

RRP:VAN 26316

# **ASIAN DEVELOPMENT BANK**

**REPORT AND RECOMMENDATION  
OF THE  
PRESIDENT  
TO THE  
BOARD OF DIRECTORS  
ON A  
PROPOSED LOAN  
AND  
TECHNICAL ASSISTANCE  
TO THE  
REPUBLIC OF VANUATU  
FOR THE  
URBAN INFRASTRUCTURE PROJECT**

June 1996

## CURRENCY EQUIVALENTS

(as of 31 March 1996)

Currency Unit	=	Vatu (Vt)
\$1.00	=	Vt113.55
Vt100	=	\$0.88

- (i) The foreign exchange rate of the vatu is determined by the Reserve Bank of Vanuatu.
- (ii) For the purposes of calculation in this Report, an exchange rate of \$1.00 to Vt112.00 has been used.

## ABBREVIATIONS

ADT	-	Average Daily Traffic
AusAID	-	Australian Agency for International Development
BME	-	Benefit Monitoring and Evaluation
EIA	-	Environmental Impact Assessment
EIRR	-	Economic Internal Rate of Return
FIRR	-	Financial Internal Rate of Return
GDP	-	Gross Domestic Product
GNP	-	Gross National Product
IEE	-	Initial Environmental Examination
MOT	-	Ministry of Transport
NDP3	-	Third National Development Plan (1992-96)
NPO	-	National Planning Office
NPV	-	Net Present Value
NRW	-	Nonrevenue Water
NZODA	-	New Zealand Overseas Development Assistance
O&M	-	Operation and Maintenance
ODA	-	Overseas Development Administration
PCC	-	Project Coordination Committee
PME	-	Project Management Engineer
PMD	-	Ports and Marine Department
PMU	-	Project Management Unit
PWD	-	Public Works Department
TA	-	Technical Assistance
UK	-	United Kingdom
UNELCO	-	Union Electric Company Limited

## WEIGHTS AND MEASURES

ha	-	hectare
km	-	kilometers
km <sup>2</sup>	-	square kilometers
m	-	meters
m <sup>3</sup>	-	cubic meters

## NOTES

- (i) The fiscal year (FY) of the Government ends on 31 December.
- (ii) In this Report, "\$" refers to US dollars.

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VANUATU  
URBAN INFRASTRUCTURE PROJECT  
LOAN AND PROJECT SUMMARY

<b>Borrower</b>	Republic of Vanuatu
<b>Project Description</b>	<p>In implementing a strategy for urban growth management the proposed Project concurrently addresses social, environmental, and economic concerns. The Project will improve living conditions in Port Vila and Luganville, the two main urban areas of Vanuatu, by providing better water supply, drainage, and sewage systems. The Project, through environmentally friendly infrastructure, will mitigate against lagoon pollution and the health hazard emanating from it. The Project will also promote economic growth by restoring existing urban roads and port infrastructure. The Project components together will assist Vanuatu to preserve its attraction as a tourist destination.</p>
<b>Classification</b>	Primary: Human Development
<b>Environmental Assessment</b>	<p>Category B. An initial environmental examination (IEE) was undertaken, and the summary IEE is a core appendix.</p>
<b>Rationale</b>	<p>The principal challenge facing urban administrations in Vanuatu is coping with the effects of rapid urban population growth and managing future urban expansion, while preserving acceptable living standards in urban areas. Port Vila's population, estimated at 28,000, has doubled over the past 13 years, primarily because of migration from the outer islands. The population will double in about 8 years, and similar increases are taking place in Luganville. If the current urban growth rates persist, this will affect the well-being of the population; the environment; and tourism potential, Vanuatu's single most important asset for economic expansion. The surge in urban population places considerable strain on physical infrastructure and the financial and human resources involved in the delivery of public services. Because these concerns are interrelated, they must be addressed concurrently. The proposed Project will help implement a multifaceted coherent urban growth strategy to alleviate the most serious infrastructure bottlenecks and institutional constraints in the urban sector.</p>

## Objectives and Scope

The primary objective of the Project is to assist in the implementation of an urban growth management strategy that will concurrently address public health, environmental, and economic concerns. Specific goals are to (i) improve the living conditions and public health of people in the two main urban areas of Port Vila and Luganville, (ii) mitigate the adverse effects of urban growth on the environment and improve natural resource management, and (iii) promote economic growth through enhancing conditions conducive to tourism. The Project scope consists of the following components:

- (i) Water Supply and Sanitation: (a) development and improvement of the potable water supply in Luganville, including the water source, associated pump house, and delivery pipelines; and repairs to the delivery network; (b) lengthening of the Erakor Causeway bridge and other selected urgent sanitation measures in Port Vila; and (c) improvement of surface water drainage in low-lying areas of the Sarakata district of Luganville, to reduce public health risks and alleviate flooding;
- (ii) Urban Roads: (a) repair and resealing of existing primary and secondary roads in Port Vila and Luganville; and (b) priority traffic management improvements within Port Vila and Luganville based on the results of the urban growth management framework and the ensuing traffic master plans; and
- (iii) Port Vila Wharf: repair of the international wharf.

The Project also includes 95 person-months of consulting services for Project management, preparation of detailed designs and contract documents, construction supervision, and project benefit monitoring and evaluation.

## Cost Estimates

(\$ million equivalent)

Item	Foreign Exchange	Local Currency	Total Cost
Base Cost	8.0	2.7	10.7
Contingency	1.5	0.6	2.1
<b>Total</b>	<b>9.5</b>	<b>3.3</b>	<b>12.8</b>

**Financing Plan**

(\$ million equivalent)

Source	Foreign Exchange	Local Currency	Total Cost	Percent of Total
Bank	9.1	0.9	10.0	78
AusAid	0.4	0.0	0.4	3
Government	0.0	2.4	2.4	19
<b>Total</b>	<b>9.5</b>	<b>3.3</b>	<b>12.8</b>	<b>100</b>

**Loan Amounts and Terms**

A loan of SDR 6.913 million (currently \$10.0 million equivalent) from the Bank's Special Funds resources with a repayment period of 40 years, including a grace period of 10 years, and carrying a service charge of 1 percent per annum.

**Period Of Utilization**

31 December 2001

**Implementation  
Arrangements**

The Public Works Department (PWD) will be the Executing Agency, responsible for the implementation of all civil works components under the Project. AusAID will provide the services of a Project Management Engineer who will be attached to the Project Management Unit within PWD and who will be in charge of contract management and construction supervision. The Ministry of Finance (MOF) will be responsible for overall Project coordination and will ensure coherent implementation of all activities under the urban growth management framework. MOF will establish a Project Coordination Committee for this purpose. The Committee will be chaired by the First Secretary of Finance and will consist of representatives of the Department of Finance, the National Planning Office, PWD, the municipalities, and the Ports and Marine Department.

**Executing Agency**

PWD

**Procurement**

Procurement of all goods and services to be financed under the loan will be carried out in accordance with the Bank's *Guidelines for Procurement*. Procurement of civil works will be awarded to prequalified contractors under the Urban Roads and Port Vila Wharf components on

the basis of international shopping (IS). Under the other components, civil works will be awarded to prequalified contractors on the basis of local competitive bidding or will be carried out by force account. Equipment and materials, including vehicles, will be procured through IS or direct purchase.

### **Consultant Services**

A total of 95 person-months of consulting services will be required to assist with Project implementation. Of these, 60 person-months will be for a project management engineer, recruited by AusAID in consultation with the Government and the Bank. Two firms of internationally recruited consultants will be required, one for specialist services in design and supervision of roads, sewage, water supply, sanitation, and benefit monitoring and evaluation (26 person-months); and the other for the design and supervision of the Port Vila Wharf rehabilitation (9 person-months). The consultants will be engaged in accordance with the Bank's *Guidelines on the Use of Consultants*.

### **Estimated Project Completion Date**

30 June 2001

### **Project Benefits and Beneficiaries**

The Project, through improving living conditions and reducing environmental pollution, will directly benefit all sectors of the urban population. The sanitation component in Port Vila and Luganville will improve health conditions of the population living in low income areas.

The improvement of urban roads and the port will contribute to economic growth in Vanuatu, and improvement of the environment will be beneficial to both the health situation and Vanuatu's tourist industry. Improvements brought about through capacity building of PWD and the municipalities will enhance sound financial management, accountability, sustained maintenance of the urban infrastructure, and better delivery of services. Improvement of the urban legislative and planning framework will benefit urban dwellers and the country as a whole through improved management of environment and natural resources. Because the Project will assist

to preserve Vanuatu's attraction as a prime tourist destination, it will enhance economic growth and employment.

**Technical Assistance**

Two technical assistance packages accompany the loan: (i) \$600,000 for the formulation of an Urban Growth Management Strategy for Port Vila, including identification of major parameters driving urban growth, improvement of the legislative framework for urban planning and environment, and assistance in urban physical and traffic planning; and (ii) \$360,000 for the Sanitation Master Plan for Port Vila.

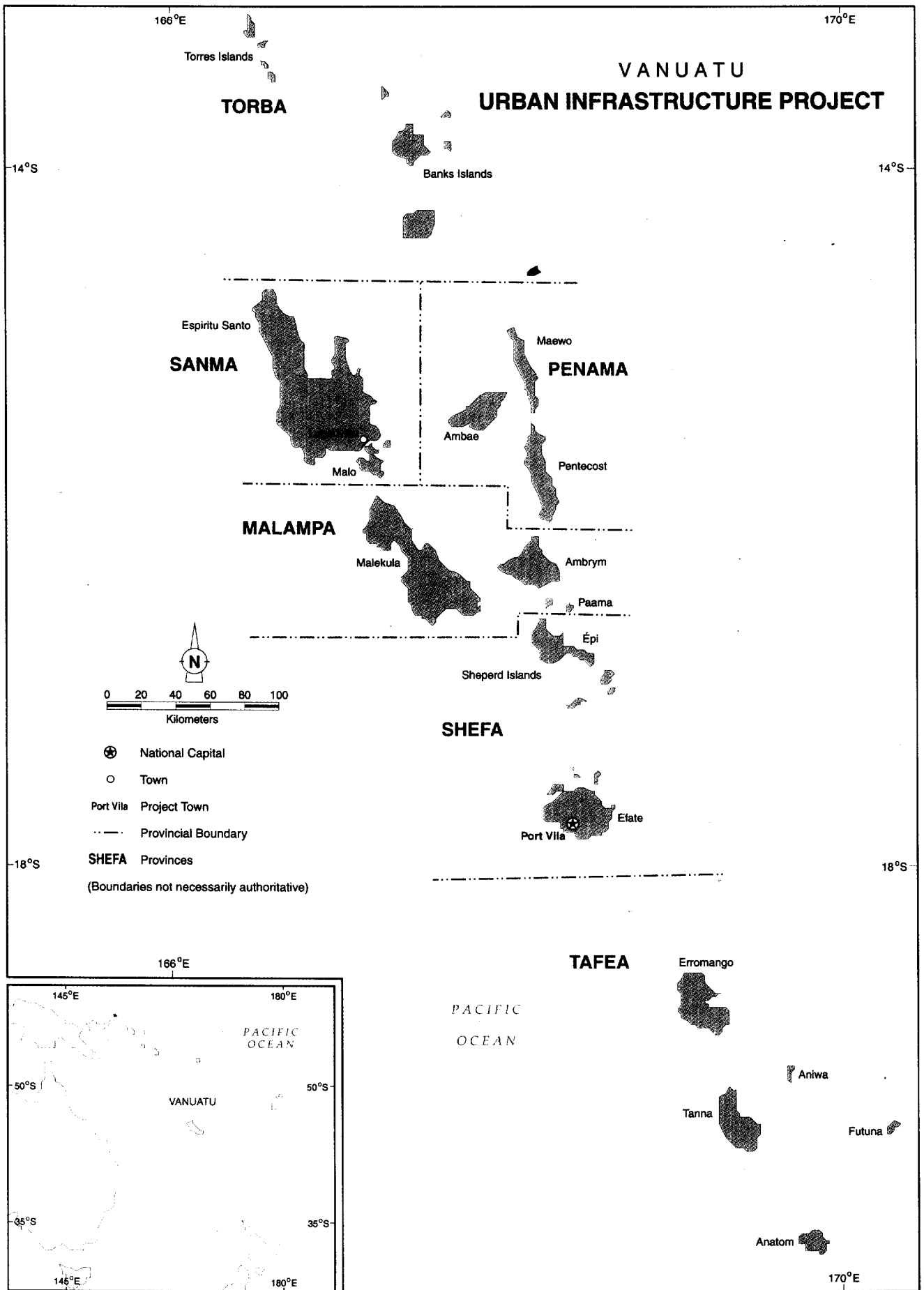
**Cofinancing**

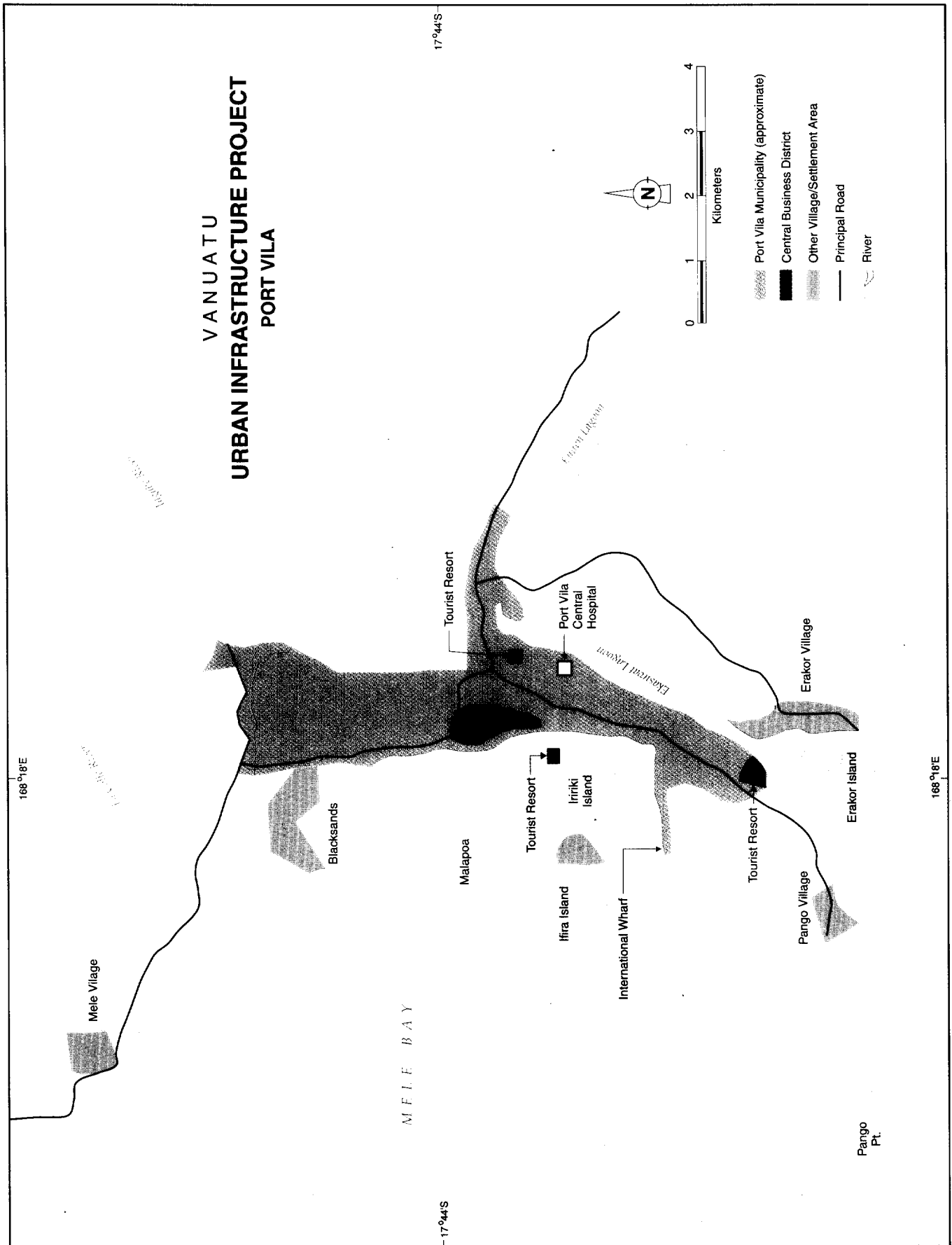
AusAid has agreed to finance the services of the Project Management engineer over the 5 year duration of the Project implementation.

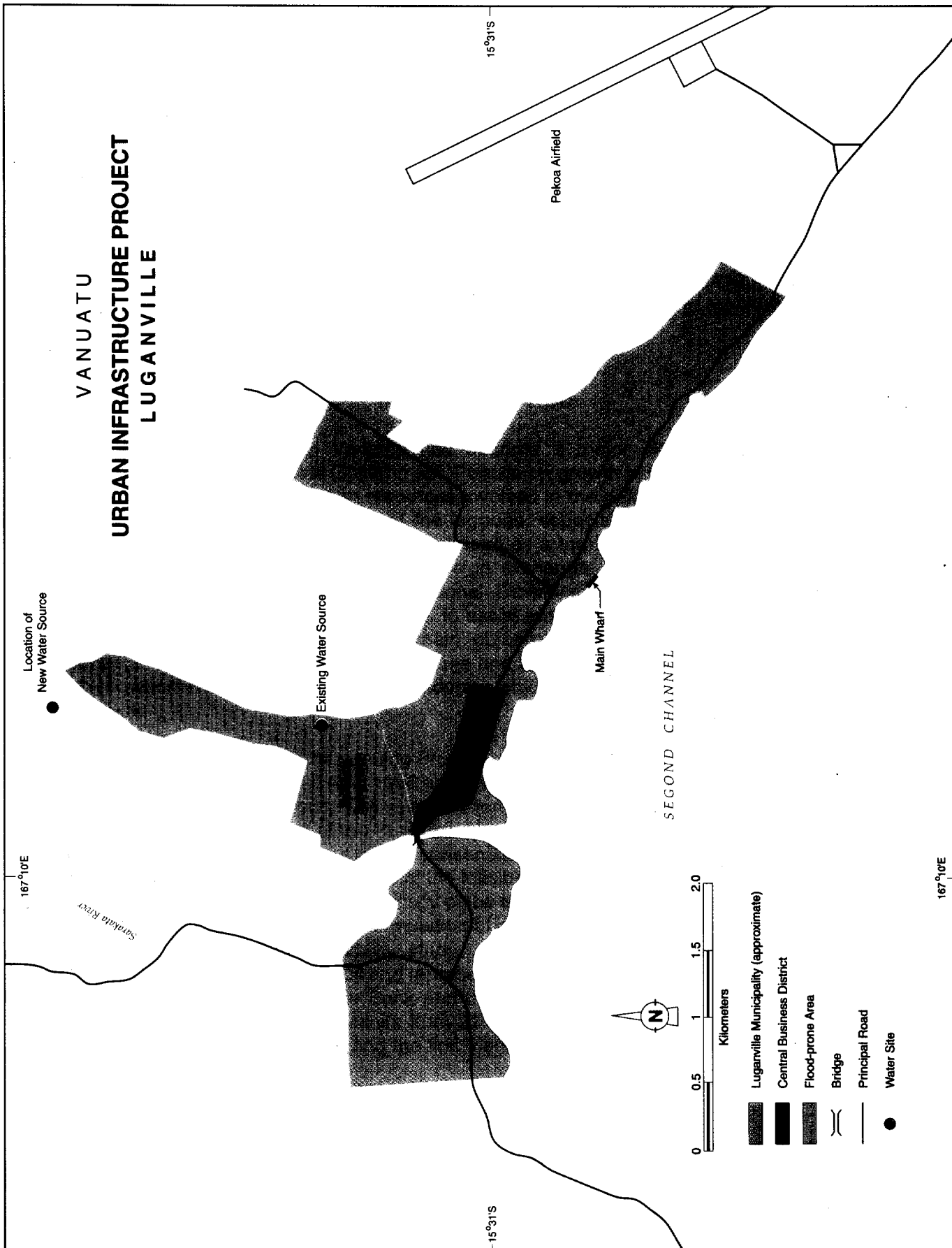
**Complementary Programs**

In addition to AusAID cofinancing of the Project Management Engineer, AusAID and New Zealand Overseas Development Assistance (NZODA) have agreed in principle to collaborate on complementary activities in institutional strengthening and capacity building related to achieving the Project goals. The activities include (i) a water quality monitoring program, (ii) financial management assistance to the two municipalities, and (iii) assistance to introduce commercial accounting systems for Luganville water supply. These activities will be financed from the ongoing programs of assistance of AusAID and NZODA, and administered by these agencies in close coordination with the Bank during Project implementation.









