mark-ups" where price elasticities are relatively low ("Ramsey" pricing) might justify higher tariffs for the road transport subsector, with higher tariffs for road transport resources being a fiscal measure and not treated as cost-recovery. Alternatively, all income from duties can be considered as contributing to cost-recovery, to the extent that the duties are imposed on road transport users, and revenue from the duties is less than that required for full cost-recovery. The analysis presented in this Annex is based on only that revenue from the duty on road transport resources in excess of the

Table 16: VANUATU—INCOME FROM IMPORT DUTY AND SERVICE TAX, 1990 (nominal prices)

	CIF Value of Imports (million Vatu)			Import Duty and Service Tax (m. Vatu)	Average Rate of Duty and Tax (%) ^{/a}
	Total Imports	Exempt from Duty	Dutiable		
Vehicles					
• Cars	312	107	205	86	42.0
• Trucks	276	78	198	47	23.7
Fuel					
• Petrol	139	8	131	178	135.9
• Distillate ^{/b}	435	237	198	131	66.2
Total	1,162	430	732	442	60.4
Total Imports					
• Including Vehicles and Fuel	11,315	4,978	6,337	2,703	42.7
• Excluding Vehicles and Fuel	10,153	4,548	5,605	2,261	40.3

^{/a} Percent of CIF value of imports subject to duty.

^{/b} Distillate fuel is used by Umelco for power generation, by vehicles involved in agriculture, and by other off-road vehicles—fuel used for these purposes is exempt from Import Duty and Service Tax. Fuel used by interisland shipping is subject to Import Duty at only half the normal rate - it is not possible to isolate fuel used for this purpose, but it is not expected to be large, and is thus ignored in the present analysis.

Source: Customs Department, Ministry of Finance.

average rate of duty for all other imports as contributing to cost-recovery. (The regional analysis presented in Volume One of this study presents the effect of all revenue from duties being attributable to cost-recovery.) At this stage, the revenue from these duties, in excess of the average rate for other imports, is viewed as a specific levy on road users. An import duty/service tax of 40 percent of the value of vehicles and fuel would produce revenue of 295 million Vatu in 1990 (assuming elasticity of demand equal to zero). The 60 percent import duty/service tax thus results in an additional levy

on road users of 147 million Vatu in that year. There is no incremental cost associated with collection of the higher rate of tax applied to vehicles and fuel. Thus the amount of 147 million Vatu can be viewed as additional charge to road users to meet the cost of development and maintenance of public roads, in the context of a fiscal/general revenue raising measure.

2.41 If the incremental import duty/service tax is regarded to contribute to cost recovery, and inflating 1990 data by 8 percent to 1991 prices, costs and revenue associated with development

and maintenance of the road system are estimated for 1991 at:

	Million Vatu
Net Revenue:	
• Road Taxes, Transfer Fees and Driving Licenses	51
• Import Duties and Service Tax	147
Total	198
Expenditure:	
• Current Maintenance	168
• Incremental Maintenance Requirement	800
• Annual Capital Charge	904
Total	1,872

2.42 Notwithstanding the difficulties of treating some vehicle import duties as indirect charges to road users, total revenue from the sector exceeds current government expenditure on maintenance but is much less than the total long run cost of sustaining the present road system. The extent to which donors have financed construction of roads in Vanuatu (and currently fund road rehabilitation required as a result of inadequate maintenance) represents an external transfer and implicit subsidy to the land transport sector in the country. The present serious deterioration of existing roads represents a substantial contingent and unfunded liability. It is problematic that future grant assistance from donors will be available to cover this accrued liability and the financing gap of 801 million Vatu (1991 prices) required to sustain the road network in the long term. This financing gap will be higher if inadequate maintenance is undertaken. Therefore, Government will need to initiate means to increase sources of funds, in particular by careful selection of road maintenance priorities, by improved maintenance efficiency and by increasing the charges imposed on road users. Increased road user charges need to be carefully

considered as a significant fiscal burden already falls on road users and raises transport cost. At the same time, the Government needs to give attention to rationalization of the existing stock of infrastructure; priorities for which assets warrant maintenance should be established.

2.43 Two key *equity* issues relate to cost recovery in the land transport subsector: (a) the geographical distribution of sources of receipts and disbursements of expenditure; and (b) the apportionment of costs and revenue by vehicle category. Eighty-four percent of vehicles in Vanuatu are located on the islands of Efate and Santo/Malo, compared with only 38 percent of the road network by value (but including all sealed roads). It is estimated that the long term cost of maintenance and annual capital charges for the roads is 471 million Vatu and 71 million Vatu respectively in these two regions. Assuming revenue to be in proportion to the number of vehicles,⁵ this indicates revenue of 166 million Vatu and costs of 542 million Vatu for the two provinces, a rate of cost recovery of 31 percent. Cost recovery for the remaining regions is estimated at 7 percent. The increase in road user charges in Efate and Santo/Malo to meet the full cost of road, construction and maintenance is thus relatively modest. The substantial gap between revenue and expenditure for roads in the other regions, and the limited financial resources in them, reinforces the need to carefully establish that part of the road network which has key economic and social values and to seek the most efficient means for ensuring maintenance of the road network - including adoption of appropriate standards. A major proportion of the road network involves low traffic volumes (less than 100 vehicles per day). Such roads, typically gravel and earth formed, provide accessibility as a social service. Fixed costs for maintaining these roads are high—over 75 percent. In such circumstances, a lower share of revenue for cost recovery will derive from specific vehicle-related fees; a higher share will need to be supported by more indirect and general taxes.⁹

2.44 The second equity issue pertains to the attribution of cost and revenue to vehicle types. Trucks cause considerable damage to the road system, disproportionately more than their share of total vehicle kilometers by all road vehicles. Road user charges should be designed to reflect this incremental cost to the system. To the contrary, the average rate of import duty and service tax for trucks is only 24 percent (see Table 16) - this is less than the average rate of tax for all imports, and implies no contribution from this source towards cost recovery for roads. The present fivefold difference between the annual registration tax for trucks in excess of ten tonnes and cars with engine capacity between 1.1 and 1.5 liters makes only a minor contribution to the difference in damage imposed on the road system by the two types of vehicle. The immediate urgency of this issue is lessened by the small number of large vehicles in use in Vanuatu at present - trucks and buses make up only nine percent of the vehicle fleet, and many of them are small in size (3 tonne trucks and mini-buses).

Ports

2.45 The Wharfage Tax collected by the Department of Ports and Marine (see Table 13) has elements of a fee for service and a tax. The excess charge for imports compared to that for exports can be considered a form of import taxation, and Ramsey pricing to take advantage of the likely lower elasticity of demand for imports than for exports. The revenue from the Wharfage Tax is not retained by the Department of Ports and Marine and the revenue from the higher charge on imports is not considered as contributing to cost-recovery in the present analysis. In 1987 (the latest year for which data are available), imports to Vanuatu were 91,030 tonnes and exports were 60,480 tonnes (World Bank 1991). Assuming this ratio of imports to exports to have continued, the Wharfage Tax attributable to exports and to imports (if imports were taxed at the same rate for exports) in 1991 is estimated as 21.7 million Vatu. Net income

in 1991 from fixed infrastructure is estimated at 62 million Vatu (see Table 13).

2.46 In summary, costs and revenue associated with development, operations and maintenance of the ports and other activities of the Department of Ports and Marine are estimated for 1991 at:

	Million Vatu
Income	62
Operating Expenditure	
• With Current Maintenance	72
• Incremental Maintenance Needs	49
Operating Surplus (Loss)	(59)
Less: Annual Capital Charge	325
Net Surplus (Loss)	(384)

2.47 Current revenue would need to be increased substantially to generate sufficient revenue to cover the cost of developing, maintaining and operating port infrastructure. Further revenue is required to fund the rehabilitation of current port infrastructure which has deteriorated due to inadequate maintenance in the past. All current revenue is derived from activities at the two principal ports which account for 82 percent of the replacement cost of Departmental assets. The distribution of costs and revenue between the most intensively used assets and assets on outer islands is thus not as imbalanced as is the case with roads.

Airports

2.48 Income collected by the Civil Aviation Department is all in the form of user fees with no explicit taxation component to them. The revenue is almost entirely attributable to aviation activity at Bauerfield Airport in Port Vila.