## I. THE PROPOSAL

1. I submit for your approval the following Report and Recommendation on a proposed loan to the Republic of Vanuatu for the Urban Infrastructure Project. The Report also describes proposed technical assistance (TA) for (i) the formulation of a Strategy for Urban Growth Management for Port Vila, and (ii) a Sanitation Master Plan for Port Vila. If the proposed loan is approved by the Board, I, acting under the authority delegated to me by the Board, shall approve the technical assistance.

## II. INTRODUCTION

2. Urbanization in Vanuatu has become a major challenge for the municipal administrations and the Central Government. Population growth in urban centers is straining the infrastructure, financial and human resources involved in the delivery of public services, and is threatening the sensitive ecosystem of the lagoons, especially in and around Port Vila. The Government is concerned about Vanuatu's image as a tourist destination because the tourist industry is the country's main source of foreign exchange. Having accorded high priority to addressing this concern in its Third National Development Plan (NDP3, 1992-1996), the Government, in 1993, requested the Bank to assist in the preparation of a feasibility study for an Urban Infrastructure Project.<sup>1</sup> The main objectives of the study were to identify key bottlenecks in the physical urban infrastructure and to formulate a comprehensive strategy for urban growth management, which would address physical, institutional and policy issues in the urban sector.

3. Processing of the ensuing Project, which commenced upon completion of the TA in November 1994, lasted until April 1996 and involved various missions in addition to the Fact-finding and Appraisal missions. The relatively long processing period was caused by (i) the complexity of the main theme of the Project, which is the rational management of urban growth and the consequent need to reach a consensus among the main stakeholders in urban development; (ii) the recommendations of the feasibility study, which were not well founded and needed to be modified; and (iii) the intricacy of the urban policy environment which necessitated detailed policy discussions and the formulation of new policy initiatives. This Report is based on the modified results of the feasibility study, additional specialist inputs from consultants<sup>2</sup>, discussions with beneficiary groups and representatives of external aid agencies, and the results of policy discussions between the Bank and the Government from June 1995 to May 1996.<sup>3</sup> Loan negotiations were held in Manila from 27 to 29 May 1996. If approved, this will be the Bank's seventh loan to Vanuatu, and the first loan for the urban sector.

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<sup>1</sup> TA No. 1952-VAN: *Urban Infrastructure*, for \$536,000, approved 13 September 1993. The TA started in April 1994 and was completed in November 1994.

<sup>2</sup> TA No. 1974-VAN: *Structural Survey of Port Vila Wharf*, for \$100,000, approved on 10 November 1993.

<sup>3</sup> Appraisal of the Project was carried out between 20 September and 4 October 1995. The Mission comprised C.J. Wensley (Mission Leader), T.K. Jayaraman (Sr. Project Economist/Programs Officer); G. Atay (Counsel); S. Fa'asau (Project Officer); H. Alatoa (Staff Consultant/Sociologist); and W.A.N. Brown (Staff Consultant/Economist).

### **III. BACKGROUND**

#### **A. Sector Descriptions**

##### **1. General**

4. The Republic of Vanuatu comprises about 80 islands scattered over an exclusive economic zone of 680,000 square kilometers (km<sup>2</sup>) in the South Pacific Ocean. The eight largest islands (Espiritu Santo, Malekula, Efate, Erromango, Tanna, Ambae, Ambrym, and Pentecost) constitute 87 percent of the country's total land area of 12,200 km<sup>2</sup> and are inhabited by 80 percent of the total population of 167,500. The capital, Port Vila, is on Efate and has a population of 28,200. The other main urban area is Luganville, on Espiritu Santo, which has a population of 9,200. Vanuatu's population is still predominantly rural, with only about 20 percent of the total population living in urban areas. However, internal migration towards the two urban centers is increasing rapidly. Thus, while overall national population growth rate is currently 2.8 percent per year, the population in Port Vila has been increasing by 8.7 percent annually, and that in Luganville by 5.2 percent. This has placed a major strain on urban services and has exacerbated environmental problems.

##### **2. The Macroeconomic Context**

5. Growing at about 2 percent, economic activity in Vanuatu in 1995 continued at a relatively slow pace. Most of that growth originated in the export-oriented agriculture sector and in service activities related to tourism. Specifically, an increase in the price of copra and a rise in tourist ship arrivals were the main causes for improved economic performance. In its fiscal operations, the Government has endeavored to avoid deficits in the recurrent budget, leaving development expenditure to be financed from external sources. As in 1994, a small surplus in the recurrent budget was achieved in 1995. However, the surplus veils the substantial underfunding of public services, which are reflected in the shortage of infrastructure facilities, inefficient delivery of services, and backlog in the maintenance of public assets. The opportunity costs of fiscal restraint are high. Deteriorating infrastructure means that restoring the infrastructure to serviceable levels will be more costly than preventive maintenance, and that the financial burden in this regard will be transferred to future generations.

##### **3. The Tourism Sector**

6. Tourism makes a major contribution to the Vanuatu economy. Tourism's share of gross domestic product has fluctuated in the past decade between 12 percent in 1983 and about 25 percent in 1995. Visitor numbers increased by nearly 50 percent between 1990 and 1992. Most of this growth was associated with cruise ships, while hotel occupancy rates have declined. Vanuatu has good potential for further tourism development. It offers physical beauty, a friendly population, cultural diversity, a pleasant climate, and easy access from Australia and New Zealand. Port Vila also has a higher level of retail and other services than most capitals in the South Pacific. Growth in tourist activities would contribute to a general increase in economic activity and provide more opportunities for people to become involved in the supply of foodstuffs and other goods and services.

#### **4. The Environment**

7. Preserving the environment is an important issue for tourism policy that will need to be addressed as a priority if long-term benefits are to be maximized. Pollution of fresh water supplies and near-shore coastal waters is increasing. While the water supply in most villages is considered to be relatively pure, problems of pollution of drinking water are growing in Port Vila and Luganville. The subsurface water supply in Luganville is already contaminated and the lack of control of building activities on the infiltration zone in Port Vila threatens its subsurface supply. In addition to pollution, sewerage and waste management are growing problems in the two main urban centers. Vanuatu still has the opportunity to prevent rather than cure a number of environmental problems; irreparable damage can be avoided.

8. Planning and legislation, followed up by effective monitoring, are essential to contain and reverse this development. Lack of comprehensive environmental legislation restricts the effectiveness of the established environmental agency. Draft legislation that addresses water resources and public health was outlined in Vanuatu's National Conservation Strategy. The Draft Water Resources Act contains guidelines for management of water resources, including protection of water catchments and pollution control. Although the Public Health Act of 1995 addresses the disposal of wastes in public places there are problems in its implementation.

#### **5. The Urban Sector**

9. The principal challenge facing urban administrations in Vanuatu is coping with the present effects of rapid urban population growth and managing urban growth in the future. Port Vila's population, estimated at 28,000, has doubled over the past 13 years, primarily because of migration from the outer islands. The population will double in about 8 years if the current growth rate persists. Luganville, with a present population of 9,200, will double in size in 14 years. Unbridled urban growth is affecting the well-being of the population; the environment; and tourism, Vanuatu's single most important source for economic expansion. The surge in population in urban areas is overburdening physical infrastructure and the financial and human resources involved in the delivery of public services. This is evident in mushrooming slum settlements, dangerous traffic conditions and traffic congestion, deteriorating infrastructure, and environmental pollution. The Government administration is ill prepared to cope with this development. A framework for urban growth management is non-existent and financial allocations to urban administrations have declined in real terms over the past decade, partly as a result of fiscal discipline, but, more importantly, also as a consequence of the Government's inability to mobilize resources where opportunities existed. In this regard, the Government has been lenient in taxing road users and real estate in urban areas and has only recently initiated measures to redress this situation. The main revenue source of the municipalities are property taxes. However, collection is hampered by weak accounting capabilities resulting in low tax collection rates. The annual budget of Port Vila is about \$1.2 million, which is below the minimum level to adequately maintain, let alone to modernize, the assets of the municipality. Central Government grants are occasionally provided to cover specific projects or to make up shortfalls in revenue.

**a. Water Supply**

10. Port Vila's water supply comes from an aquifer adjacent to the Tagabe River, which has adequate capacity to meet projected demand over the next decade. This water supply system was privatized in February 1994 through a management contract with the Union Electric Company Limited (UNELCO), which also supplies electricity to Port Vila and Luganville. The management contract covers a period of 40 years. It provides only limited scope for Government monitoring and control. The utility rates charged by UNELCO in Port Vila are comparatively high by international and regional standards. In Luganville, the water supply system is operated and maintained by the Public Works Department (PWD), and services about 1,200 consumers, of which nearly 90 percent are residential.

**b. Urban Sewage**

11. The relatively small size of the urban population has so far not warranted investments in piped sewerage systems or centralized sewage treatment facilities. Domestic sullage water is disposed of by each household in individual soakaways or seepage pits, and human wastes are routed to septic tanks or pit latrines. In Port Vila, about 65 percent of the population utilize septic tanks for wastewater disposal, and the rest of the population use pit latrines. Similarly, 57 percent of the Luganville population utilize septic tanks for wastewater disposal, while the rest use pit latrines. Package treatment plants serve the central hospital and four large hotels in Port Vila, as well as the Santo Hospital in Luganville. Many individual septic facilities have been poorly designed and constructed, are badly maintained, and provide little effective treatment; hence, effluent discharged into the ground contains significant levels of nutrients and bacteria that quickly percolate to the groundwater and eventually enter the sea, with resulting contamination and pollution. The disposal of sludge is contracted to a private enterprise in Port Vila, while in Luganville it is the responsibility of PWD. As the urban population increases, the levels of point source pollution, groundwater contamination, and the pollution load entering the harbors and lagoons will rise. Three studies on sewage treatment options for Port Vila have recommended a phased approach to sewerage development. All studies have recommended the adoption of a Sanitation Master Plan, which is to examine a range of sewage treatment options for various parts of the town and the coastal areas in the light of operational and cost efficiency.

**c. Urban Roads**

12. Vanuatu has a network of about 1,900 km of roads and tracks on 22 islands, of which 281 km (15 percent) are on Efate and 279 km (15 percent) are on Santo. Only 96 km of urban roads in Port Vila (73 km) and Luganville (23 km) are paved, with maintenance responsibilities spread between PWD (60 km or 63 percent), the two municipalities (30 km or 31 percent), and the local government (5.2 km or 5 percent). Traffic volumes are relatively light, typically less than 1,000 average daily traffic (ADT), except in Port Vila, where ADT may reach 3,000 at peak hours. The national vehicle fleet is about 6,300 vehicles, over half of which have been added in the past six years. About 80 percent of vehicles are on the two main islands: Efate and Santo.

13. The topographic constraints of Port Vila Bay, the adjacent lagoons, and the mountains have resulted in the dominant north-south axis of Port Vila's road network. The

central artery along the waterfront and servicing the central business district is Kumul Highway, but with vehicle numbers doubling over the past six years and the physical constraints of a narrow carriageway, traffic management and congestion are becoming a problem, especially during peak flows. However, outside the downtown area, traffic is well served by the original road network within the established residential areas. The road system in Luganville is less confined by topographic features, is well laid out, and has sufficient capacity to serve present traffic and the growth expected over the next 20 years. Traffic volumes are light. There have been few additions to the original road network, the most significant of which is the four-year-old 1-km bypass around the port area.<sup>1</sup> The only other additions have been minor access roads to new industrial and housing areas.

14. Responsibility for road maintenance is shared between the municipalities and PWD. The maintenance of major thoroughfares and roads of regional importance is the responsibility of PWD, while each municipality is responsible for the remaining paved and unpaved roads within its boundaries. Private contractors are increasingly being used to carry out both routine and periodic maintenance activities on Efate. While PWD is well equipped to undertake effective road maintenance works, the municipalities' capabilities for road maintenance are extremely limited, and consist mainly of mowing and cleaning the road verges. As a result, the maintenance of pavement on municipal roads in both Port Vila and Luganville is largely neglected. After reviewing the responsibility for operation and maintenance (O&M) of the various classes of roads, the Government has decided to transfer the maintenance responsibility for secondary urban roads to PWD.

#### **d. Sector Institutions**

15. Four institutions are involved with the provision of urban services in Port Vila and Luganville—PWD for roads and the Luganville water supply, the two municipal councils for sanitation and some minor roads, and the Ports and Marine Department (PMD) for the Port Vila and Santo Wharf. PWD is one of three departments within the Ministry of Transport (MOT), Civil Aviation, Ports and Marine and Urban Water Supply. PWD has two major functions: (i) maintaining Government infrastructure; and (ii) implementing civil works associated with development projects in infrastructure, buildings, and urban water supply. In this regard, PWD frequently acts as a contractor for other Government departments and collects a fee of 2 percent of the contract value. PWD has three main divisions: the Project Management Unit (PMU), the Subdivisional Unit, and the Administration Unit. PWD has a sanctioned staff strength of 270, of which 245 positions are filled; 65 of these are permanent staff and the remainder are daily labor. PWD's head office is in Port Vila; four subdivisional offices are in Efate, Malekula, Santo, and Tanna.

16. To ensure supply of local technical and professional staff capability within the department, PWD has recently developed a cadet technical training scheme for school leavers. Under this scheme, a school leaver spends one year in PWD as a junior technician, and then attends a one-year basic technical training program at the Fiji Institute of Technology. Following this training, each cadet works alongside experienced technicians for 1-2 years and returns to Fiji for a further year of training. After this, the more promising cadets go overseas to study for

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<sup>1</sup> Built under Loan No. 766-VAN(SF): *Multiproject*, for \$3 million, approved on 5 December 1985.



a diploma or degree, under a bilaterally funded scholarship program. Two or three cadets join the program each year. This program is presently funded by the Overseas Development Administration (ODA) of the United Kingdom (UK) and has about eight participants. Degree and diploma scholarships are also provided by other bilateral agencies. In-service training programs are conducted by the Australian Agency for International Development (AusAID) and other bilateral agencies for nonprofessional staff.

17. PMD is also within MOT, and the Director reports to the First Secretary of MOT. PMD's main responsibility is the operation and administration of the international wharves at Port Vila and Santo, as well as administration of marine functions (regulation, safety, training, and Government shipping). PMD has a staff of 63, of whom 28 are employed in ports activities, and 35 are involved in marine policing and administration. The administrative center is in Port Vila, with an office in Santo. Stevedoring operations at the Port Vila wharf are provided by the Ifira Wharf and Stevedoring Company.

18. Port Vila municipality is responsible for managing urban infrastructure and development within the urban area. It has an elected council and a mayor, and is linked to the National Government through the Ministry of Home Affairs and Local Government. The municipality has a staff of 100, and has six physical work/service units, and six planning/administration units reporting to the Town Clerk. The Luganville municipality is similar in structure to Port Vila and has a staff of 38, of which 12 are administrative positions and 26 daily labor.

## **B. Government Policies and Plans**

19. The overall goals of the Government during NDP3 are to achieve greater economic self-reliance, economic growth, balanced regional development, and human resource development. The Government's focus on fostering the development of outer islands serves two objectives: to diversify the country's tourism industry and to contain the rapid outmigration of the rural population to urban centers, which, in turn, is part of the urban growth management strategy adopted during NDP3. The tourism industry currently centers on Port Vila and the town's dominant role in this regard will not change significantly in the future, if its attraction as a tourist destination can be sustained. The Government is pursuing a two-pronged strategy to meet this condition: It wishes to arrest the rising trend of immigration from rural areas and concurrently to improve the urban living conditions in order to enable expansion of tourism as the country's main engine for economic growth. This is to be achieved through well balanced investments in both rural and urban infrastructure, and through investments to promote human development.

20. The thrust of the Government policy towards improving the urban sector centers on an urban growth management framework that consists of: (i) development of growth scenarios for urban centers; (ii) creation of a planning mechanism that cuts across the current institutional responsibilities; (iii) introduction and better enforcement of environmental and national water resource legislation; (iv) adoption of commercial management practices for selected public utilities; and (v) preservation rather than expansion of public assets through cost-based pricing of services and increased budget allocations for O&M.

### C. External Assistance to the Sector

21. External aid accounts for about 35 percent of GDP and finances virtually all public investments. Of the total external assistance, about 65 percent is in the form of grants. Australia (\$8.8 million), People's Republic of China (\$7.9 million), European Union (\$7.6 million), France (\$7.6 million), Japan (\$3.6 million), and New Zealand (\$3.0 million) were the main donor countries in 1995. External assistance is coordinated by the National Planning Office (NPO) in the Prime Minister's Office. The Bank has assisted the Office in aid coordination.<sup>1</sup> Details of external assistance to Vanuatu are given Appendix 1.

### D. Lessons Learned

22. Between 1986 and 1993, the Bank financed the Multiproject Loan,<sup>2</sup> which included the construction of six wharves, associated feeder roads on the outer islands, and the wharf bypass road in Luganville; reconstruction of nine primary schools; and detailed engineering for Santo Port. This project was cofinanced (\$2 million) by the International Development Association (IDA), and included an attached TA<sup>3</sup> for feasibility studies. Reconstruction and upgrading of the schools was the most successful component.<sup>4</sup> The other subprojects only partly met or failed to meet their objectives. Under the outer island wharf subproject, sites and designs were selected without appropriate consultation with the prospective users, which resulted in lack of ownership of the facilities. All wharves except one are unusable. In addition, construction of the wharves suffered from poor workmanship, use of incorrect materials, and lack of quality control. The road subproject was delayed by inappropriate planning, which caused delays in plant mobilization and procurement of equipment and materials. Diversion of counterpart funds to other projects signalled a change in Government priorities during project implementation. Although the work of the consultants engaged for the Santo Port feasibility and design appeared to be satisfactory, subsequent problems arose requiring a supplementary loan.<sup>5</sup> Problems in project management and administration by the executing agency compounded these difficulties, and the Multiproject was without a project manager for more than two years. The lessons to be learnt from the previous projects are related to (i) project design and engineering; (ii) participation of stakeholders in project formulation; and (iii) construction supervision and quality control. Under the Multiproject, the wharves were designed with little regard to local operating conditions, the underlying cause being the limited involvement of intended users. The Project was formulated with limited participation of the political decision makers. Thus, when the Government changed, a lower priority was accorded

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<sup>1</sup> TA No. 1821-VAN: *Strengthening National Planning Office in Aid Administration*, for \$270,000, approved on 22 December 1992.

<sup>2</sup> Loan No. 766-VAN(SF): *Multiproject*, for \$3.0 million, approved on 5 December 1985.

<sup>3</sup> TA No. 726-VAN(SF): *Appraisal of Subprojects under Multiproject Loan*, for \$270,000, approved on 5 December 1985.

<sup>4</sup> PCR:VAN 19054: *Multiproject Loan*, November 1993.

<sup>5</sup> Loan No. 843-VAN(SF): *Santo Port Project*, for \$5.75 million, approved on 29 September 1987; and Loan No. 1080-VAN(SF): *Santo Port (Suppl.)*, for \$3.4 million, approved on 19 March 1991.

to the Project and insufficient funds made available. Project management was largely ineffective because of shortage of supervising staff on the sites. All these factors have been taken into account in the formulation of the proposed Project.

### **E. The Bank's Sectoral and Country Strategy**

23. Infrastructure bottlenecks and deteriorating environmental and social conditions are rapidly combining to reduce the benefits of urban living. Improving the living conditions in urban centers is therefore important for both general social welfare and sustainable economic growth. A pre-requisite of the Bank's strategy for urban development is an awareness of the interdependence of the various facets which together form the urban environment. Taking an overall view enables formulation of cross-cutting policies, which, in turn, makes specific sector policies more effective. With this approach, an involvement in one sector is likely to generate synergy in overall policy terms. Integrated urban management provides an opportunity for considerably increasing the Bank's effectiveness in addressing the problems of urban agglomeration. The Bank's initiatives in this regard are based on urban-wide physical plans and focus on managing the process of change (rather than just implementing projects). Effective action in one sector will require a strategy which is cognizant of the role of other sectors and which comprises institutional development and training, policy measures, maintenance of infrastructure and equipment, and investment components. Bank assistance will be required for preparation of sector plans and identification and analysis of important issues and policies, as well as supporting project formulation and implementation.