2.49 In summary costs and revenue associated with development, operation and maintenance of Civil Aviation Department airports and activities are estimated for 1991 at:

	Million Vatu
Income	128
Operating Expenditure	
• With Current Maintenance	82
• Incremental Maintenance Needs	62
Operating Surplus (Loss)	(16)
Less: Annual Capital Charge	667
Net Surplus (Loss)	(683)

2.50 Revenue would need to be increased substantially to generate sufficient revenue to cover the cost of developing, maintaining and operating airport infrastructure. Further revenue is required to fund the rehabilitation of current airport infrastructure which has deteriorated due to inadequate maintenance in the past. As with ports and marine, there is an equity issue in respect to the distribution of revenue and costs between Bauerfield Airport and the other airport and airstrips in the country. Revenue from landing fees and other sources at Santo and outer island airfields is minimal, but together with airways equipment they account for 82 percent of the Civil Aviation Department's airport assets.

F. SITUATION SUMMARY

2.51 The previous sections of this survey indicate the problems facing the Government of Vanuatu in providing for the maintenance and rehabilitation of the nation's transport infrastructure. The analysis reflects the rudimentary nature of the information which is available to assess asset management needs, even from the most general perspective.

2.52 The replacement value of Vanuatu's transport infrastructure (excluding the vehicles, vessels and aircraft which use the system) is estimated to be close to 20,000 million Vatu (US\$200 million at 1991 prices). The average equivalent annual assessed maintenance for the transport system is estimated conservatively at 1,100 million Vatu (US\$10 million at 1991

prices). The annual assessed maintenance is on average equal to some 5 percent of the replacement value of the assets; this requirement ranges from 10 percent for roads to 1.4-1.5 percent for marine and aviation infrastructure.

2.53 The estimated annual outlays required for asset maintenance presume that the system has been well maintained in the past and that rehabilitation or reconstruction requirements should only relate to the general ageing of the system. This is not the present situation in Vanuatu.

2.54 Much of the infrastructure has been built or reconstructed in the past 10 years and possibly little remains of original investments made more than say 30 years ago, which can be taken as the average life of transport infrastructure. The expected value of one year's replacement of assets would be about 700 million Vatu (1991 prices), if the construction of the assets had been spread uniformly over the past 30 years. By comparison, the present estimated rehabilitation and replacement needs are valued at more than 2,500 million Vatu (1991 prices). It needs to be reiterated that this estimate is based on imprecise data; nevertheless, it is indicative of the backlog in restoration needs. To clear the backlog in reconstruction or rehabilitation in say the next five years, whilst meeting annual maintenance needs, would require in the order of 1,500 million Vatu per year (1991 prices).

2.55 The historic levels of actual maintenance expenditure are difficult to establish and hence to assess. Departmental budget allocations and costing procedures are not designed to provide information on a program/functional basis (for example, maintenance task). The lack of function based financial data is a constraint to understanding and managing maintenance. An apportionment of recurrent Departmental expenditures for all transport modes indicates that some 203 million Vatu was spent on maintenance in 1991, which represents only 18

percent of assessed average annual maintenance requirements.

2.56 It is evident that the capacity of the Government to sustain infrastructure, in financial and institutional terms, has not been assessed sufficiently in project feasibility studies. Moreover, some projects may have been implemented in the expectation of economic benefits which have not eventuated (see Box 2.2). Assessment of future projects should

Box 2.2: ECONOMIC JUSTIFICATION OF RURAL ROADS

Rural road development is generally justified primarily on the basis of increased agricultural production and social benefits. A road justified on the latter will generate only indirect economic benefits through access to services and facilities and, given limited tax incidence on the rural population, will generate little increased revenue for Government - in these cases there will be a continuing need for net Government funding to sustain the road and the social benefits.

Agricultural production is more diversified in Vanuatu than most other South Pacific countries. Evaluations for feeder road projects on five islands in Vanuatu indicated about one quarter (24 percent) of benefits from increased cattle production, one quarter (22 percent) from copra and one half (54 percent) from cocoa. There appears to have been no ex-post-project evaluations of projects to verify if production has increased as forecast. The responsiveness of agricultural production to improved accessibility is important to the success of such projects and the Government's ability to adequately fund maintenance of the road.

examine the viability of sustaining infrastructure (for example, on the basis of cost recovery or general budget support) together with the appropriate standards and mechanisms for effective implementation.

2.57 At present, about one-quarter of all maintenance is undertaken by Government Departments using force account and Government-owned equipment. This approach fails to give sufficient consideration to the

separation of management and technical activities, and has resulted in almost exclusive emphasis on the latter. The approach also places heavy demands on the limited number of qualified staff in Departments, and fails to take advantage of the greater flexibility available in private companies and the community.

2.58 An indication of cost recovery with assessed maintenance for each transport mode (as presented in Table 17) indicates substantial under-recovery of costs for road, marine and aviation transport. Current maintenance expenditure and the higher annual equivalent, capital replacement costs imply a lower level of cost recovery.

2.59 The Government needs to give serious attention, not only to higher cost recovery through user charges, but also to *assessment of all existing infrastructure and determination of what assets warrant maintenance (and at what standard)*; priorities for rationalization of existing infrastructure should be established.

Table 17: VANUATU—SUMMARY OF COST RECOVERY, 1991
(Vatu million, 1991 prices)

	Roads	Marine	Aviation
Income			
• Direct	51	62	128
• Indirect /a	147	-	-
Total	198	62	128
Operating Expenditure			
• With Current Maintenance	168	72	82
• Incremental Maintenance Needs	800	49	62
Operating Surplus (Loss)	(770)	(59)	(16)
Less: Annual Capital Charge	904	325	667
Net Surplus (Loss)	(1,674)	(384)	(683)

/a Share of import duty in excess of average rate of duty for all imports.

Source: Mission estimates.

CHAPTER 3

EQUIVALENT ANNUAL VALUE FOR TRANSPORT INFRASTRUCTURE

3.1 Introduction. Inadequate maintenance results in more rapid deterioration of transport infrastructure than would be the case with optimum maintenance. This Annex estimates the extent of this effect.

3.2 Infrastructure Value. The value of current infrastructure estimated in Section A of Chapter 2 is summarized in Table 18. The cost of this infrastructure comprises two parts; a fixed component and a renewable component. The former includes, for example, clearing and construction of the base for a road. The renewable component of infrastructure is that part which periodically requires reconstruction, for example the surface of a road. The approximate proportion of the total cost of infrastructure which is fixed and renewable is described in Table 18. The estimates are drawn from construction cost estimates for typical construction projects.

3.3 Economic Life. With optimum maintenance, the fixed component of infrastructure should have a life of at least 50 years. By definition, all elements of the fixed component of infrastructure should not be affected by the level of maintenance. This is not necessarily the case, however, in practice. For example, poor maintenance of a road may result in inadequate drainage and pot-holing. Water can then penetrate the base structure of the road and result in deterioration of this element of the fixed component. The lives of the fixed components of infrastructure adopted for the current assessment are presented in Table 18.

Typical lives of the renewable components of infrastructure with current maintenance and optimum maintenance are also presented in Table 18.

3.4 Equivalent Capital Cost. The equivalent annual capital cost of infrastructure with current maintenance patterns and with optimum maintenance are shown in Table 18. An opportunity cost of capital of 7 percent is used. The data illustrate that the current equivalent annual capital cost with current maintenance patterns is about 46 percent greater than would be the case of optimum maintenance was undertaken (i.e., 2.7 billion Vatu compared with 1.9 billion Vatu). The data also shows the importance of adequate maintenance of engineered, unsealed roads, with the incremental capital cost of this item alone accounting for over 50 percent of the incremental capital cost for all infrastructure.

**Table 18: VANUATU—SUMMARY OF INFRASTRUCTURE
VALUE AND MAINTENANCE COSTS, 1991
(million Vatu)**

Item	Roads				Marine				Aviation				TOTAL
	Sealed	Engi- neered	Earth	Total	Wharves & Yards	Bldgs.	Equip. & Other	Total	Runways	Bldgs.	Equip. & Other	Total	
Asset Replacement Value	1,817	5,701	1,507	9,025	3,976	150	168	4,302	3,147	1,795	1,476	6,418	19,745
Maintenance Overhang ^{/a}	..	..	..	2,160	..	..	..	400	..	..	..	12	2,572
Assessed Annual Maintenance ^{/b}	89	713	166	968	40	2	17	59	33	21	33	87	1,113
Current Maintenance Expenditure	..	..	..	168	..	..	..	10	..	..	..	25	203
% of Assessed Maintenance	..	..	..	17%	..	..	..	17%	..	..	..	29%	18%
Incremental Maintenance Expenditure for Optimal Maintenance ^{/c}	..	..	..	800	..	..	..	49	..	..	..	62	910
Equivalent Annual Capital Cost: ^{/d}													
With Optimum Maintenance	153	609	142	904	288	13	24	325	312	145	210	667	1,895
With Current Maintenance	195	998	215	1,408	360	17	41	418	469	197	274	940	2,766
Incremental Capital Cost	42	390	72	504	72	5	17	93	157	52	64	273	870
Proportion of Capital Cost:													
Fixed Component	65%	80%	100%		20%	100%	0%		20%	100%	0%		
Removable Component	35%	20%	0%		80%	0%	100%		80%	0%	100%		
Economic Life: (years)													
Fixed Component													
With Optimum Maintenance	50	50	20		50	30	0		50	30			
With Current Maintenance	40	30	10		40	15	0		40	15			
Removable Component													
With Optimum Maintenance	16	5	-		50		10		16		10		
With Current Maintenance	8	2.0	-		20		5		8		7		