24. The overall objective of the Bank's strategy for Vanuatu is to help generate efficient, sustainable and equitable growth. Within this framework the Bank seeks to achieve three strategic objectives: (i) improving economic efficiency; (ii) alleviating poverty; and, (iii) protecting the environment and conserving natural resources. The Bank's strategy provides for assistance in areas related to human resource development and the social sectors through the provision of technical assistance and follow-on loan projects to address the broad objectives of equity and sustainability. The issue of financial sustainability is a particular challenge in the context of urban infrastructure, because public services have been traditionally perceived as a social benefit with only a nominal user charge heavily subsidized from general revenues. The issue of environmental sustainability in terms of management of resources is very important because of the heavy demand on a comparatively scarce resource. The Bank's strategy addresses these objectives through improvement of the health and living standards of the urban population while contributing to an improved environment and economic growth. Emphasis is being placed on ensuring that incentive structures are adopted to adequately reflect the costs of the services in an equitable manner. Cost recovery and financial sustainability are being emphasized so that public utilities have adequate resources to finance investments and operation and maintenance costs.

### **F. Policy Dialogue**

25. The policy dialogue with the Government commenced with the review of the feasibility study results and continued during Project processing. The overriding concern of the dialogue was to seek a commitment from the Government to establish a sustainable urban growth management framework for the two urban areas of Port Vila and Luganville. In this context, Bank staff heightened the Government's awareness of the interdependence between

urban policies and institutions and of the need for taking an overall view to dovetail policy measures towards addressing the problems created by urbanization. While the policy dialogue covered several sectoral issues, particular attention was paid to those issues considered essential for the sustainability of the proposed Project. Specific issues discussed with the Government included: (i) formulation of a strategy for urban growth management; (ii) legislation and regulations with respect to urban planning and environmental management; (iii) cost recovery and commercial accounting practices for public utilities; (iv) urban road maintenance management; and (v) corporatization of sector institutions.

## **1. Urban Growth Management**

26. Although the scale of urban agglomeration in Vanuatu is small compared to that of the megacities in Asia, the rate of urbanization is as high and the ensuing problems similarly severe. It is expected that the population of Port Vila will double in eight years, and consequently public service and infrastructure development will need to accelerate. It is important to continually identify what developments are required to both satisfy the demands of the community, and maximize the community's contribution to development. In the past, numerous plans have been prepared focusing on particular aspects of urban development. However, they have failed to account for the cross-cutting problems encountered in implementation. These include land and custom issues, coordination among public and private stakeholders, securing of finance and equity between, and ability to pay of all sectors in the urban community. The Bank has succeeded in convincing the Government that an orchestrated approach must be adopted to tackle these concerns. In response, the Government instructed the National Planning Office (NPO) to formulate a strategy for urban growth management. Bank technical assistance will be provided to assist NPO towards this end.

## **2. Legislative Framework for Urban Planning and the Environment**

27. A review of environmental law, undertaken in 1991 under Bank TA<sup>1</sup>, indicated that despite the substantial body of environmental legislation in Vanuatu, major gaps exist in the areas of water resources, waste management, environment management, and planning. The extension of planning control to the littoral zone and the establishment of a legal basis for environmental impact assessment (EIA) are also lacking. Current requirements for EIA have no formal legal status, being only guidelines. There is no legal support for sanitation and water protection zones. However, the Public Health Act was passed in April 1995 and draft legislation exists for water resources. In February 1993, the Cabinet approved the drafting of comprehensive environmental legislation, but no further action has so far been taken. As a result of the policy dialogue with the Bank, the Government has agreed to expedite this process and TA from the Bank will assist the Government in this regard.

28. Urban planning in Vanuatu is governed by the Physical Planning Act (1986). Although physical plans for the urban areas of Port Vila and Luganville, as required under the Act, were prepared in 1987 and 1988, they were never formally adopted. The underlying reason is the lack of consultation among the groups affected by the plans and their unwillingness to endorse them. Building codes and standards exist only in draft form, and need to be formally

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<sup>1</sup> TA No. 1116-VAN: *Environmental Legislation Review*, for \$75,000, approved on 25 January 1989.

adopted to complement the physical plans for the two urban areas because they have direct implications on sanitation and public health. The Government recognizes the need for (i) reviewing, updating and enacting the existing physical planning legislation, including the national building code, and physical plans for Luganville and Port Vila. Action in this regard will be supported by Bank TA, which the Government has requested for this purpose.

### **3. Cost Recovery, Commercialization and Maintenance**

#### **a. Water Supply and Sanitation**

29. Billing and collections for water supply in Luganville are undertaken by PWD on behalf of the Government. In contrast, the Port Vila water supply system was privatized in February 1994 under a 40-year contract with UNELCO.<sup>1</sup> The UNELCO contract provides for possible future management of the Luganville water system, as well as sanitation activities within the two municipalities. In Port Vila, services are provided at relatively high costs<sup>2</sup>, which raised the issue of affordability for the increasing number of low income families moving to the urban areas. In addition, the contract of UNELCO provides only limited scope for Government monitoring of service and cost performance. Pricing policies should, therefore, reflect the capacity of disadvantaged groups to pay for services and subsidies may be required for the poor in order to make essential services affordable. The Government agreed that prior to further privatization it will review the lessons learned from the current arrangements and will revise the regulations in this regard in consultation with the Bank.

30. Luganville has an estimated 1,200 water connections, of which about 87 percent are domestic and 13 percent commercial. Collections, amounting to about \$120,500 annually, are presently about 64 percent of collectibles and these funds are credited directly to the Government's consolidated revenue. Budgets for maintenance and staffing are provided to PWD (about \$95,500 annually), but are not linked to the efficient O&M of the system, need for replacement or upgrading of the system, or the level of collections. Improvements in O&M, and in the management of the utility would significantly reduce nonrevenue water (NRW), which currently accounts for about 70 percent of the total water supply.<sup>3</sup> Technical efficiency could be raised to 70 percent, and recovery of billings increased to 85 percent, reducing overall NRW to about 40 percent. The first step in this direction will be the introduction of commercial accounting practices for the Luganville water supply. TA for this purpose will be provided by a New Zealand ODA-funded water and sanitation engineer expected to join PWD in 1996 and through AusAID staffing assistance. A revised two-part tariff structure, similar to the one currently in operation in Port Vila, will be adopted by December 1997 after the introduction of commercial accounting.

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<sup>1</sup> UNELCO also operates the electrical generation and distribution system in Port Vila and Luganville. The charges for this service are among the highest in the Pacific.

<sup>2</sup> Water connections are generally made at the full cost of connecting the property to the nearest water main. Cost of domestic water, based on 20 cubic meters/month/household, is presently about \$10.05 per month in Port Vila. This compares with about \$2.32/month in Manila and \$6.52/month in Singapore (ADB. 1993. *Water Utilities Data Book*).

<sup>3</sup> NRW is a combination of technical inefficiency and uncollected bills. No systematic data are collected to enable an accurate assessment of the level of NRW. This estimate is based on second quarter 1994 data only.

31. Institutional strengthening of the municipalities, particularly in financial management and improving collections, together with the establishment of reporting and management systems, will be provided under AusAID-financed staffing assistance. Until the municipal bodies are in a position to fully meet O&M of the sanitation facilities, the Government has assured the Bank that it would cover any shortfall in the recovery of O&M costs.

#### **b. Urban Roads**

32. Recognizing the shortfall in road and port maintenance funding, and the need to address domestic resource mobilization to finance O&M expenditures of physical infrastructure for Vanuatu, the policy dialogue addressed the issues of sources of finance, levels of taxes, scope of facilities to be maintained, and responsibility and institutional arrangements for maintenance. Road vehicle license fees and import duties and taxes on vehicles and fuel are the principal road user charges in Vanuatu. The Government is fully committed to the principle that road users should be required to adequately contribute to the recovery of costs caused by them. Taxation of road users through import duties and taxes is relatively high and the scope for further increases is limited. Nonetheless, the Government has recently raised the tax content in the price of gasoline by 6 percent and that of diesel by 100 percent. The Government has assured the Bank that it would keep future road user charges in line with the development of road-usage related costs.

33. In 1993, the budget allocation for road maintenance was only about 25 percent of what is needed.<sup>1</sup> In response to the policy dialogue, the Government has raised funding for maintenance in its 1996 budget by 400 percent and is committed to increase maintenance funding in real terms in future. Maintenance targets and funding requirements will be reviewed annually with a view to reducing the current maintenance backlog and to ensuring adequate maintenance of the roads to be improved under the Project.

34. A review of budget allocation to road maintenance will have to go hand in hand with the envisaged re-alignment of maintenance responsibilities. At present, responsibility for the 95 km of urban road network in Vila and Luganville is divided between PWD and the two municipalities, with PWD presently responsible for about 53 km of the national road network (primary roads), and the municipalities responsible for the remaining 42 km of secondary (access) and tertiary (residential) roads. The two municipalities have neither the funding nor the human resources to maintain the roads under their purview, and, as a consequence, minimal maintenance work is being undertaken. The Government is, therefore, considering to transfer the responsibility for these roads to PWD. Although this step runs counter the Government policy of decentralization, consolidation of maintenance functions within PWD is warranted because the prospect for maintaining the necessary skills within the municipalities is limited given that trained staff is in short supply in all sectors of the economy. As of September 1995, PWD has taken over responsibility for a large part of the secondary network of Port Vila, and negotiations with the Municipality of Luganville about a similar arrangement are ongoing.

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<sup>1</sup> World Bank. 1993. *Pacific Islands: Transport Infrastructure Study*.

#### 4. Corporatization of Sector Institutions

35. Currently, the two main transport sector institutions, PWD and PMD, are part of the Government administration. The Mission examined the need and rationale for separating these agencies from the Government and for creating an autonomous Port Authority and a Road Board. The trade-offs between the assumed benefits from greater autonomy and the cost of administrative fragmentation, do not favor the creation of new sector entities. The relatively small size of the country and the shortage of skills call for consolidation, rather than fragmentation of administrative entities. While the Government appreciates the advantage inherent in self-financing and accountable Government enterprises, a Road Board would not have its own revenues and PWD has already delegated most routine and periodic maintenance to private contractors. A Port Authority would still be heavily dependent on Government financing given the present port traffic and the level of port tariff, which is considered high and has limited potential for growth in port revenues. Nonetheless, the Government gave an assurance to review the financial situation of international port operations and to consult with the Bank on the results as soon as firm information in this regard become available.

### IV. THE PROJECT

#### A. Rationale

36. The populations of Port Vila and Luganville increased dramatically during the 1980s, and the rapid growth is expected to continue. Although these are relatively small urban centers by international standards, the increase in population places considerable pressure on social services, urban infrastructure, transport, and the environment. The road infrastructure, water supply, sewage, and waste management facilities are struggling to cope with the increasing demand. Several informal and poorly serviced low income housing areas have emerged in recent years,<sup>1</sup> and are growing faster than the urban centers as a whole. In the new areas of settlement, urban growth is unplanned, lacking social services and supporting infrastructure, which poses a risk to public health; places significant pressure on the environment; and adversely affects tourism, which is a major economic activity of Vanuatu. The rationale of the Project emanates from the recognition that these concerns are closely linked and therefore must be addressed concurrently by a coherent strategy for urban growth management. The various facets of the Project are consistent with the Bank strategy for the Pacific,<sup>2</sup> and that for Vanuatu.<sup>3</sup>

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<sup>1</sup> These are principally the Freswata, Ohlen, and Seaside areas within the Port Vila municipality, and the Sarakata district in Luganville. The Blacksands area, adjacent to Port Vila, is also growing very rapidly.

<sup>2</sup> *Strategy Paper for the Pacific: Policies and Program for Sustainable Growth*, Office of Pacific Operations, September 1995.

<sup>3</sup> *Country Program Notes 1996-1998*, Office of Pacific Operations, p. 205-212.

## **B. Objectives and Scope**

37. The primary objective of the Project is to assist in the implementation of an urban growth management strategy which will address public health, environmental, and economic concerns. Specific goals are to (i) improve the living conditions and public health of people in the two main urban areas of Port Vila and Luganville; (ii) mitigate the adverse effects of urban growth on the environment and improve natural resource management; and (iii) promote economic growth by enhancing conditions conducive to tourism.

38. The Project will consist of the following three components in the municipalities of Port Vila and Luganville and their immediate environs:

### **1. The Water Supply and Sanitation Component will include:**

- (i) developing a new water source; constructing a new pumphouse and delivery main; repairing and improving the existing pumphouse; and upgrading the distribution network (to include leak detection, metering, improvement of system control facilities, and installation of pressure reducing valves) for the potable water supply system in Luganville;
- (ii) lengthening of the Erakor causeway bridge in Port Vila to enable better flushing of the lagoon sections which are divided by the causeway. This component will address: (a) the environmental concern of lagoon pollution; (b) the health concern emanating from the pollution; and (c) the need to replace the existing bridge which is in a poor state of repair and which is structurally unsafe.
- (iii) provision of small package treatment plants in prime areas of point source pollution in Port Vila.
- (iv) improving surface water drainage in low-lying areas of the Sarakata district of Luganville, to reduce public health risks and alleviate flooding.

### **2. The Urban Roads Component will include:**

- (i) repair and resealing of existing primary and secondary roads in Port Vila and Luganville; and
- (ii) priority traffic management improvements within Port Vila and Luganville based on the results of the urban growth management framework and the ensuing traffic master plans.

### **3. The Port Vila Wharf Component**

- (i) will entail repairing the steel piles, concrete deck, fenders, and other components of the international wharf necessary to extend its useful working life.



39. The Project also includes 95 person-months of consulting services for Project management, preparation of detailed designs and contract documents, construction supervision, and project benefit monitoring and evaluation.

### **C. Technical Justification**

#### **1. The Water Supply and Sanitation Component**

##### **a. Luganville Water Supply**

40. The system was built in the 1940s, and although it was modernized over time, many of the original components are still in use. About 35 percent of the system consists of old galvanized iron pipework, sections of which are undersized, corroded, or cracked, and need to be replaced to reduce leaks. The significant differences in elevation and the lack of pressure reducing valves also cause the low-lying areas to be affected by very high pressures that damage the pipes and cause substantial leakage. The water source is in sedimentary deposits adjacent to the Sarakata River. Although the dug well, 3.5 meters (m) diameter and 6.5 m deep, is in good physical condition, the water level has dropped by about 1.7 m since the well was constructed in 1943, indicating a long-term dewatering of the aquifer. In addition, the water quality is being affected by residential development encroaching on the water protection zone. Chlorination is now required to ensure potable water. System management, both technically and financially, is also weak. About 55 percent of water supplied is lost through leakages and illegal connections, and about 35 percent of water bills issued are outstanding. To overcome these shortcomings, the water source should be relocated, the distribution system repaired to reduce leaks, pressure reducing valves and other control systems installed, and system management improved.

##### **b. Stormwater Drainage in Luganville**

41. The highly permeable soils, coupled with the hilly topography of the higher ground in Port Vila and Luganville, do not require extensive stormwater systems. However, about 50 hectares (ha) of the lower-lying areas of Luganville, on the floodplain of the Sarakata River, are poorly drained and are affected by the tidal fluctuation in the river. This area is densely populated by migrants from outer islands. The natural, meandering tidal creek draining much of this area is obstructed by debris and poorly sited road crossings. This creates drainage problems during heavy rainfall, with water backing up in the creek and flooding the residential areas, including septic tanks and pit latrines. During periods of low flows, water stagnates and provides a habitat for malarial mosquitoes. The drainage system therefore needs to be improved through increasing the channel capacity, straightening its course and removing obstructions, and redesigning and/or relocating critical road crossings.

#### **2. Lengthening of the Erakor Causeway Bridge**

42. The Erakor Lagoon near Port Vila is of considerable attraction to tourists, but is becoming polluted. The construction of the Erakor Causeway has divided the lagoon into two parts. The bridge intersecting the causeway is not wide enough to allow proper flushing of the lagoon sections. As a result, water clarity is reduced and there is some evidence of faecal contamination. Uncontrolled nutrient discharge into the Lagoon is the main source of pollution.

Because the lagoon is poorly flushed, the polluting effects of outflows of sewage, siltation and industrial waste are compounded. The bacterial contamination poses a risk to health and is detrimental to tourism development in the area. Lengthening of the bridge by about 10 m will result in lower overall pollution levels. In addition, the existing bridge is structurally unsafe and in urgent need of replacement for traffic safety reasons.

### **3. Package Treatment Plants for Port Vila**

43. Previous studies on sewage treatment options for Port Vila have identified the most critical sources of pollution. These include the municipal area from Tasiriki to the Le Lagon Hotel draining westwards into the Erakor Lagoon, and the high density, low income housing areas of Blacksands, Freswata, Ohlen, Seaside, and the Central Hospital. Package treatment plants in these areas will reduce the negative environmental and public health impacts of sewage discharge into the lagoons and improve the standard of living in the low income areas.

### **4. Urban Roads**

44. Most roads in Vanuatu were constructed prior to independence, and the majority are more than 20 years old. Because high quality materials are locally available for road construction, the roads are structurally sound, although their bituminous surfaces have become brittle because of age. Periodic maintenance, including resealing, which should be carried out in intervals of about seven years, has not been undertaken systematically. The condition of Luganville's roads is generally fair, although the riding quality is rough due to repeated patching. Priority is being attached to upgrading the 19 km of primary and secondary roads.

45. At the end of 1994, 20 km of roads in Port Vila were resealed by PWD using an international contractor. Funding for this was provided from a local bond issue. The remaining 38 km of primary and secondary roads, although structurally sound, are rough because of repeated patching, and are in urgent need of resealing. The 11.4 km of tertiary paved roads are also in a state of disrepair, but because these are mainly minor roads in residential and commercial areas, resealing is not given high priority. An indicative list of roads proposed for resealing is in Appendix 2.

### **5. Port Vila Wharf**

46. The International Wharf in Port Vila was constructed 22 years ago and serves as the main port of entry for the majority of imports. The wharf structure is 213 m long and 9.1 m wide. It is served by five access bridges, three of which link the wharf to the main transit shed and the other two link the wharf to the general port area. Over time, the wharf and access bridges have deteriorated to a critical state of repair. Chloride penetration of the underside of the reinforced concrete deck structure has caused spalling of the cover concrete and corrosion of the reinforcement. Corrosion of steel piling is also reaching critical levels. Without rehabilitation, the structure is becoming unsafe and its remaining useful life is limited to about five years. The proposed repairs would increase the operational life of the wharf by about 15 years.

## D. Cost Estimates

47. The total cost of the Project is estimated at \$12.8 million equivalent, including physical contingencies, price escalation, and service charge on the loan. The foreign currency cost is about \$9.5 million and the local currency cost is about \$3.3 million equivalent. Appendix 3 provides details of the estimated Project costs, which are summarized in Table 1.

**Table 1: Project Cost Estimates  
(\$ million)**

	Foreign Exchange	Local Currency	Total
<b>Base Cost</b>			
1. Water Supply and Sanitation	3.7	1.0	4.7
2. Urban Roads	1.9	0.9	2.8
3. Port Vila Wharf	1.2	0.3	1.5
4. Consulting Services	1.0	0.2	1.2
5. Land Acquisition	0.0	0.2	0.2
<b>Total Base Cost</b>	<b>7.8</b>	<b>2.6</b>	<b>10.4</b>
Incremental Project Cost <sup>a</sup>	0.2	0.1	0.3
Contingencies and Loan Service Charge <sup>b</sup>	1.5	0.6	2.1
<b>Total Project Cost</b>	<b>9.5</b>	<b>3.3</b>	<b>12.8</b>

<sup>a</sup> Costs incurred by Project Management and annual auditing.

<sup>b</sup> Contingencies: physical, 11 percent (weighted); price, 2.7 percent (foreign) and 5 percent (local).