^{/a} Cost required to rehabilitate infrastructure to a sound standard, i.e. the standard through time which would have been the case with optimal maintenance and for which the assessed annual maintenance expenditure is sufficient to adequately maintain the infrastructure.

^{/b} Expenditure required for optimal maintenance.

^{/c} Difference between current annual expenditure on maintenance and the equivalent annual expenditure assessed as being optimal.

^{/d} Based on opportunity cost of capital of 7 percent and parameters described in the lower part of the table.

CHAPTER 4 ROAD VEHICLE OPERATING COSTS

4.1 **Introduction.** Vehicle operating costs have been established using the RTIM2 model,¹⁰ with two exceptions:

- (a) The model to determine road roughness (based on, for example, the number of vehicle passes since the last grading on unpaved roads) has not been used as traffic volumes are commonly very low, and the rate of road deterioration will be heavily affected by environmental conditions in addition to traffic activity. Moreover, no systematic data are available on the present condition of roads. For indicative purposes three road conditions have been adopted, as shown in Table 19.

Table 19: VANUATU—ROAD ROUGHNESS AND CONDITION

Road Condition	Road Roughness (mm/km)	
	Gravel Road	Sealed Road
Good	3,000	2,000
Fair	5,000	3,000
Poor	8,000	5,000

Source: Mission estimates.

- (b) Data on the age profile of vehicles in Vanuatu and scrappage rates are not available, and the cost of capital and depreciation have been based on the

average annual cost over the economic life of vehicles.

4.2 **Vehicle Features.** Representative vehicle types for the most commonly found types of vehicles in use in Vanuatu are:

- Car (Toyota Corolla)
- Light Utility (Nissan pickup)
- Four Wheel Drive (Toyota Hilux)
- Light Truck (3 tonne Nissan Cabstar)

Most other vehicle will have operating costs similar to these vehicles. Features of these vehicles which influence operating costs are presented in Table 20. The data has been obtained from investigations in Vanuatu and comparative data presented in ADB (1990).¹¹ The share of each vehicle type is based on the share of registered vehicles and the annual distance travelled by each vehicle category. The number of vehicles registered in 1988 was:

Cars	2,186
Pickups	1,733
Trucks	184
Buses	210
Motor Cycles	287
Other	6
Total	4,624

Vehicle resource consumption for travel on good sealed roads derived from the RTIM model is also presented in Table 20.

4.3 **Vehicle Operating Costs.** Total vehicle operating costs, in Vatu per kilometer (1991

prices), for travel on sealed roads in good condition are described in Table 21. (Note that the difference between financial and economic operating costs is comparatively small.) These figures are used as a datum from which vehicle operating costs are estimated for sealed roads in fair and poor condition and unsealed roads (in each of the three conditions) using road roughness as described in Table 19, and relationships in the RTIM model.¹² Traffic volumes are low (see Box 4.1) and representative values have been used in estimating total annual vehicle operating cost savings. The vehicle operating costs are summarized in Box 2.1.

Box 4.1: TRAFFIC VOLUMES

The distribution of traffic volumes over the road network is highly skewed. The National Transport Planning Study reported traffic volumes of less than 100 vehicles per day on the main circuminsular road on Efate within 20 km from Port Vila. On Santo and Malekula islands, traffic volumes are less than a hundred vehicles per day outside (but in the vicinity of) the urban centers. Traffic volumes elsewhere, and even on main roads on other islands can be as low as only a few vehicles per day.

4.4 Sufficient detail is not available to accurately establish the foreign cost component of vehicle operating costs, but for the principal items with a substantial imported component are fuel, oil, tires, spare parts for maintenance and depreciation. About a quarter of these costs can be attributed to local distribution and retailing; however, there is an import component to these latter costs. Taking the import component of distribution and retailing costs as 47 percent (this being the share of imports in GDP in Vanuatu),¹³ 87 percent of the cost of fuel, oil, tires, spare parts and depreciation is estimated to be foreign. A similar percentage is applied to interest as it is occasioned by the capital cost of the vehicle, and Vanuatu is a net importer of capital. A part of insurance costs will be foreign in nature as they will be directed to the importation of vehicle parts, however data is not available. The foreign cost component of insurance and of labor is taken as 47 percent in line with the share of imports in economic activity in Vanuatu. On this basis, it is estimated that the imported cost component of financial vehicle operating costs is estimated to be 74 percent.

4.5 Average vehicle operating costs on gravel and sealed roads in the three conditions described in Table 19 are presented in Box 2.1.

**Table 20: VANUATU—VEHICLE OPERATING PARAMETERS:
SEALED ROADS IN GOOD CONDITION, 1991**

	Car	Light Utility	4WD	Light Truck
Physical Data				
Free Speed	60	50	60	45
Power-Weight Ratio (BHP/t)	-	-	-	25
Gross Vehicle Weight (t)	1.0	1.0	1.5	3.0
Annual Use:				
Distance (km)	12,500	14,750	12,500	17,000
Time (hours)	500	600	500	680
Effective Life (years)	10	10	10	10
Average Vehicle Age (years)	4	4	5	5
Vehicle Crew:				
Driver	0	1	1	1
Other	0	1	1	1
Traffic Composition	38%	39%	11%	11%
Unit Price Data (1991 prices)				
(i) Financial Prices /a				
Vehicle	1,666,500	1,212,000	2,024,040	2,206,850
Tire	9,500	9,500	13,800	13,800
Fuel	87.7	87.7	63.5	63.5
Oil	250	250	250	250
Driver Time (/hr)	60	60	60	70
Crew Time (/hr)	30	30	30	30
Maintenance Labor (/hr)	100	100	100	100
Insurance	72,850	102,630	125,340	136,660
Annual Registration	10,000	7,500	18,000	20,000
Real Interest Rate	7%	14%	14%	14%
(ii) Economic Prices /b				
Vehicle	1,266,600	1,044,200	1,743,900	1,901,400
Tire	7,980	7,980	11,590	11,590
Fuel	50.7	50.7	46.5	46.5
Oil	240	240	240	240
Derived Data /c				
Average Speed (kph)	58	48	59	44
Fuel Consumption (l/'000 km)	72	67	113	134
Oil Consumption (l/'000 km)	1.2	1.8	1.8	4.0
Tires (Consumed/'000 km)	0.139	0.139	0.139	0.331
Spare Parts (%/'000 km)	0.001	0.001	0.001	0.001
Maintenance Labor (hrs/km)	0.001	0.001	0.001	0.001

/a Includes Retail Purchase Tax of 1 percent

/b Excludes taxes and duties.

/c Derived from RTIM for sealed roads with roughness of 2,000 mm/km.

Source: Mission estimates.