## E. Financing Plan

48. The Government has requested the Bank to provide a loan of \$10.0 million equivalent from the Bank's Special Funds resources to finance all foreign expenditures, including the loan service charge, and a portion of the local expenditures. Local cost financing is justified by fiscal and monetary policy considerations, including adherence to budget and money supply targets, and reduction of inflation. AusAID has agreed to provide a grant of about \$0.4 million equivalent in foreign exchange to finance the cost of the Project Management Engineer for the duration of the Project. The Government has given an assurance to provide the remaining \$2.4 million from its own resources. The terms of the Bank loan include a repayment period of 40 years, with a grace period of 10 years and a service charge of 1 percent per year. Table 2 summarizes the financing plan.

**Table 2: Financing Plan  
(\$ million)**

Source	Foreign Exchange	Local Currency	Total	Percent of Total
Bank	9.1	0.9	10.0	78
Government	0.0	2.4	2.4	19
Cofinancier (AusAID)	0.4	0.0	0.4	3
<b>Total</b>	<b>9.5</b>	<b>3.3</b>	<b>12.8</b>	<b>100</b>

## **F. Implementation Arrangements**

49. The Director of PWD, the Executing Agency, will be the Project Director. The municipalities, PMD, and NPO will be involved in Project design and implementation. Technical staff from the municipalities and PMD will be seconded as required to PWD's PMU during Project implementation to gain experience for future O&M of Project facilities. The municipalities represented in the Project Coordinating Committee (PCC) by the town clerks will be actively involved in Project implementation.

### **1. Project Management**

50. The Project Director will be assisted in Project management by a full-time engineering consultant who will be designated as the Project Management Engineer (PME) and will be responsible for day-to-day activities and administration of the Project. The PME will be assigned to PWD's PMU. On behalf of the Project Director, the PME will also oversee and report on the activities of the consultants engaged to assist with the design and supervision of the Project components.

51. The First Secretary for Finance will be the Project Coordinator, and will be responsible for overall Project coordination. The PCC will be established for the Project and chaired by the Project Coordinator. The Project Director will act as Secretary of the PCC; the other members will be the Director of Finance, Director of NPO, Director of PMD, Director of Physical Planning, Director of Health, Principal Environment Officer, and the town clerks of Port Vila and Luganville. The PCC will meet quarterly to plan, schedule, monitor, and periodically review the Project. The Project Coordinator will report to the Minister of Finance on a quarterly basis to seek guidance and assistance on the various policy issues and actions. The Project organization charts are shown in Appendix 4.

### **2. Implementation Schedule**

52. The implementation period of the Project will be approximately five years, and it is expected to be completed by 31 December 2001. The rehabilitation works on urban roads, and the Port Vila wharf will be implemented during the first two years of the Project. Implementation of the water supply and drainage improvements in Luganville will begin in the second year. Appendix 5 provides details of the schedule for Project implementation.

### 3. Procurement

53. Procurement of civil works, goods, and services to be financed by the Bank will be undertaken in accordance with the Bank's Guidelines for Procurement. Details of contract packages are given in Appendix 6. Because of the contract sizes and Vanuatu's remoteness, only a limited number of foreign contractors will be interested in bidding for the civil works packages. Under the urban roads and Port Vila wharf components, specialized foreign contractors will be needed for the plant and equipment requirements and because of the technical nature of the works involved. Procurement of civil works for the road rehabilitation and wharf repair components will therefore be awarded to suitably experienced and financially capable contractors on the basis of international shopping. Award of the contracts will be subject to prior Bank approval of the list of contractors and draft contract documents, and the evaluation of bids received. Under the Erakor bridge and water supply and sanitation component, where local contractual capability exists, procurement of civil works will be awarded to prequalified contractors on the basis of local competitive bidding, in accordance with procedures acceptable to the Bank. For small civil works that may be undertaken most effectively by Government departments, force account procedures may be used up to an aggregate amount of \$1 million equivalent. Direct purchase procedures may be used for the purchase of equipment and materials up to an equivalent of \$1 million, in the aggregate.

### 4. Consulting Services

54. About 95 person-months of consulting services will be required to assist in Project implementation. The consultants will be engaged in three separate packages. The first package will comprise the PME for 60 person-months, to be recruited by AusAID in consultation with the Government and the Bank. The second package will comprise 26 person-months of specialist services in design and supervision activities for the roads, sewage, water supply and sanitation, and BME components (of which about 10 person-months will be internationally recruited and 16 person-months will be domestically recruited expertise) to be provided by an international consulting firm. The third package will comprise 9 person-months of internationally recruited consultants for design and construction supervision of Port Vila Wharf, to be provided by an international consulting firm. These latter two firms of consultants will be engaged by the Government in accordance with the Bank's *Guidelines on the Use of Consultants*. Selection of the consultants will be initiated by PWD. Outline terms of reference for the consultants are given in Appendix 7.

### 5. Reports, Accounts, and Audit

55. Separate accounts will be established and maintained by the Government for each component of the Project. Such accounts will be audited annually by auditors acceptable to the Bank, and copies of the audit reports, together with certified copies of the financial statements, will be submitted to the Bank not later than nine months after the close of the fiscal year to which they relate.

56. Quarterly reports will be prepared by PWD on the progress of Project implementation and will be forwarded to the Bank on a timely basis. A Project completion report will be prepared within three months of Project completion by PWD, and submitted to the Bank shortly thereafter.

## 6. Advance Action and Retroactive Financing

57. The Government has requested and the Bank has approved advance action and retroactive financing for (i) engagement of the PME and other consulting services; and (ii) procurement of civil works, equipment, and materials for the urban roads component. The limit of retroactive financing will be the equivalent of \$1 million (about 10 percent of the proposed loan amount). The Government has been advised that approval of advance action and retroactive financing does not commit the Bank to financing the Project, and that the procurement of goods and services must be conducted in accordance with the Bank's guidelines.

## 7. Benefit Monitoring and Evaluation

58. BME will be undertaken for each Project component to ensure that Project facilities are managed efficiently and that the benefits are maximized. The BME specialist, with the assistance of the PME, will help NPO develop a comprehensive BME system. The BME activities will have strong community involvement and will cover public health and socioeconomic changes, environmental improvements, and improvements in municipality operational efficiency.

59. BME activities, including the establishment of benchmark information through initial physical and socioeconomic surveys, data collection, and analysis, will be the responsibility of NPO. BME surveys will be repeated at regular intervals to determine changes in key indicators on health, environment, socioeconomic, and physical conditions. NPO will submit a detailed implementation plan for monitoring benefits and for preparing benchmark information for the Bank's review and concurrence within six months of loan effectiveness. The BME plan will be prepared and implemented in accordance with the Bank's *Handbook on Benefit Monitoring and Evaluation*. Annual reports on BME will be furnished to the Bank by NPO throughout Project implementation.

## 8. Midterm Review

60. As the Project is fairly large and complex, a midterm review will be undertaken about two years after loan effectiveness to enable the Government and the Bank to assess Project progress and the continuing relevance of Project components, and, if required, to make appropriate adjustments to the scope and design. The review will take special note of the recommendations of the Sanitation Master Plan for Port Vila in reviewing the scope of the sanitation component. The review will focus on the Project scope and implementation status, sustained O&M, progress on policy issues, beneficiary participation, local resource mobilization, and environmental impact.

## 9. Operation and Maintenance

61. PWD will be responsible for the O&M of primary and secondary roads and Luganville water supply, PMD will be responsible for Port Vila wharf, and Luganville municipality will be responsible for the drainage component. The institutional arrangements for O&M of the Port Vila sewerage system will be determined after completion of the Sanitation Master Plan. The Government has assured allocation of adequate budgets for regular and special maintenance of the Project components, as necessary, and for sustained O&M of facilities as described in detail in the policy dialogue. The status of the O&M budget will be reported in the quarterly progress reports to enable monitoring of these assurances.

## **10. Beneficiary Participation**

62. Beneficiary participation in the implementation of the Project will be ensured through the active participation of the town clerks of Port Vila and Luganville municipalities in the PCC on a regular basis. The town clerks will be required to report regularly to their elected municipal councils, to brief council members. On an annual basis, the Project Director will organize public meetings in Port Vila and Luganville to discuss Project progress and to solicit public input into the decision-making process. In particular, representatives of the National Council of Chiefs, Vanuatu National Council of Women, National Council of Youth, Vanuatu Christian Council, and Vanuatu Association of Non-Government Organizations will be invited to attend the meetings. Public meetings will also be held during the preparation of the Sanitation Master Plan and the drafting of environmental and planning legislation under the attached Bank TAs.

## **11. Complementary Programs**

63. AusAID and NZODA have agreed in principle to provide complementary TA in institutional strengthening and capacity building. These activities will be undertaken within their present programs of bilateral assistance and will specifically target areas necessary to support the Project goals.

64. The areas to be funded by AusAID will include (i) a long-term environmental water quality monitoring program of surface, ground, and coastal waters in and adjacent to the two municipalities through the Department of Geology, Mines and Resources; (ii) expertise to help the two municipalities prepare and maintain commercial accounts, and improve property tax collection; and (iii) expertise to assist PWD and/or the municipalities to establish commercial accounting systems for water supply (in Luganville) and to operate sewage collection and treatment systems. NZODA will provide (i) expertise for TA to PWD in urban water supply and sanitation; (ii) overseas technical training opportunities for PWD cadets to enable 2-3 cadets to be absorbed into the program each year; and (iii) overseas diploma and degree courses for PWD staff. NZODA's training opportunities are included in its present program of assistance to Vanuatu.

## **12. Land Acquisition**

65. Land is required for (i) rights-of-way for road improvements in Port Vila and Luganville; (ii) rights-of-way and land acquisition for the water supply source and transmission line for the Luganville water supply component; (iii) rights-of-way and land acquisition for drainage improvements in Luganville; and (iv) rights-of-way for the first phase of the reticulated sewerage system in Port Vila, and land acquisition for necessary secondary treatment and disposal facilities. None of these Project components will require resettlement of persons presently occupying the land.

66. The Physical Planning Act of 1987, the Land Acquisition Act of 1992, and the Urban Land Act of 1993 give the Minister of Lands the right to declare physical planning areas, control the type of development, purchase and/or acquire custom or leasehold lands, and create or extend urban areas. Thus, the Government has given assurances that the land required for the Project will be made available on a timely basis.

## **G. The Executing Agency**

67. The Executing Agency, PWD, will be responsible for implementing the civil works, including detailed design, construction supervision, and Project management for all physical works (water supply, sewage, roads, and wharf). PWD is implementing a number of externally funded projects and has gained appreciable experience in project implementation. It has implemented two Bank projects, although its professional and technical capabilities need to be strengthened. This is to be achieved by the provision of consulting services financed under the loan and by complementary staff training programs.

## **H. Environmental and Social Measures**

### **1. Environment**

68. An initial environmental examination for the Project was undertaken under the feasibility study and indicates that the Project is expected to have an overall beneficial environmental impact (see Appendix 11). As a result of the increase in population, the municipalities will inevitably expand into sensitive environmental areas. For example, concern has been expressed about the development of unplanned settlements within the water protection zones and development within the coastal zone. However, the positive impacts of planning future urban development, including road maintenance, water supply, and sanitation, as envisaged under the Project, outweigh any expected negative impacts (which, if any, are expected to be relatively minor and temporary).

69. In Project design, a strong emphasis has been placed on preserving the environmental and aesthetic quality of the two urban areas through the introduction of a water quality monitoring program, and TA to the Physical Planning Unit, Environment Unit, and Attorney General's Office to facilitate the adoption of a legislative framework, regulations, codes, and physical plans, and their enforcement. The engineering designs and construction methods employed will pay due attention to environmental aspects such as erosion, drainage, and contamination of water bodies. For all types of construction, excavation, backfilling, etc., the bedrock and soil do not pose any restrictions. The limestone bedrock is highly stable and the shallow, well-structured soil is not prone to wind or water erosion.

70. The road rehabilitation and traffic management components will minimize traffic congestion, and thus pollution, in the center of Port Vila and Luganville, and improved road safety will also reduce the frequency and severity of road accidents. The wharf repair in Port Vila will ensure continued, safe operation of the port and the risks associated with improper handling of materials will be lower than if the unrepaired wharf became unusable and alternative port facilities were not available.

71. The water supply component will ensure the continued provision of a safe, potable water supply for the residents of Luganville, and reduce the potential for contamination of the source. The drainage component in Luganville will (i) reduce the flooding of residential properties and septic tanks/pit latrines, thus improving public health; (ii) eliminate the breeding areas for mosquitoes; and (iii) reduce the risks of waterborne diseases associated with poor drainage. The proposed sewerage improvement for Port Vila will have beneficial public health and environmental effects on the waterbodies adjacent to the urban area, and particularly the



Ekasuvat lagoon, by reducing the nutrient and coliform content of water presently entering the natural ground and surface water systems from individual septic tanks, pit latrines, and package treatment plants.

## **2. Social Analysis**

72. Beneficiary participation in identifying and selecting the components under the Project has been a key principle in the preparation of the Project. Field surveys were conducted to ascertain from the local people their concerns about services provided and problem areas to be addressed. No involuntary resettlement is required, as there are no settlers within the legal boundaries of the infrastructure facilities to be rehabilitated under the Project.

### **I. Technical Assistance**

73. The Government has requested that the Bank provide two TA packages. One TA will be for an Urban Growth Management Strategy for Port Vila and will consist of the following two components:

- (i) a framework for urban planning, which will consist of chief parameters and policies which will govern future economic and social development in Port Vila and which will assist the Government in the identification of the needs of urban areas; methods for implementing the strategy; and means to manage the growth process. This component will involve 6 person-months of two internationally recruited consultants in the fields of urban planning policies and administration;
- (ii) a legislative framework for urban planning and the environment, which will assist the Government to review, draft, adopt, and enforce environment, water resources, and planning legislation. This component will involve 12 person-months of three internationally recruited individual consultants in the fields of urban legislation, physical planning and environment.

74. The first component focuses on an analysis of the chief parameters and policies which will govern future economic and social development in urban centers. Among these parameters are the role of tourism for the economy, government policies for internal population migration, ecological, and environmental constraints. An assessment of different urban development scenarios is a prerequisite for and must precede subsidiary planning exercises, such as the proposed legislative review and the physical plan, which are part of the second component.

75. The total cost of the TA is estimated at \$650,000 equivalent, including \$560,000 in foreign exchange and \$90,000 equivalent in local currency. The Government has requested TA in the amount of \$600,000, which will be financed on a grant basis. This TA will be charged to the Bank-funded TA program. The Executing Agency for this TA will be the NPO. Terms of reference and cost estimates are given in Appendix 8.

76. The second TA is for the preparation of the Sanitation Master Plan for Port Vila. Ten person-months of consulting services will be provided by a firm of consultants, comprising both international and domestic expertise in sanitation engineering and utility finance and

management. The team will assist the Government to prepare a 20-year master plan. The total cost of this TA is estimated at \$370,000 equivalent, including \$320,000 in foreign exchange and \$50,000 equivalent in local currency. The Government has requested the Bank for TA in the amount of \$360,000 equivalent, which will be financed on a grant basis. The Executing Agency for this TA will be PWD. Terms of reference and cost estimates are given in Appendix 9.

77. The consultants for both TAs will be engaged by the Bank in accordance with the Bank's *Guidelines on the Use of Consultants*. The Government has agreed to fund a portion of the local currency costs from its own resources.

## V. PROJECT JUSTIFICATION

78. The Project will have wide-ranging economic, social, institutional, and environmental benefits. Improving the existing infrastructure will result in more efficient and cost-effective utilization of capital stock, as well as enhancing quality of life and public health, and mitigating adverse environmental developments. Consequently, the current attractions of Port Vila and Luganville will be preserved, promoting tourism and tourist-related service activities, thereby contributing to economic growth. The TA projects will improve institutional management performance, as well as provide the framework for long-term sustainable economic development of the main urban areas of Port Vila and Luganville.

79. Rehabilitation and improvement of the primary and secondary urban road network will reduce the extent and frequency of routine maintenance, and of vehicle operating costs. Improved traffic management will also improve traffic flow, congestion, and road safety, and reduce the likelihood of vehicle and pedestrian traffic-related accidents.

80. Improvements in the Luganville urban water supply will generate significant public health benefits through the provision of a safe, potable water supply, replacing a depleting and contaminated existing source. Benefits will also result from improved distribution efficiencies by reducing water losses, improving overall resource utilization. Institutional benefits will result from improved management and financial systems, in particular the introduction of enterprise accounting practices, improved collection procedures, and a two-part tariff structure that will encourage appropriate demand-side management responses by consumers.

81. Improved channel capacity in the existing floodplain waterway in Luganville will alleviate annual flooding that currently results in physical damage to property and infrastructure, disrupts access, and creates public health concerns with ponded contaminated water. This component will therefore improve the environmental conditions in the area and reduce both public health risks and private and public costs from flood damage.

82. The Project will develop and strengthen Vanuatu's legal and institutional framework to provide for the sustainable development and management of resources in the urban environment. Project and TA activities will assist in formalizing the urban planning process, as well as finalizing and adopting legislation needed for the environment, public health, water resources, and physical planning. A national building code and associated planning bylaws will be promulgated. Training and institutional development, undertaken as complementary activities

implement and manage municipal service delivery and planning functions in a more cost effective and efficient manner.

83. Rehabilitation of Port Vila wharf will extend its operational life and provide continuous and safe berthing facilities for international cargo and tourist traffic. The major benefits from this component will be reduced risk of structural failure within the next 5 years, thus increasing the working life of the existing facility by up to 15 years, during which time a long-term strategy for port development can be planned and implemented.

## **A. Financial and Economic Analysis**

### **1. Tariffs and Subsidies**

84. Public services in Port Vila are not explicitly Government subsidized. Power and water supply are provided by UNELCO on a profitable basis and the municipality is required to operate on a balanced budget. However, budget appropriations have been inadequate to ensure maintenance of assets and better delivery of essential services. Revenue of Luganville municipality has consistently been insufficient to fully cover expenditure on service provision and administration. Despite grants from the central Government of about \$80,000 annually, the municipality has accumulated losses of \$240,000 as of June 1995.

85. The urban water supply in Luganville is operated by PWD, and the billing revenue (1995 budget of \$142,000) is more than adequate to cover cash operating expenses of about \$96,000. This revenue is, however, remitted to the Government treasury. Actual expenditures on system maintenance are less than what is required to adequately maintain the system, and there is no recovery of sunk capital cost. Implementation of the Project is anticipated to improve system operational efficiencies and increase net revenues. Monitoring of revenues and expenditures through commercial accounting will allow more accurate budgetary projections and allocations for system maintenance. In addition, the introduction of a two-part tariff structure and graduated tariffs based on consumption will assist in demand-side management and improve resource management.

86. With respect to roads, road users contribute an estimated \$6.5 million to consolidated revenue, primarily through customs duties, services taxes and taxes on fuel, and vehicle license fees. Together with the recent increase in taxes on diesel and gasoline, this amount adequately recovers road usage related costs. However, the Government's allocations to PWD and the provinces, together with municipal expenditure, has been only about \$2.7 million annually. The Government in its 1996 budget has taken rigorous action to eliminate the gap between revenues and expenditures for roads.

87. The current level of port charges, which is high by international standards, is insufficient to recover operating costs and depreciation. In the absence of adequate accounting, there is no basis to determine the incidence of specific costs, let alone to establish cost and revenue centers. The Government has given an assurance to address this issue in the context of the review of its international port operations.

## 2. Financial and Economic Assessment

88. Economic and financial analyses of the various Project components are detailed in Appendix 10. Economic benefits accruing from the resealing expenditure within the urban road component derive from a combination of saved routine maintenance costs and reduced vehicle operating costs, taking into account the level of ADT on the 43 road sections targeted for resealing under the Project. As with most road rehabilitation projects, the economic viability of this component is robust, with an overall economic internal rate of return (EIRR) estimated at 19.8 percent.

89. Development of an alternative supply source for the Luganville urban water supply is necessary for the continued availability of a safe, potable supply for the town, and is the most cost-effective option investigated. About half of the component cost is for upgrading the distribution system, and the financial internal rate of return (FIRR) for this expenditure has been estimated on the basis of projected technical and management performance with and without the Project. With reduced technical losses (from 58 to 30 percent) and an increased collection rate (from 65 to 85 percent), this investment has an estimated FIRR of 10 percent. Should upgrading costs be 10 percent greater than anticipated, the FIRR falls to 8.8 percent, as will occur if collection efficiencies reach only 80 percent compared with a target of 85 percent.

90. The Sarakata and Solway floodplain areas within Luganville cover about 50 ha and contain around 338 households, or just under 30 percent of the town's population. The EIRR from averted flood damage to households resulting from implementation of the drainage component is around 4 percent, but this does not reflect the significant environmental and public health benefits that will result from improved drainage in this locality.

91. Repair of the Port Vila wharf is anticipated to generate economic benefits from extending its operational life and deferring the time at which investment will be required for a new facility. The current life of the facility without rehabilitation is assumed to be about five years, but remedial works will extend this by a further ten years. The investment in these remedial works is estimated to generate a net present value (NPV) of \$0.37 million at a discount rate of 10 percent,<sup>1</sup> and sensitivity tests show that as long as rehabilitation enables capital expenditure for a new wharf to be deferred by at least nine years, the component generates a positive NPV at a 10 percent discount rate.

## 3. Project Risks

92. Several risks associated with Project implementation and sustainability have been identified and assessed during Project preparation, including (i) inadequate capacity of PWD to implement the Project; (ii) inability of local contractors to carry out all Project works; (iii) inability of PWD, PMD, and the municipalities to ensure the sustainability of Project components; (iv) the weak legal and regulatory framework for urban planning and environmental management; and (v) change in Government priorities.

93. These risks have been addressed as follows:

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<sup>1</sup> NPV analysis is used because solution of the EIRR computation has multiple roots.

93. These risks have been addressed as follows:

- (i) The capacity of PWD to implement the Project will be strengthened through consulting services for Project management and for design and construction supervision to supplement the existing resources of PWD.
- (ii) Specialized civil works, including the rehabilitation of Port Vila wharf, will be procured through international shopping to ensure that contractors are adequately prequalified to carry out these works.
- (iii) Institutional strengthening and capacity building will be undertaken through complementary programs of AusAID and NZODA, which will include training and staffing assistance in water supply and sanitation engineering for PWD; in finance and management for PWD (for Luganville water supply); and for the municipalities (generally improving accounting and reporting); and in town and traffic planning. The proposed TA will assist PWD in preparing a long-term Sanitation Master Plan.
- (iv) The legal and regulatory framework for urban planning and environmental management will be strengthened under the legislative TA.
- (v) The risk that a change in Government may reduce the priority of and Government funding for the Project is minimal. During Project processing, the Government changed and both the previous and the subsequent Government have endorsed the Project.

## **B. Social Dimensions**

94. A socioeconomic study carried out as part of the feasibility study, and strengthened using a staff consultant during appraisal, demonstrates the support of all segments of society for the Project, although implementation of cost recovery mechanisms for urban services needs to include very careful consideration of the access to these services by low income groups. This will be specifically addressed under the Sanitation TA.

95. The social impact of the Project is expected to be generally positive and is aimed at all sectors of the community. Public health and safety will be enhanced by improved drainage, solid waste management, roads and traffic management. Employment opportunities will be created both for men and women, during construction of the facilities and through provision of funds for proper, ongoing O&M.

96. The provision of water supply and sewerage will result in public health improvements benefiting all sectors of society, including men, women and children, through a reduction of working and school days lost due to illness.

## **VI. ASSURANCES**

97. The Government has given the following assurances, in addition to the standard assurances, which have been incorporated in the legal documents.

### **A. Legislative Framework for Urban Planning and the Environment**

98. By 31 December 1997, the Government has agreed to (i) review, update, and present physical planning legislation, regulations, and the national building code for consideration of Parliament, and ensure adoption of the draft physical plans by the municipalities; (ii) draft and present legislation on water resources and environmental impact assessment for consideration of Parliament; and (iii) develop new environmental management legislation to streamline the monitoring and enforcement of environmental and natural resources management legislation currently in place, for consideration of Parliament.

### **B. Provision of Municipal Services**

99. With regard to the provision of municipal services, the Government has agreed to (i) require the municipalities of Port Vila and Luganville to prepare annual accounts in accordance with the Municipalities Act, by 31 December 1997; (ii) implement commercial accounting for Luganville water supply, by 31 December 1997; and (iii) adopt a revised two-part tariff structure for Luganville water supply (similar to the tariff structure currently in place in Port Vila) by 30 June 1997.

### **C. Operation and Maintenance**

100. The Borrower has agreed that, starting 30 June 1997, PWD will enter into arrangements with Port Vila and Luganville Municipalities covering the responsibility for the maintenance of the bituminous surfaces of all primary (national) and secondary (access) roads.

### **D. Financial Arrangements**

101. The Government will, by 30 June 1997, examine its road user tax policies in consultation with the Bank and ensure that user charges are adjusted periodically in accordance with inflation and international prices in order to maintain such charges at current levels in real terms.

102. The Government has agreed to ensure the allocation of adequate funds for road maintenance and, in consultation with the Bank, to determine annual increases required for its road maintenance budget in real terms, taking into consideration the additional municipal roads put under the jurisdiction of PWD.

### **E. Port Operations**

103. In regard to port operations, the Government has agreed, by 30 June 1998, to examine its international cargo and passenger operations, including its tariff policies, and agree with the Bank on appropriate organizational arrangements and tariff policies to ensure that port services are delivered in an efficient and cost-effective manner.

**F. Land Acquisition**

104. The Government will ensure that PWD and/or the municipalities take appropriate action to acquire, prior to the scheduled start of civil works under the Project, all land and rights in land and water required to undertake the Project works.

**VII. RECOMMENDATION**

105. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Bank and recommend that the Board approve the loan in various currencies equivalent to Special Drawing Rights 6,913,000 to the Republic of Vanuatu for the Urban Infrastructure Project, with a service charge at the rate of 1 percent per annum and with an amortization period of 40 years, including a grace period of 10 years, and such other terms and conditions as are substantially in accordance with those set forth in the draft Loan Agreement presented to the Board.

MITSUO SATO  
President

4 June 1996

## APPENDIXES

<b>Number</b>	<b>Title</b>	<b>Page</b>	<b>Cited On (page, para)</b>
1	External Assistance to Vanuatu	30	7, 21
2	Indicative List of Roads Proposed for Resealing	31	15, 45
3	Detailed Cost Estimates	32	16, 47
4	Project Implementation and Organization Charts	33	17, 51
5	Implementation Schedule	35	17, 52
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7	Outline Terms of Reference for Consulting Services	37	18, 54
8	Urban Growth Management Strategy for Port Vila - Terms of Reference	42	22, 75
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10	Economic and Financial Analysis	52	25, 88
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**EXTERNAL ASSISTANCE TO VANUATU <sup>a</sup>**  
**(\$ million)**

	<b>(Annual Average) (1992/1994)</b>		<b>1995/96 <sup>c</sup></b>	
	<b>Loans <sup>b</sup></b>	<b>Grant</b>	<b>Loans</b>	<b>Grant</b>
<b>BY MAJOR DONOR:</b>				
<b>Multilateral Assistance</b>				
Bank	0.88	0.59	2.68	0.29
European Union	-	2.28	-	3.32
STABEX	-	0.98	-	4.37
UNDP, UNICEF, UNFPA, WHO	-	1.76	-	1.82
IMF	-	1.46	-	1.00
World Bank	-	-	-	0.30
Others	-	0.22	-	-
<b>Total</b>	<b>0.88</b>	<b>7.29</b>	<b>2.68</b>	<b>11.10</b>
<b>Bilateral Assistance</b>				
AusAID	-	7.91	-	8.81
Canada	-	0.15	-	0.26
PRC	0.25	-	7.87	-
France	0.22	4.41	2.26	5.33
Japan	-	2.94	-	3.56
New Zealand	-	2.69	-	3.26
Switzerland	-	-	-	3.09
United Kingdom	-	3.15	-	2.41
US Peace Corps	-	0.12	-	0.56
<b>Total</b>	<b>0.47</b>	<b>21.37</b>	<b>10.13</b>	<b>27.28</b>
<b>Grand Total</b>	<b>1.35</b>	<b>28.66</b>	<b>12.81</b>	<b>38.38</b>
<b>BY SECTOR:</b>				
Energy	0.12	2.03	1.44	2.77
Finance	-	0.79	5.94	1.09
Industry / Minerals	-	0.10	-	0.14
Multisector / Others	-	4.12	-	3.66
Natural Resources / Agriculture	-	4.81	-	6.60
Social Infrastructure	1.12	13.03	6.43	17.90
Transport and Communications	0.11	3.78	-	5.19
<b>Total</b>	<b>1.35</b>	<b>28.66</b>	<b>13.81</b>	<b>37.35</b>

IMF = International Monetary Fund; STABEX = Commodity Export Stabilization Fund

UNFPA = United Nations Population Fund

UNICEF = United Nations Children's Fund; WHO = World Health Organization

<sup>a</sup> on commitment basis

<sup>b</sup> on drawdown basis

<sup>c</sup> estimates

## INDICATIVE LIST OF ROADS PROPOSED FOR RESEALING

Road	Class	Length
<b>PORT VILA</b>		
<b>A. PRIMARY ROADS</b>		
Elluk Road (Pango Jct - Jetty)	I	0.50
Emile Street	I	0.18
Kumul Highway: Trader Vicks-Bouganville Rd	I	0.68
Kumul Highway: Bouganville-Post Office	I	0.40
Malapoa Road	I	0.60
Mele Road	I	9.08
Erakor Road	I	5.20
Rue de Paris	I	0.44
Pierre Lammy St: Bouganville-Montfort	I	0.32
Sokabo-VMF-Champagne	I	1.78
Wharf Road	I	1.82
Subtotal (A)		21.00
<b>B. SECONDARY ROADS</b>		
Ohlen-VMF	II	1.08
Agathis Road	II	1.99
Avenue de Stade	II	1.47
Base Hospital Street (Connaught Street)	II	0.50
Carnot Street	II	0.19
Ch. Kalsakau Street	II	0.45
Cornwall Street	II	0.45
Cpt Cook Avenue	II	1.15
Cumberland St	II	0.26
Fleming Street	II	0.09
Lycee-Cemetery-Champagne	II	1.10
Manples-Ohlen Road	II	1.25
Melcofe Road	II	0.27
Pango Road	II	1.75
Pasteur Street	II	0.20
Route Anabrou	II	0.49
Rue Andre Ballande	II	0.24
Rue d'Auvergne	II	0.35
Rue de Picardie	II	0.64
Rue Emmanuel Brunet	II	0.68
Rue Henri Ohlen	II	0.54
Rue Laperouse	II	0.23
Rue Maurice Miltride	II	0.68
Wales Street	II	0.62
Subtotal (B)		16.67
Subtotal (A+B)		37.67
<b>LUGANVILLE</b>		
<b>C. PRIMARY AND SECONDARY ROADS</b>		
Higginson Blvd	I	1.90
St. Michel Road	I	5.00
Delegations St	I	1.00
Canal St	I	2.80
Airport Road	I	1.20
Gen. Rose/Surunda	I	4.70
Ave Pasteur	II	0.75
de Gaule/Churchill	II	1.52
Subtotal (C)		18.87
<b>Total</b>		<b>56.54</b>

Note: Class I - primary roads  
Class II - secondary roads

Source : ????

**DETAILED COST ESTIMATES**  
(\$ million equivalent)

Item	Foreign Exchange	Local Currency	Total
<b>A. Base Costs</b>			
1 Water Supply and Sanitation			
i. Water Supply (Luganville)			
Civil Works	0.70	0.25	0.95
Equipment and materials	0.18	0.02	0.20
ii. Sanitation (Port Vila)			
Civil Works	1.75	0.63	2.38
Equipment and materials	0.36	0.04	0.40
iii. Public Health (Luganville)			
Causeway and Package Plants	0.28	0.10	0.38
Equipment	0.09	0.01	0.10
2 Rehabilitation and Improvement of Urban Roads			
i. Rehabilitation of Urban Roads			
Civil Works	1.44	0.56	2.00
ii. Improvement of Urban Roads			
Civil Works	0.48	0.28	0.76
3 Port Vila Wharf			
Civil Works	1.20	0.30	1.50
4 Consulting Services			
Project Engineer	0.48	0.12	0.60
Design and supervision	0.51	0.11	0.62
Benefit Monitoring	0.06	0.02	0.08
5 Land Acquisition <sup>a</sup>	0.00	0.23	0.23
Subtotal (A)	7.53	2.67	10.20
<b>B. Contingencies</b>			
Physical Contingency <sup>b</sup>	0.82	0.30	1.12
Price Contingency <sup>c</sup>	0.41	0.30	0.71
Subtotal (B)	1.22	0.60	1.82
<b>C. Loan Service Charge</b>	0.36	0.00	0.36
<b>Total</b>	<b>9.11</b>	<b>3.27</b>	<b>12.38</b>
<b>Percent</b>	<b>74</b>	<b>26</b>	<b>100</b>

Note: Totals may not add exactly due to rounding.

<sup>a</sup> Estimated at 5 percent of cost of civil works (except Port Vila Wharf and Rehabilitation of Roads)

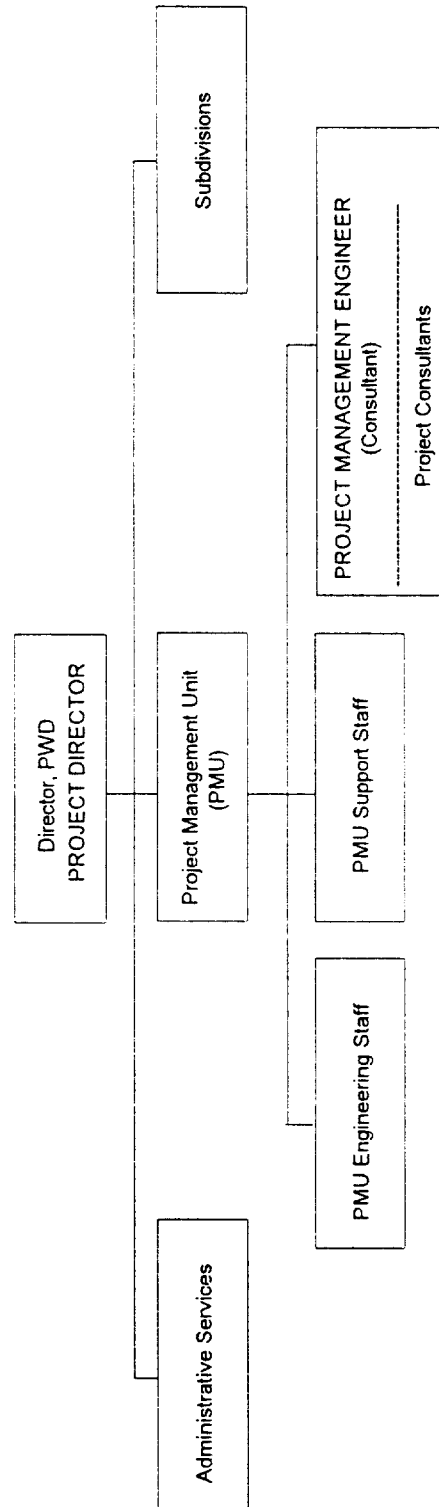
<sup>b</sup> 11 percent physical contingency (weighted)

<sup>c</sup> 2.7 percent foreign and 5 percent local price contingencies.

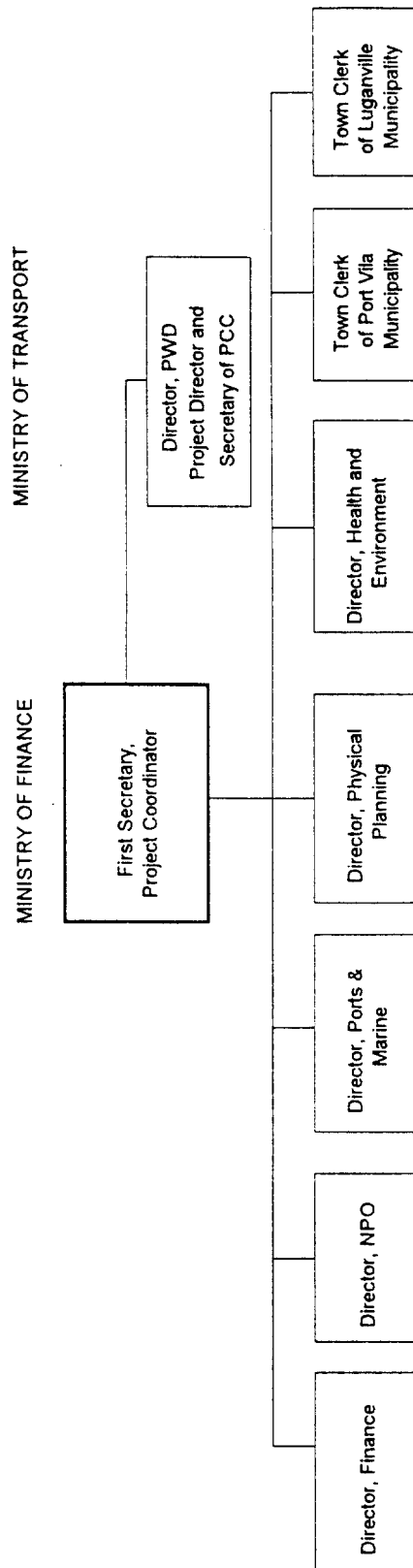
## PROJECT IMPLEMENTATION AND ORGANIZATION CHARTS

### 1. PROJECT MANAGEMENT STRUCTURE

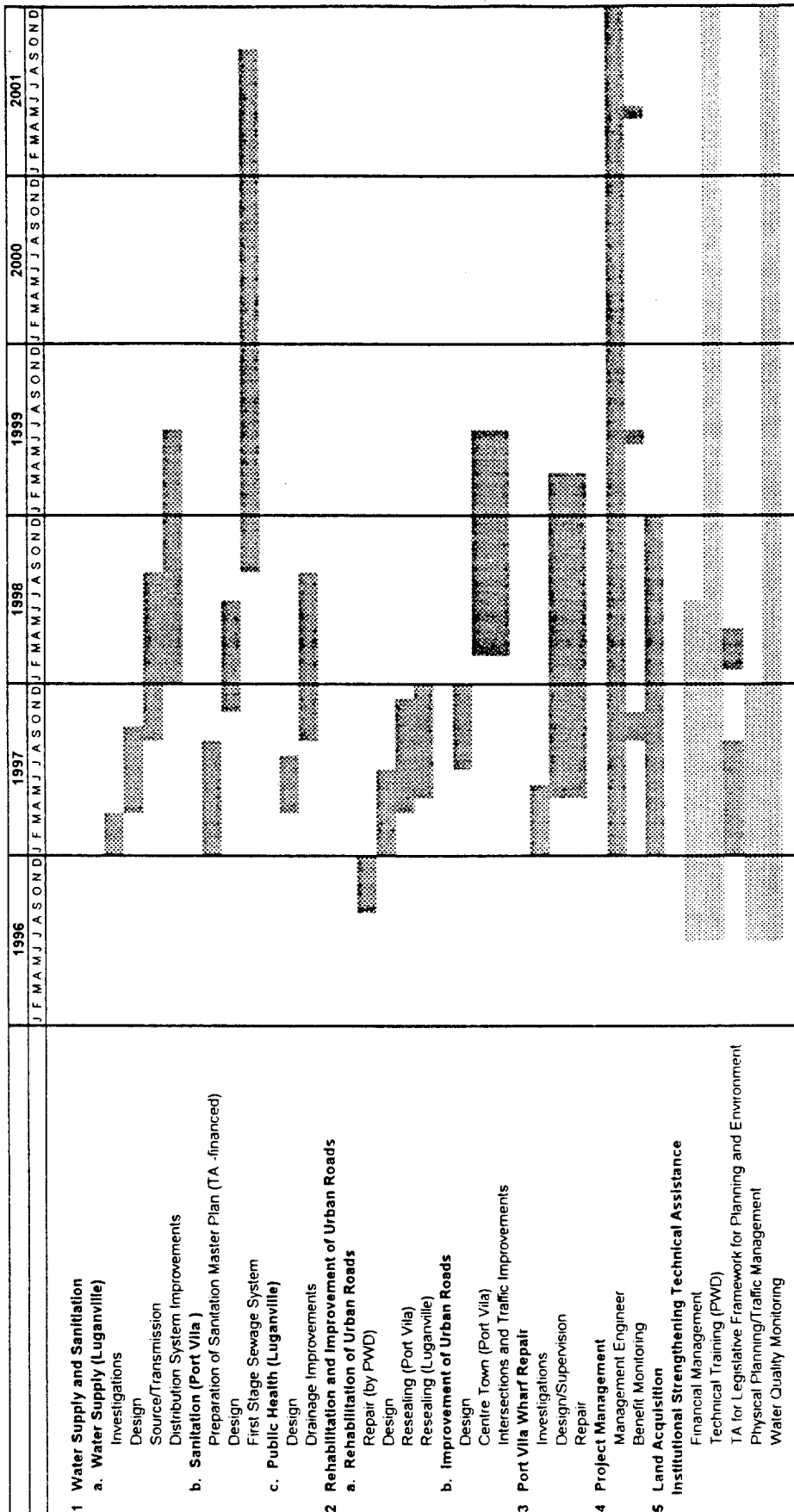
MINISTRY OF TRANSPORT  
PUBLIC WORKS DEPARTMENT