**Table 21: VANUATU—VEHICLE OPERATING COSTS ON PAVED ROADS
IN GOOD CONDITION, 1991 /a
(Vatu/km, 1991 prices)**

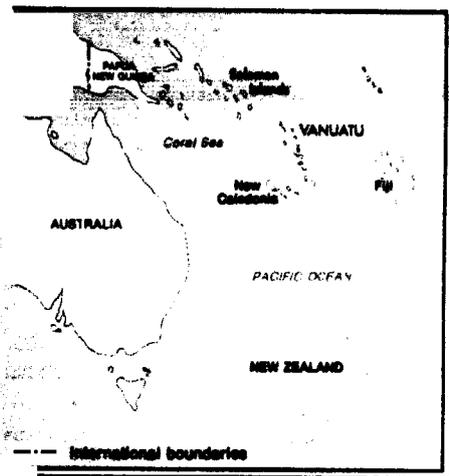
	Car	Light Utility	4WD	Light Truck	Average
Paved Road					
<i>Financial Cost</i>					
Fuel	6.3	5.9	7.2	8.5	6.4
Oil	0.6	0.9	0.9	2.0	0.9
Tires	1.3	1.3	1.9	3.4	1.6
Maintenance	2.0	1.8	3.0	4.4	2.3
Interest and Depreciation	19.0	11.7	23.1	18.5	16.3
Licenses and Insurance	6.6	7.5	11.5	9.2	7.7
Driver and Crew	0.0	1.9	1.5	2.3	1.1
Total	35.8	30.9	49.1	48.4	36.4
<i>Economic Cost</i>					
Fuel	2.7	2.5	4.3	5.1	3.0
Oil	0.6	0.9	0.9	1.9	0.9
Tires	1.1	1.1	1.6	2.9	1.3
Maintenance	1.5	1.5	2.6	2.4	1.9
Interest and Depreciation	14.4	10.1	19.9	15.9	13.3
Insurance	5.8	7.0	10.0	8.0	6.9
Driver and Crew	0.0	1.9	1.5	2.3	1.1
Total	26.2	24.9	40.8	40.0	28.5

/a Vehicle operating costs for paved roads in good condition (roughness index 2,000 mm/km) are used as the datum, against which vehicle operating costs for other road types (unsealed and earth) and road conditions (fair and poor) are estimated. The total annual cost of owning and operating vehicles is expressed in Vatu/km; variations in operating costs with road condition are tested only for fuel, oil, tires and maintenance.

Source: Mission estimates and RTIM model.