## 2. PROJECT COORDINATING COMMITTEE



## IMPLEMENTATION SCHEDULE



PWD = Public Works Department, TA = Technical Assistance

## Legend

Bank-financed loan and TAs

Collaborative assistance (AusAID, NZ ODA)

**CONTRACT PACKAGES**

<b>Contract Package(s)</b>	<b>Est. Contract Value (\$ '000 equiv.)</b>	<b>Procurement Mode</b>
<b>1. Water Supply and Sanitation</b>		
<b>a. Water Supply (Luganville)</b>		
Source/Transmission	500	FA/LCB
Distribution system improvements	500	FA/LCB
Equipment and materials	200	IS/DP
<b>b. Sanitation (Port Vila )</b>		
Erakor Causeway	1,500	FA/LCB
Selected Sanitation Measures	1,000	FA/LCB
Equipment and materials	600	IS/DP
<b>c. Public Health (Luganville)</b>		
Drainage Improvements	400	FA/LCB
Equipment	100	IS/DP
<b>2. Rehabilitation and Improvement of Urban Roads</b>		
<b>a. Rehabilitation of Urban Roads</b>		
Repair	200	FA/LCB
Resealing	1,800	IS/DP
<b>b. Improvement of Urban Roads</b>		
Centre Town (Port Vila)	500	FA/LCB
Intersections (Port Vila)	200	FA/LCB
Traffic Improvements (Luganville)	100	FA/LCB
<b>3. Port Vila Wharf Repair</b>		
Investigations and Repair	1,500	IS

**Legend**

IS	International Shopping
LCB	Local Competitive Bidding
FA	Force Account
DP	Direct Purchase

## OUTLINE TERMS OF REFERENCE FOR CONSULTING SERVICES

1. About 95 person months (pm) of consulting services will be required to assist in project implementation. The consultants will be engaged in three separate packages. The first package will comprise a Project Management Engineer (PME) for 60 pm to be recruited under AusAID financing, in consultation with the Bank. The second package will comprise 26 pm of specialist services in design and supervision activities for the roads, sewage, water supply, and sanitation and BME components (of which about 10 pm will be internationally-recruited and 16 pm will be locally-recruited expertise) to be provided by an international consulting firm. The third package will comprise 9 pm of internationally-recruited consultants for design and construction supervision of Port Vila International wharf, to be provided by an international consulting firm. The latter two firms of consultants will be engaged by the Government in accordance with the Bank's *Guidelines on the Use of Consultants*. The Terms of Reference of the consultants are given below.

### A. PACKAGE 1--PROJECT MANAGEMENT ENGINEER

#### 1. Scope of Services

2. The Project Management Engineer (PME) will be attached to the Project Management Unit (PMU) and will be responsible to the Director, Public Works Department (PWD), for the implementation of the Vanuatu Urban Infrastructure Project, and other designated project works under the PMU. He/she should be a graduate civil engineer with 5-10 years practical, professional experience in planning, design, contract management and project implementation in the general field of urban infrastructure (roads and water/sanitation). Preference will be given to a consultant with demonstrated regional experience and ability to work under local conditions. He/she will, inter alia, be responsible for the following activities:

- a) plan, program, co-ordinate, implement and monitor all physical and financial aspects associated with the Project;
- b) assist PWD in the selection, engagement and management of all specialist consultants engaged under the Project in accordance with the Bank's *Guidelines on the Use of Consultants* and *Handbook for Users of Consulting Services*;
- c) review work practices, quality control, design standards, specifications, and cost accounting practices for construction work and maintenance, and assist in making improvements as necessary;
- d) review the detailed designs, bills of quantities, technical specifications and cost estimates prepared by the specialist design consultants;
- e) based on the output under (d) above, prepare pre-qualification and contract documents for the Project, including the procurement of goods and services and procurement of civil works, and assist the Government to advertise, pre-qualify contractors, and to evaluate and award contracts under the Project in accordance with the Bank's *Guidelines for Procurement*;
- f) prepare reports required by the Bank and the Government for monitoring the physical and financial progress and completion of the Project;



- g) advise the Government and co-ordinate the actions required under the Loan covenants and the Government's responsibilities under the Bank's TA grants;
- h) assist the Government in undertaking Project Benefit Monitoring and Evaluation; and
- i) in consultation with other Project and PWD personnel, assist in developing, implementing and monitoring training strategies for local staff associated with the Project.

## **2. Staffing**

- 3. The position will be for 60 person months, and will be staffed by an individual consultant, internationally recruited.

## **B. PACKAGE 2--URBAN ROADS, WATER SUPPLY AND SANITATION COMPONENTS**

### **1. Scope of Services**

- 4. About 26 person months (pm) of consultant input are required from an international consulting firm with particular experience in the design and implementation of roads, water supply and sanitation works. The firm will also supply the services of a specialist in BME, selected in consultation with NPO. The broad scope of services to be provided will include, but not necessarily be limited to the following--the individual position timeframes and scope of services are indicative only, and will be refined during implementation:

- a. **Road Construction Planning and Supervision (Port Vila and Luganville) -- 6 person months**

- 5. The consultants will undertake refinement of the list of roads to be included in the program; and a detailed assessment of existing pavement conditions; determine quantities and prepare cost estimates; assist the Project Management Engineer (PME) prepare prequalification, bid invitation and contract documents, evaluate responses and recommend award; review contractors work program; supervise construction activities; prepare payment certificates; assess claims; undertake final inspection of works; and keep construction records and prepare progress and final reports.

- b. **Traffic Planning (Port Vila) -- 4 person months**

- 6. The consultants will undertake the following activities: forecast medium (10-year) and long term (20-year) traffic growth for Port Vila based on existing strategic and physical plans, and economic and demographic data; assess present road and street network, and identify existing and potential trouble areas considering factors such as capacity and safety; prepare traffic models for short, medium and long term and identify practical options and solutions for developing and improving street network; and make specific proposals and undertake designs and prepare cost estimates for the following improvements:

- one-way system in the town centre
- improvements of 13 intersections identified in the PPTA studies;

- identify parking areas, regulation of on-street parking and bus stops; and
- street signs and markings, and pedestrian crossings.

**c. Water Supply (Luganville) -- 4 person months**

7. In collaboration with DGMWR and PWD water supply staff, supervise and/or monitor (as appropriate) site investigation and data collection for the new source; review present operation and water consumption, and future system growth requirements, taking into account present and future system efficiencies; map the distribution system layout, together with system appurtenances; review system hydraulic designs to accommodate the proposed new source and determine network modifications necessary to improve efficiency of operation, such as installing/replacing meters, increasing line capacities, installing pressure reducing valves, providing automatic control mechanisms, and providing chlorination or other disinfection/filtration equipment; prepare detailed designs, drawings, specifications, quantities, and cost estimates for the new source, transmission line, network improvements and associated control facilities; assist the PME with the preparation of contract documents, tendering and bid evaluation; and initiate a program of leak detection, determine the need to rehabilitate or replace faulty segments, and train PWD staff in leak detection and general system operation and maintenance.

**d. Drainage Design and Construction Supervision (Luganville) -- 4 person months**

8. The consultant will supervise site investigations, surveys and data collection for the proposed drainage improvements in the Sarakata subdivision of Luganville; prepare detailed designs, drawings, specifications, quantities, and cost estimates for the drainage works; assist the Project engineer with the preparation of contract documents, tendering and bid evaluation; and supervise and/or monitor construction activities (as appropriate), and train PWD and Municipality staff in drainage system maintenance.

**e. Design and Construction Supervision of Erakor Causeway and Selected Sanitation Measures (Port Vila) -- 5 person months**

9. In collaboration with PWD and municipality staff, initiate site investigations, prepare detailed designs, specifications, quantities, and cost estimates for the Erakor Causeway and selected sanitation measures to be undertaken under the Project; assist the PME with the preparation of contract documents, tendering and bid evaluation; supervise and/or monitor construction activities, and train PWD staff in general system operation and maintenance.

**f. Benefit Monitoring and Evaluation (BME) -- 4 person months**

10. The purpose of BME is to determine if planned results of project implementation are, in fact, achieved. The periodic review of the results of this activity will allow NPO and the Bank to evaluate progress, identify problems, and to take remedial action, as necessary, on a timely basis. The proposed BME program will follow a 4-step process defining a program, developing a system to collect information, periodically reviewing and evaluating results, and taking action based on the findings.

11. The actual BME activities, including the establishment of benchmark information through initial physical and socioeconomic surveys, data collection and analysis, will be the responsibility of NPO. The consultant will assist NPO to develop a BME program to monitor key indicators on health, environment, socio-economic and physical conditions in accordance with the Bank's *Handbook on Benefit Monitoring and Evaluation*.

### **3. Implementation and Reports**

12. The timing of the inputs will be in accordance with the progress of the various Project components, and the specific timeframe, reports and outputs of the individual specialists will be in accordance with the activities described above. PWD will provide necessary assistance to the consultants, including office space, support staff and all available documentation to undertake the works.

## **C. PACKAGE 3--PORT VILA INTERNATIONAL WHARF REPAIR**

### **1. Background**

13. A preliminary investigation of the structural condition of the wharf was undertaken in July 1994 under TA No. 1974-VAN: Structural Survey of Port Vila Wharf, and identified the wharf as requiring rehabilitation as follows: (i) repair of piling above water level, including plating of some 90 piles and the preparation and application of protective treatment to some 287 piles; (ii) repair of piling below water level, including sleeving some 10 piles; (iii) concrete repairs to the structural elements of the main wharf and access bridges estimated to amount to some 620m<sup>2</sup>; (iv) replacement of the existing fenders to provide a more energy absorbing system; (v) general rehabilitation of the deck furniture; and (vi) application of a protective coating to the underside of the deck following the rehabilitation works.

14. The findings of the preliminary investigations, reported in the consultants' report issued in September 1994, recommend that confirmatory investigations proceed before the design and specification of the rehabilitation works. The additional investigations required are as follows: (i) taking of concrete cores from the deck and main structural elements for preparation and testing; (ii) drill sampling and half cell potentiometer measurements to assess the extent of chloride penetration within the apparently sound members; and (iii) undertaking a grillage analysis of the main wharf deck and approach bridges to confirm the limitations set on 24t FLT operations.

### **2. Scope of Services**

15. About 9 person months (pm) of consultant input are required from an international consulting firm with particular experience in the design and implementation of marine rehabilitation works, in the following fields: (i) a marine works design engineer with particular experience of concrete testing and rehabilitation works (2 pm) (Team Leader); (ii) a specification and contract documentation specialist with experience in rehabilitation works for marine structures (1 pm); (iii) technical support (2 pm); and (iv) a contract and site supervision engineer with experience in rehabilitation works (4 pm). The scope of consulting services will include, but not necessarily be limited to, the following:

- (a) review and as necessary update, the estimated extent of rehabilitation works required;
- (b) undertake confirmatory investigations as detailed above;
- (c) on the basis of the confirmatory investigations and the consultant's experience prepare a provisional scope of work for preliminary engineering purposes including cost estimates;
- (d) prepare prequalification documents, circulate and evaluate and submit recommendations for an approved tender list;
- (e) prepare detailed specifications and contract documents suitable for submission for international tender;
- (f) prepare a tender evaluation report for submission to the implementing agency; and
- (g) undertake contract administration and site supervision for the works including maintenance period inspections as necessary.

### **3. Implementation and Reports**

16. The assignment will be undertaken under guidance of PMD, who will provide necessary assistance to the consultants, including the provision of office space, support staff and all available documentation for the completion of the works.

17. The consultants shall prepare the following documents: (i) a preliminary design report covering the findings of the site investigations, evaluations and provisional quantities and cost estimates, for review by the Government and the Bank prior to proceeding with rehabilitation activities; (ii) a prequalification evaluation report; (iii) tender documents and specifications; (iv) a tender adjudication report; and (v) a contract completion report.

18. The total elapsed time between the commencement of the assignment and completion of the works is estimated to be 1 year.

## **URBAN GROWTH MANAGEMENT STRATEGY FOR PORT VILA**

### **Terms of Reference of Consultants**

#### **A. Component (1): Policy Framework**

1. Port Vila refers to the greater urban area, and not just the municipality. The Government has already begun the task of reviewing plans and objectives of growth management for Port Vila. Some documentation has been collated, and a preliminary workshop to determine a method of conducting and implementing the strategy, has already occurred.

2. The policy framework will be formulated under the supervision of the National Planning Office (NPO) and will include the following tasks:

- (i) Review existing and proposed plans and agreements relating to the development of greater Port Vila, and prepare a paper discussing and summarizing these findings;
- (ii) Assist in the organization, conduct and facilitation of a series of growth management consensus workshops. The initial workshop will consist of an informational plenary, involving a series of urban management experts drawn from the region;
- (iii) Assist focus groups to prepare issue and summary papers in time for discussion at the workshops;
- (iv) Prepare an urban growth management plan (UGMP) that identifies growth objectives, their requisite activities, and a detailed short term implementation plan. This should include reference to other existing plans and activities, and highlight/prioritize the immediate future planning needs of Port Vila;
- (v) Prepare a draft of a strategic growth management framework, that provides options Government must consider to better manage the growth process for Port Vila. Coordination and the elimination of existing redundancies and delays should be a key priority for the framework. It should be developed in light of the objectives and activities of the UGMP. The framework should also consider and recommend options for long term guidance mechanisms, enabling monitoring, updating and altering of objectives, plans and actions;
- (vi) Following adoption by Government, complete and publish a final report for distribution.

## B. Component (2): Legislative Framework

3. In 1991, a review of environmental law in Vanuatu was undertaken under a Bank TA<sup>1</sup>. It notes that there already exists a substantial body of environmental law in Vanuatu, which consists not only of sectoral legislation specifically referring to environmental issues, but also other parts of the general law which have considerable potential for use in ensuring the protection of the environment and the wise use of natural resources. The review identifies major gaps in the sectoral coverage of specific environmental law, particularly in the areas of waste management, water resources and dangerous substances. Furthermore, it notes that recent escalation of development pressure in Vanuatu, especially in the coastal zone, has also rendered urgent the extension of planning control to the littoral zone and the setting of environmental impact assessment for all major projects on a statutory footing. Recommendations are made for appropriate modifications to individual legislation to transform these existing laws into a modern legal regime for environmental and natural resource conservation and management. These recommendations have been echoed under the National Conservation Strategy<sup>2</sup>, which calls for the adoption of a comprehensive environmental protection act, including measures for environmental impact assessment (EIA), pollution control and waste management.

4. Although draft legislation has been developed in several areas of natural resources management, these have not been enacted into law. There is also a need to formalize and adopt regulations which impact on living conditions and public health. The establishment of a legal basis for EIA is lacking and current requirements have no formal legal status, being guidelines only.

5. Physical planning in Vanuatu is governed by the Physical Planning Act 1986 which needs to be reviewed for effective enforcement of planning control. Physical plans for land development, as required under the Act, are in draft form and have yet to be approved by the Municipalities of Port Vila and Luganville. Building codes and standards should be adopted to complement these plans since they have direct implications on sanitation and public health. Although a national building code has been drafted, it has not been enacted into law. A Public Health act was passed in April 1995. Approval was given by cabinet on 18 February 1993 to draft comprehensive environmental legislation.

6. Comprehensive resource management acts have been introduced in a number of countries, and significant lessons have been learned from this experience.<sup>3</sup> Emphasis is now being placed on developing a comprehensive body of legislation to promote Strategies for National Sustainable Development,<sup>4</sup> which incorporate the provisions under previous environment and natural resource management acts, but aims to streamline the enforcement and

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<sup>1</sup> TA 1116-VAN: *Environmental Legislation Review*, for \$75,000, approved 25 January 1989.

<sup>2</sup> *Vanuatu National Conservation Strategy*, prepared by the Environment Unit with assistance from SPREP, AIDAB and IUCN.

<sup>3</sup> World Bank: *"National Environment Strategies: Learning from Experience"*. 1995.

<sup>4</sup> World Bank: *"Strategies for National Sustainable Development"*. 1995.

monitoring of such acts. Typically a large number of agencies are involved in the promotion and implementation of legislation relating to their own specific areas of responsibility. However, with limited resources, enforcement of such legislation is often not effective. It is therefore proposed that comprehensive environmental management legislation be prepared that would provide a consistent and comprehensive legal framework. This would assist in promoting greater coordination and cooperation amongst implementing agencies, and ultimately, more consistent enforcement of sustainable development policies. The Government has requested further Bank technical assistance to undertake this task.

7. The terms of reference for the consultants will include, but will not necessarily be limited to, the following specific activities:

### **1. Physical Planning and Water Resources Legislation**

8. Under the supervision of the Environment Unit (EU), Physical Planning Unit (PPU), Department of Geology, Mines and Water Resources (DGMWR), and the Attorney General's Office (AGO), as appropriate, undertake the following tasks:

- (i) review and make appropriate recommendations for amendment of: (a) the Physical Planning Act 1986, (b) draft Water Resources act (c) general guidelines for the preparation of environmental impact statements<sup>1</sup>, (d) the national building code, and (e) the draft physical plans;
- (ii) prepare discussion papers for: (a) submission to Cabinet to seek approval to make amendments to the Physical Planning Act, including measures to legalize the national building code; (b) adoption of water resources legislation; (c) adoption of EIA legislation; (d) submission to the Municipalities to seek approval to make amendments to the draft physical plans; and (e) circulation to the public and private sectors.
- (iii) facilitate inter-departmental discussions conduct workshops with the public and private sector to seek input to any proposed drafts or amendments to the existing for planning legislation, water resources and EIA legislation/ regulations;
- (iv) prepare legislation for review by the AGO prior to submission to Cabinet: (a) draft amendments to the Physical Planning Act and national building code; (b) amendments to the draft Water Resources act; (c) revised physical plans for approval by the Municipalities; and (d) draft EIA legislation;
- (v) assist with the incorporation of any proposed modifications prior to submission to Parliament for enactment; and

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<sup>1</sup> Technical Paper No. 1, General Guidelines for the Preparation of Environmental Impact Statements 1987, Environment Unit.

- (vi) assist in dissemination of information about the Acts, through a public awareness campaign.

## **2. Environmental Management Legislation**

9. Under the supervision of EU, undertake the following tasks:

- (i) review the National Conservation Strategy and related environmental legislation with the view to develop a comprehensive environment management act;
- (ii) prepare discussion papers to circulate to the public and private sectors;
- (iii) facilitate inter-departmental review, conduct workshops with the public and private sector to seek input to the proposed legislation;
- (iv) prepare a draft of the new comprehensive environment legislation for review by the AGO prior to submission to Cabinet;
- (v) assist with the incorporation of any proposed modifications prior to submission to Parliament for enactment;
- (vi) assist the PPU, EU and Municipalities to create institutional mechanisms to monitor and enforce legislation;
- (vii) complete and publish a comprehensive environmental law handbook for Vanuatu; and
- (viii) assist in dissemination of information about the act, through a public awareness campaign.

## **C. Executing Agency, Consulting Services and Implementation Timeframe**

10. The Executing Agency for the Technical Assistance will be the Attorney General's Office. The advisory TA will provide 12 person-months of international, individually-recruited short-term inputs of a physical planner and a legal specialist, recruited individually, over a two-year period for the PPU, EU, DGMWR and AGO, to undertake activities in the areas identified above. It is anticipated that the TA will begin immediately after Loan signing, anticipated in March 1996. The reports to be prepared include (i) the specific outputs listed in the terms of reference above, and (ii) an end-of-assignment report for each consultant summarizing work undertaken and recommendations for future activities, and attaching copies of draft legislation. Six copies of the reports will be prepared, three for the Government and three for the Bank, and submitted within one month of completion of the consultant's input.



**D. D. Cost Estimates and Financing Plan**

11. The total cost of the TA is estimated at \$405,000, including \$335,000 in foreign exchange costs and \$70,000 in local currency costs, as indicated in Table 9-1. The Government has requested \$360,000 as a grant.

**Table 1: Estimated Cost and Financing Plan  
(\$)**

Item	Foreign Exchange	Local Currency	Total
<b>A. Financed by the Bank</b>			
1. Consultants			
a. Remuneration			
International consultants	350,000	-	350,000
b. Per Diem	90,000	-	90,000
c. International Travel	25,000	-	25,000
d. Local Travel	-	5,000	5,000
2. Equipment			
Computer/office equipment	10,000	-	10,000
Vehicle hire	20,000	-	20,000
3. Seminar/conference/workshop	10,000	15,000	25,000
4. Studies, surveys and reports	5,000	-	5,000
5. Miscellaneous TA Administration support costs/communications	5,000	5,000	10,000
6. Contingency	<u>45,000</u>	<u>15,000</u>	<u>60,000</u>
Subtotal (A)	<u>560,000</u>	<u>40,000</u>	<u>600,000</u>
<b>B. Financed by the Government</b>			
Counterpart staff, office facilities and support services	-	<u>50,000</u>	<u>50,000</u>
Subtotal (B)	-	<u>50,000</u>	<u>50,000</u>
<b>Total (A+B)</b>	<b>560,000</b>	<b>90,000</b>	<b>650,000</b>

## TERMS OF REFERENCE AND COST ESTIMATES FOR SANITATION MASTER PLAN FOR PORT VILA

### A. Background

1. The Bank's project preparatory technical assistance (TA) no. 1952-VAN: Urban Infrastructure Project,<sup>1</sup> recommended the installation of a reticulated sewerage systems for the whole urban area of Port Vila. However, Bank staff and staff consultants consider that this system is not economically or financially viable at the present time. In addition, operation and maintenance (O&M) requirements,<sup>2</sup> as well as the user charges required to cover the investment and operating costs,<sup>3</sup> make such a system difficult to justify. Coupled with this, the hilly topography of Port Vila creates technical difficulties for installing of a conventional sewerage system, and land ownership and custom rights complicate the situation as the various disposal options, such as ocean outfalls, would require considerable negotiation with custom landowners concerning rights-of-way and compensation for possible loss of fishing grounds.

2. On the other hand, there is considerable concern, particularly from the public health and environmental standpoints, that the present sewage treatment methods and solid waste disposal practices are causing significant pollution of ground, surface, and coastal waters around the urban area. Geologically, the highly permeable coral limestone bedrock beneath the relatively shallow soil conveys effluent discharge rapidly from the septic tanks and pit latrines to the groundwater. Similar concerns have been raised about the poor disposal of industrial and toxic wastes.

3. During fact finding, the Government reiterated its urgent need for a sewage system because of rapid urban growth, pollution, public health, and impact on tourism. Based on intensive discussions, the Government and the Mission reached an understanding that, before embarking on any physical work, a sanitation master plan should be formulated for Port Vila, and a first-phase project implemented to address priority concerns before the overall sanitation/sewage investment project is commenced for Port Vila. Concern was also raised regarding the high cost and affordability of utilities in general, particularly water and electricity, and eventually sanitation services. In this regard there is a need to review the Government's role in monitoring and regulating utility charges, and measures needed to strengthen this role. To this end, the Government has requested a Bank TA to prepare the Sanitation Master Plan for Port Vila and a detailed feasibility study for the first phase.

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<sup>1</sup> TA 1952-VAN: *Urban Infrastructure*, for \$536,000, approved on 13 September 1993.

<sup>2</sup> The total sewerage option in the TA report considers the use of 32 effluent lift and pump stations, 2 treatment facilities, and two ocean outfalls.

<sup>3</sup> User charges associated with operating and maintaining the sewer system would be about 50 percent of the water rate (Water Utilities Data Book, ADB, 1993). Cost of domestic water, based on 20 cubic meters/month/household, is presently about \$10.05/month in Port Vila, compared to about \$2.32/month in Manila and \$ 6.52/month in Singapore.

## **B. Objectives**

4. The objectives of the TA are (i) to prepare the Sanitation Master Plan for the systematic development of the sanitation requirements for Port Vila over a 20-year time frame, in order to provide a range of options for sanitation appropriate to low, medium, and high density residential, tourist, and commercial developments within the urban area, and to target specific socioeconomic groups, such as low income families; and (ii) to undertake detailed feasibility-level design of the first phase activities proposed under the loan.

## **C. Cost Estimates and Financing Plan**

5. The total cost of this TA is estimated at \$370,000 equivalent, including \$320,000 in foreign exchange costs and \$50,000 in local currency cost, as indicated in Table 1. The Government has requested \$320,000 as a grant. The TA will be financed by the Bank on a grant basis.

## **D. Scope of Services**

### **1. Sanitation Master Plan**

6. The scope of consulting services for the Sanitation Master Plan will include, but not necessarily be limited to, the following activities:

- (i) review previous studies and reports, relevant legislation (both adopted and draft), and planning documents, and prepare a detailed sector overview, including projections of population, potential changes in the extent of the urban area, anticipated settlement patterns, water usage, and sewage and waste generation;
- (ii) undertake necessary data collection programs; technical, economic, and social surveys; mapping; and other activities to fill in technical information gaps and gauge the social acceptance of proposed schemes—such activities should, to the extent possible, involve the target beneficiary communities, and should make full use of formal and informal groups, such as nongovernmental organizations and church groups, for this purpose;
- (iii) consider various sewage treatment options, to include a range of appropriate, cost effective treatment options from simple pit latrines and septic tank systems serving relatively low density areas, to more sophisticated, reticulated collection and disposal networks or community-based septic systems serving high density settlements, tourist resorts, or environmentally sensitive areas—specific consideration should be given to the introduction of a scheme to maintain private septic tanks on a regular basis, and to facilitate the provision of safe sewage treatment and waste collection facilities for low income groups and squatter areas;

- (iv) analyze alternative design options and their costs to ensure the most cost-effective and least-cost option has been selected for implementation, consistent with meeting design objectives;
- (v) study present solid waste collection, recycling, and waste disposal practices, and consider options for improvement, particularly the handling of septage and problematic wastes such as toxic substances, hospital and industrial wastes, used lubricants, and abattoir wastes;
- (vi) review institutional arrangements and responsibilities for the provision and monitoring of sanitation services, including public works, the municipality, provincial councils, and the private sector;
- (vii) consider various institutional and cost recovery mechanisms for installing and operating all types of systems, ranging from individual facilities for low income families to wide-scale reticulated systems serving entire communities within the urban area;
- (viii) assess alternative institutional arrangements for system O&M, fully addressing the capability and capacity of institutions to undertake the necessary maintenance activities together with associated financial control, and make appropriate recommendations in this regard.
- (ix) review the role of the Government in monitoring and regulating utility charges for water, electricity, and sanitation services, recommending measures to strengthen this role through the possible creation of a utilities board;
- (x) prepare a detailed and realistic investment plan for the implementation in a phased manner, recommending priority activities for the phase in the first 3 years, and for the 5-, 10- and 20-year planning horizons; such priorities should take due account of prevailing environmental, social, and public health concerns, and fully discuss the funding, technical, and institutional aspects (including O&M), cost recovery, and recurrent budgetary implications of each activity;
- (xi) prepare a profile of the customers to be connected to the system, and stratify by type, number, and location according to groups such as domestic households, commercial, industrial, etc; quantify the extent of cost-recovery and user charges that can be sustained by each of these groups to cover (i) system O&M; and (ii) system O&M together with a partial or full recovery of capital costs; ensure that any charges proposed are within affordable limits for consumers and within their willingness to pay, as determined by socioeconomic surveys;
- (xii) prepare an action plan to increase sanitation charges over time to increase the level of cost recovery, recognizing the constraints of affordability and willingness to pay; and

- (xiii) evaluate the options for linking any sewerage charge as a water surcharge, and discuss the implications for such a system.

## **2. Detailed Preparation of the First Phase of a Sewage Collection and Treatment System**

7. The scope of consulting services for the first phase development will include, but not necessarily be limited to, the following activities:

- (i) consistent with the recommendations of the Sanitation Master Plan, develop detailed feasibility-level designs for the first phase activities identified for implementation during the first three years of the Plan;
- (ii) in preparing the designs, provide background data and sources, design assumptions, calculations, site plans, drawings, quantities, unit rates, and cost estimates;
- (iii) for the first phase reticulated sewage collection and disposal system, develop the engineering details, construction costs, O&M implications, and financial aspects of the system; fully explore treatment and disposal options, including ocean outfalls and sewage effluent re-use for irrigation, and take due consideration of land requirements, land ownership and custom issues;
- (iv) in the case of decision to invest in individual pit latrines and/or septic tanks, explore financial and technical options (including possible assistance schemes promoted by the municipality) for helping property owners install new and upgrade present systems at all stages of property development from initial planning to extension and redevelopment, specifically highlighting maintenance requirements and cost recovery mechanisms;
- (v) in the case of improved solid waste management options, develop the engineering, construction cost, O&M implications, and financial aspects of the system, and compare the technical merits of alternative technologies (such as recycling versus disposal).

## **D. Consulting Services, Implementation, and Reporting Schedule**

8. About 15 person-months of consulting services to be provided by an international consulting firm are anticipated for the preparation of the Sanitation Master Plan and detailed feasibility-level design of the first phase of development, in the fields of sanitation and public health engineering, urban planning, financial and economic analysis, and social and institutional development. The implementation time frame is anticipated to be six months. A draft master plan will be prepared within three months of the start of the TA, and will be circulated to the Government and the Bank for review. This Plan will be discussed at a tripartite meeting between the Government, the Bank, the consultant within a month of circulation. The final Plan and detailed feasibility-level designs of the first phase of implementation will be prepared thereafter, and presented to the Government and the Bank on completion of the TA.

**Table 1 : Estimated Cost and Financing Plan  
(\$)**

Item	Foreign Exchange	Local Currency	Total
<b>A. Financed by the Bank</b>			
1. Consultants			
a. Remuneration			
International Consultants	200,000	-	200,000
b. Per Diem	50,000	-	50,000
c. International Travel	15,000	-	15,000
d. Local Travel	-	5,000	5,000
e. Remuneration			
Local Consultants	-	10,000	10,000
2. Equipment:			
Computer/Office Equipment	10,000	-	10,000
3. Seminar/Conference/Workshops	-	2,000	2,000
4. Studies and Investigations	-	10,000	10,000
5. Miscellaneous TA Administration			
Support Costs/Communications	5,000	3,000	8,000
6. Contingency	<u>40,000</u>	<u>10,000</u>	<u>50,000</u>
Subtotal (A)	<u>320,000</u>	<u>40,000</u>	<u>360,000</u>
<b>B. Financed by the Government</b>			
Counterpart staff, Office Facilities			
and Support Services	<u>-</u>	<u>10,000</u>	<u>10,000</u>
Subtotal (B)	<u>-</u>	<u>10,000</u>	<u>10,000</u>
TOTAL (A+B)	320,000	50,000	370,000

## ECONOMIC AND FINANCIAL ANALYSIS

### A. Economic Analysis for the Rehabilitation of Urban Roads

#### 1. Assumptions

1. The economic analysis for the subcomponent on the rehabilitation of urban roads was based on a cost savings approach. The major assumptions were:

- (i) Annual patching requirement and pavement roughness were determined through use of pavement deterioration models.<sup>1</sup>
- (ii) Traffic loading assumed that 5 percent of the traffic is heavy vehicles, the average loading per truck is 0.25 equivalent standard axle (ESA), and the annual traffic growth rate is 4.5 per cent.
- (iii) For purposes of calculating the impact of resealing on the extent of cracking and patching (and therefore saved maintenance costs), it was assumed that the application of a chip seal effectively improved the condition of the road surface as it relates to requirements for routine maintenance to that prevailing ten years prior to the resealing.
- (iv) With respect to vehicle operating costs (VOCs), it was assumed that the chip seal resulted in a slight reduction in overall surface roughness, such that VOCs reflected unit costs associated with the road condition as it had existed five years prior to the reseal. However, because the relationship between unit VOCs and surface roughness are representative of operating costs at higher average travel speeds than those associated with travel within urban areas, these VOC cost savings attributable to the resealing were reduced by 75 percent.
- (v) VOCs were based on the 1993 World Bank Pacific Islands Transport study, adjusted to 1995 prices. These reflect vehicle operating costs for four vehicle types (cars, light utilities, 4 wheel drive, and light trucks) as derived from the Road Transport Investment Model (RTIM) model, with economic prices excluding taxes and duties (see Table 1).
- (vi) It is not anticipated that the resealing will have any impact on vehicle travel times, or that it will result in any VOC savings due to diverted or generated traffic. Therefore, the VOC savings included only relate to the normal traffic volumes anticipated over the analysis period, and are assumed to be the same whether the resealing proceeds or not.

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<sup>1</sup> Road Transport Investment Model (RTIM), Transport and Road Research Laboratory (TRRL), Laboratory Report (LR) No.674; and Highway Design Model 3 (HDM3), A. Guide to the Structural Design of Roads in Tropical and Sub-Tropical Countries, Road Note (RN) 31, TRRL.

**Table 1 : Road Vehicle Operating Costs, 1995 Prices  
Sealed Road**

Road Condition	Road Roughness (mm/km)	Vehicle Operating Costs (\$/km)	
		Financial Prices	Economic Prices
Good	2,000	0.41	0.33
Fair	3,000	0.46	0.34
Poor	5,000	0.54	0.39

mm = millimeter; km = kilometer

Source: World Bank 1993. *Pacific Islands Transport Sector Study*. Vol II: Vanuatu 1991 prices updated to 1995 prices by the CPI.

## 2. Methodology

2. The level of routine maintenance depends on the initial standard of road construction as well as traffic volumes (expressed in terms of equivalent standard axle [ESA]). Application of a sealing coat and rehabilitation retards and reduces maintenance requirements. Therefore the economics of resealing depend on (i) the costs of maintenance versus resealing; and (ii) the rate of surface deterioration (with and without resealing), taking into account the level of average daily traffic (ADT). Estimates of traffic composition and volumes were based on traffic counts undertaken by the PWD. Cost saving benefits were identified for (i) reduction in road routine and periodic (resealing) maintenance costs and (ii) reduced VOCs across a 1-kilometer (km) section reflecting the weighted average traffic volumes across the 56.5 km of urban roads programmed for resealing under this subcomponent.<sup>1</sup> The relative traffic densities across the various sections are summarized in Table 2.

3. Base costs for the resealing subcomponent are estimated at \$2 million, excluding taxes and duties. In addition, design and supervision is estimated at \$0.06 million, and a "pro-rata" share of the costs of the Project Manager Engineer<sup>2</sup> at \$0.13 million, together with contingencies of 10 percent, represents a total cost for this subcomponent of \$2.41 million.

**Table 2 : Traffic Densities**

Traffic Density Range ADT	No. of Road Sections	Length of Road Sections (km)
<1500	4	2.60
1500-3500	34	48.18
3500-7500	3	4.68
7500-12,500	1	0.68
>12,500	1	0.40
	43	56.54

<sup>1</sup> Since the road resealing involves 43 individual sections of urban roads with varying lengths from 0.18 to 9.08 km in both Port Vila and Luganville, analysis of the economic internal rate of returns (EIRRs) associated with individual road sections is not warranted.

<sup>2</sup> Allocated across all subcomponents in proportion to base cost.



### 3. Results of Analysis

4. The analysis indicates that the impact of the resealing on reducing roughness (and therefore VOCs) combined with maintenance savings, results in an economic internal rate of return (EIRR) of 19.8 percent (Table 3).

5. A sensitivity analysis indicates that the EIRR is sensitive to a 10 percent increase in the cost of resealing, with the EIRR falling to 18.1 percent. If traffic growth is higher than anticipated, at 6 percent annually (compared to the 4.5 percent assumed in the base case), the EIRR rises to 20.8 percent, but falls to 17.9 percent if the traffic growth rate is only 3 percent annually. In the worst-case scenario, when capital costs increase by 10 percent and traffic growth is at 3 percent, the combined impact is to reduce the EIRR to 16.2 percent.

**Table 3 : Urban Roads Rehabilitation  
Aggregate Economic Costs and Benefits (Vt)**

Year	Resealing Costs	Saving in Maintenance Plus VOCs
1	4,777,360	
2		762,263
3		800,376
4		840,395
5		882,415
6		926,535
7		972,862
8	1,155,000	2,350
9		1,072,585
10		1,126,209
11		1,182,520
12		1,241,646
13		1,303,728
14		1,368,914
15		1,437,360
16		1,509,228
17		1,584,690
18		1,663,924
19		1,747,120
20		1,834,476
21		1,926,200
Estimated EIRR		19.8%

### B. Financial Analysis of Luganville Water Supply Rehabilitation

#### 1. Introduction

6. The current reticulated water supply system in Luganville services about 1210 consumers, of which 59 percent are domestic, 17 percent public sector, 13 percent commercial, and 11 percent industrial. An estimated 81 percent of the population of 1600 households is served by the current system, with 57 percent being on individual connections, 40 percent on shared connections, and 3 percent accessing the system through standpipes.

7. The present source was developed in 1943, but is now becoming depleted, and is being contaminated with coliform bacteria originating from seepage from pit latrines and septic tanks associated with newly developed households within the watershed.<sup>1</sup> Development of a new source is therefore critical from public health and supply perspectives.

8. System management is also of concern, particularly in the areas of system maintenance, as well as in the collection of recoverables. Technical losses in the 38-km reticulation system are currently estimated at 58 percent<sup>2</sup> and could be reduced considerably through replacement of old galvanized pipes and installation of pressure reducing valves and automatic cutoff switches for the pumps, all resulting in savings in operating costs. Although the present system generates a cash surplus (excluding PWD overhead and capital depreciation), with revenues of an estimated Vt13.7 million out of a total billings of Vt21 million, and operating expenses of Vt10.7 million<sup>3</sup>, improved billing collections, the introduction of a two-part tariff system<sup>4</sup> and the creation of enterprise accounting (effectively linking operating costs with collections) would also increase the financial efficiency of the utility. For example, while PWD issues quarterly billings, receipts are paid into the Department of Finance, and there is little attention paid to sundry creditors—to the extent that an estimated 35 percent of billings are not collected.<sup>5</sup>

9. The proposed subcomponent will therefore generate benefits in a number of areas. First, the public health will improve as a new potable water supply is developed to replace the currently contaminated and depleted source. Second, the supply will improve with greater pressure and a reduction in nonrevenue water (NRW), which will improve the capacity of the system to meet projected demand. Third, the introduction of institutional reforms will further reduce NRW through reductions in free and/or illegal water delivery as well as increased recoverables. In addition, improved system O&M as well as financial management and control, and the implementation of a two-part tariff structure will have benefits in terms of demand-side management and resource conservation.

## 2. Financial and Economic Internal Rate of Return Analysis

10. Development of an alternative supply source, which involves about half of subcomponent cost, is necessary for the continued availability of a safe, potable

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<sup>1</sup> Coliform bacteria levels are above acceptable international standards, and chlorination of the supply started in March 1994 as a precautionary measure.

<sup>2</sup> No systematic data on nonrevenue water (NRW) is available. However, for the second quarter 1994, an estimated 245,000 cubic meters ( $m^3$ ) were pumped, with corresponding billings of 102,964  $m^3$ , or technical losses of 58 percent.

<sup>3</sup> Electricity at Vt6.1 million, staff at Vt3.1 million, and repairs and miscellaneous costs at Vt1.5 million.

<sup>4</sup> Consumption is billed quarterly on the basis of Vt52/ $m^3$ , with no connection charge. This differs from Port Vila, where there is a fixed quarterly connection charge and a variable consumption tariff based on four consumption levels.