Endnotes

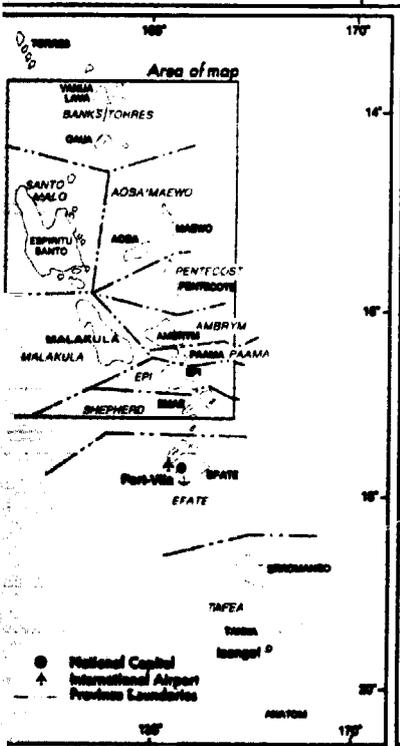
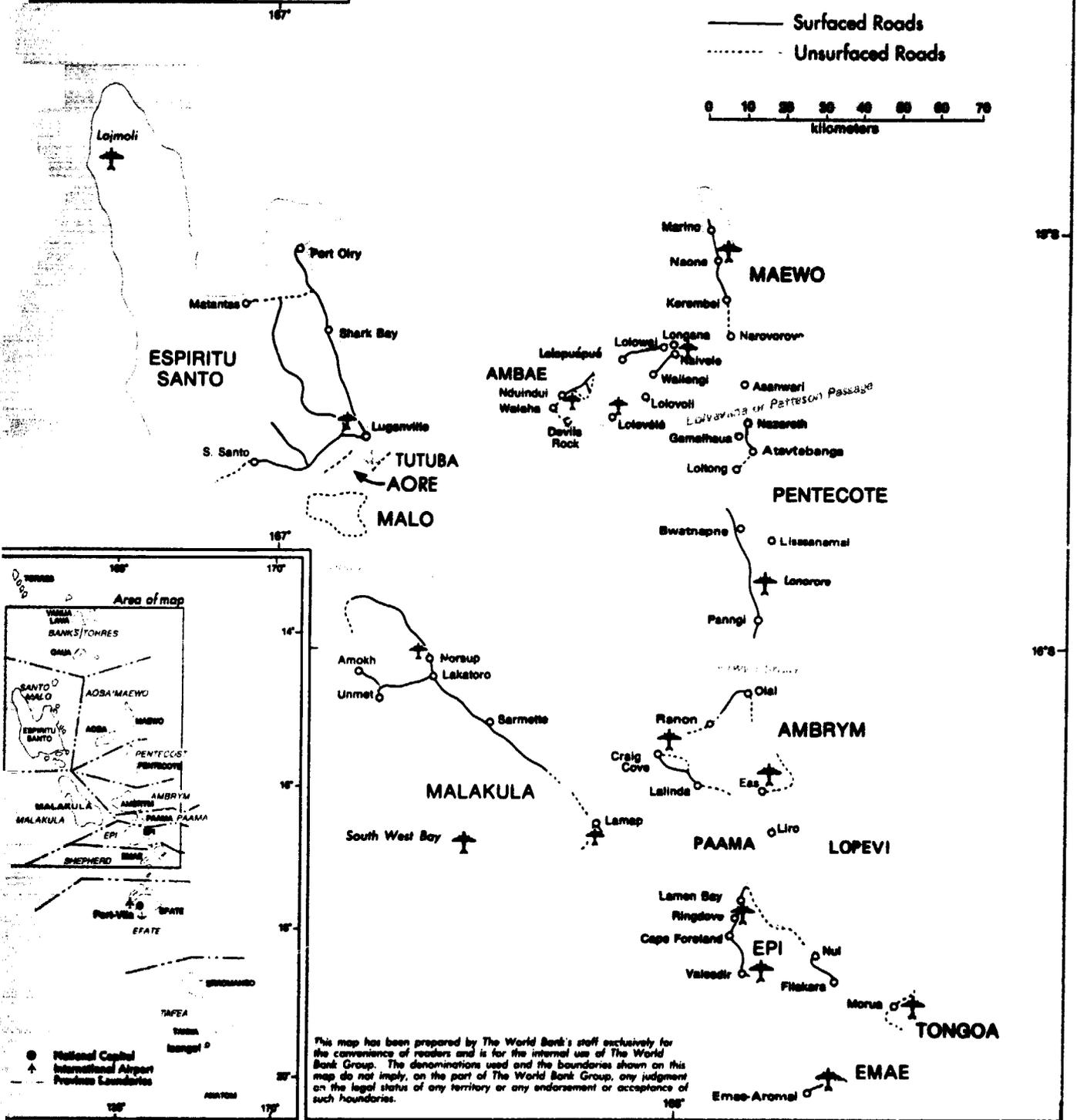
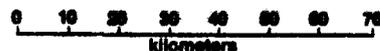
1. The survey of the maintenance situation presented here is based upon a World Bank mission visit to Vanuatu September 9-13, 1991.
 2. These tables are based on a classification system outlined in Volume One, Part II. The notional classifications used in the marine and aviation subsectors are subject to further refinement.
 3. The information is derived from two sources. A questionnaire setting out the data required was circulated prior to the mission visit and used as the reference for discussions with the relevant Ministries and Departments. In addition to the information from the mission, data are drawn from previous sectoral and subsectoral reports on transport in Vanuatu.
 4. By using a 'replacement' value for the asset, no consideration has been given to the condition of the asset. In most cases the actual value of the asset would be considerably lower than the replacement cost, due to age and lack of maintenance.
 5. A full road inventory has been commenced recently (1992) and this is completed for Efate and covers about one-half of Santo.
 6. Transport infrastructure in this report is limited to assets within the public sector. While the majority of transport infrastructure in Vanuatu is publicly owned, the public/private distinction is an arbitrary one from the standpoint of provision of transport services.
 7. At the same time the costs (in addition to maintenance expenditure) of putting in place effective maintenance, such as the administrative and management of personnel, training and information, need to be factored in. Implementation of improved maintenance needs to be cost effective and the costs should be less than the direct savings in infrastructure costs. This issue is addressed in Volume One, Part II of this report.
 8. This assumption overallocates income to the remaining nine regions in Vanuatu given the exemption of vehicles imported for use on them from import duty and service tax.
 9. The structure of road user charges and other fees/taxes for road cost recovery is more complex in such situations. This issue of providing reliable access to small, often remote, communities also arises in maritime and aviation with small wharves and airfields.
 10. Transport and Road Research Laboratory (1982).
 11. Asian Development Bank, (1990).
 12. The vehicle operating costs are summarized in Box 2.1 in Volume One of this report.
 13. Based on data for 1987 when imports and GDP were 6.3 billion Vatu and 13.5 billion Vatu respectively.
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VANUATU PACIFIC ISLANDS TRANSPORT SECTOR REPORT

- ✈ Air Strips (not all shown)
- ✈ International Airport (inset)
- ⬇ Ports

- Surfaced Roads
- ⋯ Unsurfaced Roads



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