<sup>5</sup> Most recent data covers the billing period of the second quarter of 1994, with recoveries at 75 percent, and the third quarter of 1994 with recoveries of 49 percent. An "average" 65 percent is assumed.

water supply for Luganville. Engineering studies have been conducted on a number of options, and the recommended solution is the most cost-effective.

11. The remaining 50 percent of the total costs, or \$0.69 million,<sup>1</sup> are for upgrading the distribution system. The financial internal rate of return (FIRR) associated with this expenditure is estimated under the following assumptions:

- (i) All components for the FIRR calculations are expressed in constant 1995 prices.
- (ii) O&M cost is currently estimated at Vt11.1/m<sup>3</sup> pumped. It is assumed that the sustainable level of O&M necessary is about Vt13.8/m<sup>3</sup> pumped.
- (iii) Estimates "with" the Project are based on improved technical efficiency of the system, and so reducing system losses from leakage, illegal connection, and undermetering from 58 percent to 30 percent over a six-year period.
- (iv) Potential sales are based on projected billable water consumption from the current system, which is assumed to grow in line with population expansion at 3 percent annually.
- (v) Projected revenues "with" the Project are based on improved recovery of collectibles which is estimated to increase from 65 percent to 85 percent, assumed to be achieved over six years.
- (vi) There is a change in the tariff structure to incorporate a two-part structure, the same as applies in Port Vila. While the demand impact of this change is difficult to forecast, preliminary analysis indicates that the change will have little impact on gross revenue compared with the current fixed tariff, but will benefit resource conservation and demand-side management (DSM). Calculation of the FIRR therefore assumes continuation of the current charge of Vt52/m<sup>3</sup>.

### 3. Methodology

12. The FIRR is estimated for the Luganville water supply subcomponent by comparing the incremental financial costs and revenues streams "with" and "without" the Project. The net benefits from the Project are measured as the difference between cash flows from operations as they would be without the Project, and those projected as a result of Project improvements. A sensitivity analysis was also undertaken, assuming a lower reduction in technical losses (from 58 to 35 percent), a lower increase in collectibles (from 65 to 80 percent), a 10 percent increase in capital cost, and higher system operational costs at Vt15.5/m<sup>3</sup>.

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<sup>1</sup> Base costs of \$1.10 million, design and supervision of \$0.08 million, a "pro-rata share of Project Management Engineering services of \$0.07 million, plus contingencies of 10 percent, for a total cost of \$1.38 million.

#### 4. Results of Analysis

13. It is estimated that, if the collection rate increases from 65 percent to 85 percent, technical losses are reduced from 58 percent of water pumped to 30 percent, and system demand grows in line with population expansion at 3 percent annually, then the investment in improving the reticulation system, as well as associated institutional strengthening, achieves an FIRR of 10 percent real over an analysis period of 20 years (Table 4). This compares favorably with the real weighted average cost of capital of about 6 percent if the investment were debt financed domestically, or less than 3 percent if financed through the Bank's Asian Development Fund.<sup>1</sup>

14. The FIRR is sensitive to reductions in technical and financial efficiencies, as well as increases in capital costs. If collection rates only achieve 80 percent (compared to the target 85 percent), the FIRR falls to 8.8 percent. Similarly, if technical losses are reduced to 35 percent (compared with 30 percent), the FIRR reduces to 8.4 percent, and where both these outcomes occur together, the FIRR falls to 7.2 percent. A 10 percent increase in capital costs associated with the upgrading reduces the FIRR to 8.8 percent. Conversely, should the sustainable O&M system costs be higher than expected (say Vt15.5/m<sup>3</sup> compare to Vt13.8/m<sup>3</sup>), then the FIRR increases from 10 percent to 11 percent real.

15. An alternative presentation of the results of the FIRR analysis is to compare the average incremental costs associated with upgrading the system (financing charges in this case), with average cost savings (the reduction in average unit costs associated with increasing system efficiencies). The system efficiencies in reducing NRW are expected to generate increased net revenues of about Vt27.4/m<sup>3</sup> of water receipted.<sup>2</sup> This can be compared with a unit finance charge of about Vt15.3/m<sup>3</sup>,<sup>3</sup> demonstrating that efficiency savings should more than cover incremental financial charges.

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<sup>1</sup> Assumes domestic debt finance at about 10 percent nominal with inflation at 4 percent. Asian Development Funds (ADF) incur a service charge of 1 percent nominal, together with international inflation at about 2 percent and an exchange risk of a further 2-3 percent.

<sup>2</sup> This is based on improving overall efficiency levels from 27.3 percent to 59.5 percent. Water receipted is water delivered and paid for.

<sup>3</sup> Based on a capital cost of Vt77.3 million, financed over 20 years at a 6 percent real interest rate recovered through equal annual installments. The unit data is based on projected water billings in Year 10 of 504,164 m<sup>3</sup>, allowing for 85 percent collection.

Table 4 : Financial Analysis—Luganville Water Supply

<b>Base Data:</b>							
Unit Rate	Vt/m <sup>3</sup>	52					
Consumers	No	1,209					
Non-residential Consumers	No	1,048					
Residential Consumers	No	161					
NRW-Physical loss	%	55%					
NRW-Non-collection	%	35%					
Operating expenditure on water pumped	Vt/m <sup>3</sup>	13.8					
Demand Growth	%/annum	3.0%					
Water Pumped 1995	m <sup>3</sup>	920,000					
Year		0	1	5	10	15	20
		1995	1996	2000	2005	2010	2015
<b>Status Quo</b>							
Water Pumped	m <sup>3</sup>	920,000	947,600	1,066,532	1,236,403	1,433,330	1,661,622
Operating Expenditure	Vt '000	12,696	13,077	14,718	17,062	19,780	22,930
Technical Loss	m <sup>3</sup>	506,000	521,180	586,593	680,022	788,332	913,892
Water Billed	m <sup>3</sup>	414,000	426,420	479,939	556,381	644,999	747,730
	Vt '000	21,528	22,174	24,957	28,932	33,540	38,882
Non-collection	%	35%	35%	35%	35%	35%	35%
Waterbill Collections	Vt '000	13,993	14,413	16,222	18,806	21,801	25,273
Net Revenue	Vt '000	1,297	1,336	1,504	1,743	2,021	2,343
<b>With-Project</b>							
Water Pumped	m <sup>3</sup>	920,000	947,600	689,144	741,842	859,998	996,973
Operating Expenditure	Vt '000	12,696	13,077	9,510	10,237	11,868	13,758
NRW-Technical Loss	%	58%	58%	35%	30%	30%	30%
Technical Loss	m <sup>3</sup>	533,600	549,608	241,200	222,553	257,999	299,092
Water Billed	m <sup>3</sup>	386,400	397,992	447,944	519,289	601,999	697,881
	Vt '000	20,093	20,696	23,293	27,003	31,304	36,290
Noncollection	%	35%	35%	19%	15%	15%	15%
Waterbill Collections	Vt '000	13,060	13,452	18,867	22,953	26,608	30,846
Net Revenue	Vt '000	364	375	9,357	12,715	14,740	17,088
Incremental Net Revenue	Vt '000	(933)	(961)	7,853	10,972	12,719	14,745
Capital Expenditure	Vt '000		38,640				
Net Cash Flow	Vt '000		(39,601)	7,853	10,972	12,719	14,745
FIRR	10%						

### C. Economic Evaluation of Sanitation Components

16. The net public and environmental benefits under these components (Sanitation and Drainage) are largely intangible and no detailed economic analysis (EIRR) is required.<sup>1</sup> Therefore, economic analysis is limited to a qualitative assessment of the benefits.

<sup>1</sup> EDRC/IFD. "Framework for the Economic and Financial Appraisal of Urban Development Sector Projects," January 1994.

## 1. Sanitation

17. Substantial environmental and health-related benefits associated with improving sanitation in the Port Vila area include the reduction of public health risks from urban sewerage disposal, and the reduction in contamination of the groundwater and the water in the lagoons caused by faecal coliform organisms, as well as nutrient dieoff and algal growth in the coastal waters. Implementation of the treatment plants at sources of point pollution will have an immediate impact on pollution levels in the Ekasuvat and Upper Emten Lagoons, an area within the Port Vila environs that exhibits the highest coliform pollution levels and is currently being further degraded with increasing effluent seepage. Because this lagoon borders the beach areas of two of the main hotels in Vila, coastal water quality is a major issue, particularly as it relates to environmental sanitation and public health concerns with a large number of bodily contact sports (swimming, paddling, windsurfing, etc.). Indirect economic benefits will be generated from the beneficial impact on the tourist industry through improved sanitary and environment conditions in coastal waters (compared to the situation that might prevail without any sewerage program), as well as from effluent reuse for irrigation of recreational areas (rather than an ocean outfall). Finally, the subcomponent is in support of the Government's urban development strategy, improves and extends the coverage of urban infrastructure services, and enhances the ability of the municipality to respond to growing environmental and public-health-related concerns in the area of sanitation.

## 2. Drainage

### a. Project Costs

18. The proposed open drainage subcomponent envisages a total cost expenditure of Vt73.9 million<sup>1</sup> to improve the channel capacity of the existing waterway. In terms of cost recovery, if it can be determined that benefits are largely captured by properties within the drainage catchment, special rates are appropriate.<sup>2</sup> If however, the benefits are assessed across the whole municipality, the average annual increment of debt service per property would be about Vt5,200, or an increment of about 40 percent, assuming 30 years at 10 percent nominal interest rate<sup>3</sup>.

### b. Benefits

19. The Sarakata and Solway floodplain areas, which are directly affected by surface flooding due to impeded drainage, cover approximately 6-7 hectares (ha) within the town boundary of Luganville, or 10 percent of the town area. Using the 1989 Census, the resident population was estimated at 1,938 in 338 households, or just under 30 percent of the town's population. The area is mainly residential in nature, with two primary schools and one kindergarten, but no commercial or industrial establishments.

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<sup>1</sup> 1995 prices. Includes base cost of \$0.5 million, together with design costs, a pro-rata share of project management, and physical contingencies

<sup>2</sup> Since these benefits will be capitalized into land values, municipal rates are not the appropriate mechanism to capture such rents, since these rates are based on the value of improvements.

<sup>3</sup> There are about 1,500 municipal rate assessment notices issued in Luganville

20. Flooding occurs on average once annually, although in some years with heavy rainfall and tropical cyclones there may be up to three flood events. Flood depths commonly range from 300-500 millimeters (mm), with up to 1 meter in the low-lying areas, and with durations of 4-6 hours but with ponded water remaining for up to 2-3 days in the lower parts of the floodplain. All households in the floodplain suffer damage each time water backs up and the area floods, with physical damage to property (houses, contents, and gardens), as well as to infrastructure (roads). Access is also disrupted, and schooling affected. The flooding therefore causes direct physical damage to structures and household contents, dislocation and disruption, as well as incurring clean up costs. Of equal if not greater importance, however, is the fact that septic tanks and pit latrines in the area are flooded and drains blocked, contaminating parts of the area with untreated sewage and creating pools of contaminated water. The untreated sewage affects bathing, washing, and laundry, and creates associated public health risks from generally unsanitary conditions as well as unpleasant odors. Stagnant polluted water in the ponded areas also encourages mosquito breeding, with concomitant impacts on public health in the township, especially malaria and intestinal diseases including diarrhea.

21. The TA study did not quantify direct physical damages due to the flooding resulting from impeded drainage, but random household surveys conducted during the Appraisal suggested damages of Vt10,000 - 15,000 per household. If this level of damage is representative of the households across the floodplain, the EIRR is estimated at around 4 percent,<sup>1</sup> but this does not take into account the improved environmental and public health conditions in the area that will result from improved drainage.

#### D. Economic Analysis of Port Vila International Wharf Rehabilitation

22. The economic analysis for this component was undertaken using a "with" and "without" Project approach. The analysis (see Table 5) was based on the technical data contained in TA 1974-VAN, with the following assumptions:

- (i) Without the Project, it is estimated that the wharf will remain operational for a further 5 years, at which time it needs replacement at an estimated base cost of \$8.25 million (1995 prices). A residual value is recorded in year 15 of the project analysis period, based on straight line depreciation over a 20-year life.
- (ii) The without-Project scenario is based on the assumption that future development of international port facilities, at any alternative site, would be developed at similar cost and timetable.
- (iii) With the Project, the estimated capital costs of \$1.97 million (1995 prices) for the proposed rehabilitation works are assumed to be incurred in Year 1. These costs include base costs for civil works of \$1.5 million, design and supervision at \$0.06 million, a "pro-rata" share of Project

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<sup>1</sup>

Assuming that maintenance costs are the same, with and without the Project, and the economic life of the drainage improvement is 30 years.

management engineering costs of \$0.04 million, and physical contingencies of 10 percent. Taxes and duties are excluded.

- (iv) Rehabilitation of the wharf extends its operational life until year 15, at which stage replacement is required.
- (v) It is assumed that the ongoing routine maintenance and repair requirements of the wharf will remain the same with and without the Project.

23. Assuming a discount rate of 10 per cent over the 15 year period, the rehabilitation works generate a positive net present value (NPV) of \$0.37 million.<sup>1</sup>

24. Sensitivity tests indicate that as long as the rehabilitation works enable capital expenditure on the international wharf, or any other facility, to be deferred by at least 9 years, this investment achieves a positive NPV at a 10 percent discount rate.

**Table 5 : Economic Analysis—Port Vila Wharf Rehabilitation**

Year	Capital Cost	Wharf Replacement		Net Benefits
		"With"	"Without"	
1	-1,970,000			-1,970,000
2				0
3				0
4				0
5			8,250,000	8,250,000
6				0
7				0
8				0
9				0
10				0
11				0
12				0
13				0
14				0
15		-8,250,000	-4,125,000	-12,375,000
<b>Estimated NPV</b>				<b>369,215</b>

<sup>1</sup> NPV analysis is used because solution of the EIRR computation has multiple roots.



## INITIAL ENVIRONMENTAL EXAMINATION

### A. Introduction

1. This appendix summarizes the findings and conclusions of the initial environmental examination (IEE), which was originally presented in the consultant's final report for Technical Assistance (TA) No. 1952-VAN: *Urban Infrastructure Project*.<sup>1</sup> This IEE was based on a study of available literature complemented by field work including water sampling for water quality analyses, and was carried out jointly by the TA consultant and supported by local agencies, in particular the Vanuatu Department of Geology, Mines and Water Resources (DGMWR). The IEE has been updated by the Bank's Fact-finding and Appraisal Missions where appropriate.

### B. Description of the Project

2. The primary objectives of the Project are improvement and upgrading of the physical infrastructure, including roads and the international wharf, water supply and sewage, public health, and environmental and natural resource management, in Vanuatu's two main urban areas of Port Vila and Luganville. The IEE identifies the possible environmental consequences of the proposed Project, the scope of which is described in detail in the main text.

### C. Description of the Environment

#### 1. Port Vila

##### a. Topography and Soils

3. The Port Vila urban area is largely situated on a broad northerly trending coral limestone ridge, bounded by steep escarpments both towards the ocean to the west (Mele Bay) and the Ekasuvat Lagoon to the east. Due to the high degree of permeability of the coral limestone and the development of an underground karst drainage system, the terrace is slightly dissected and large areas of flat land are present. The rapid rate of infiltration is also responsible for the absence of any serious soil erosion in the area. The altitude of the urban area ranges from sea level to a maximum of 70 meters (m).

4. The soils on the flatter parts of the urban area are moderately weathered, medium- to fine-textured, weakly acid to neutral soils. On the steeper slopes, rendzina type soils are present with simple profile containing only A and C horizons. These are generally shallow to moderately deep, and rest on the parent rock with a sharp boundary.

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<sup>1</sup> For \$536,000, approved on 13 September 1993.

**b. Geology**

5. The entire Port Vila area is underlain by Pleistocene and some Holocene coral limestone of at least 20 m thickness. The rocks are highly fractured and have been weathered, and underground karst conduits have developed, thus increasing the naturally high permeability of the rocks.

**c. Climate**

6. The climatic conditions of Port Vila are characterized by marked seasonality in rainfall and a relatively uniform temperature regime. Annual rainfall is 2,100 millimeters (mm) with the wettest months being January, February, and March with averages of around 300 mm; the months with the lowest rainfall are July to October with values around 100 mm per month. Average temperatures for the warmer rainy season are 26 degrees celcius (°C, average maximum 30.5°C average minimum 22.5°C). These drop to an average of 22°C (average maximum 26.5°C, average minimum 17.5°C) during the cooler dry season.

**d. Water Resources**

7. The only perennial stream in the Port Vila area is the Tagabe River, the source of which is situated less than a kilometer upstream from the pumping station. The two tributaries joining the Tagabe River below the source are nonperennial but contribute considerable flow after intense rainfall. There is appreciable increase in discharge downstream from the source, indicating lateral seepage into the river from the banks and surrounding higher ground.

8. There are two main types of aquifers on Efate: the karstic aquifers in the raised coral limestone and the aquifers in the alluvial deposits adjacent to the larger rivers. The deposits above the limestone tend to seal off the limestone from local infiltration resulting in the aquifer becoming almost independent from the actual water level within the river. Being semi-confined, this may result in upward movement of groundwater during the rainy season when the artesian water level is above the water level in the river. Although in the long term the aquifer remains at an almost constant level, short- term fluctuations occur in association with high rainfall events.

**e. Coastal Resources**

9. The coastal marine waters include Port Vila Harbor west of the town and the Erakor Lagoons to the east. Port Vila harbor extends over about 485 hectares (ha) and consists of the centrally located Port Vila Bay surrounded by three distinct smaller bays: Faturaru Bay to the north and the Pontoon and Paray bays to the south. Water circulation in the harbor results from a complex interplay of water density, wind, and tidal-driven flows. Density variations between Port Vila harbor and Mele Bay waters are due to the influx of fresh water into the harbor. These variations coupled with the predominantly southeasterly winds result in a discharge of surface water from the harbor even during flood tide.

10. The Erakor Lagoons comprise the upper Emten and the lower Ekasuvat lagoons and form a narrow valley-like inlet east of Port Vila. Their combined surface

area measures 397 ha and maximum depths are 6.4 m (Emten) and 10.7 m (Ekasuvat). Ekasuvat Lagoon is connected to the open ocean via the Ekasuvat Channel (average depth of 2.8 m), while the two lagoons are linked by the Emten Channel (about 800 m long and between 20 and 75 m wide). Emten and Ekasuvat lagoons do not have any surface streams draining into them; any reduction in salinity must therefore be due to groundwater seepage, direct precipitation, and (to a lesser degree) septic tank overflow.

#### i. Port Vila Harbour

11. The littoral environment surrounding Port Vila Harbour has been modified as a result of urban development and reclamation. Even vegetation at Worowloa Point and Malapoa Point on the margins is highly disturbed and dominated by exotic species. There are no records of rare or endangered species, although Vanuatu's flora and fauna are in general poorly studied. Isolated mangroves grow along the coast, but there are few mature specimens.

12. A 1988 survey in the harbor observed extensive coral rubble banks, with 50 percent of the area dead standing coral and only some 2 percent live coral. Damage to coral was attributed to crown-of-thorns (*Acanthaster planci*) outbreaks and cyclones from which coral communities have yet to recover. Massive *Porites* corals at Malapoa and corals around Ifira Islands have survived better than others. Despite their degraded state, the reefs of Port Vila are important for tourism, with a resort on Iririki Island and glass bottom boats visiting areas around Malapoa Point and Ifira Island. Dive tourism within the harbor focuses on wreck sites rather than natural reefs.

13. Limited subsistence and recreational fishing takes place in and around the harbor, particularly toward Malapoa Point, and around Ifira Island. Shellfish are collected from shallow waters in Fatamaru Bay, toward Malapoa Point, and by villagers on Ifira.

#### ii. Emten and Ekasuvat Lagoons

14. Littoral environments surrounding the Emten and Ekasuvat lagoons are highly disturbed. Natural vegetation has been cleared for urban development, coconut plantations, or grazing, and in places some infilling has occurred. Scattered mangroves grow opportunistically along the coast. There are no records of rare or endangered flora or fauna, although there is limited scientific data on the distribution of species within Vanuatu.

15. Sea grasses grow in the muddy substrates of both lagoons. Because of the lack of historical data it is not known if these communities have been affected by eutrophication and associated increases in turbidity. Uncommonly high densities of beche-de-mer (*Holothuria atra*) and starfish, relative to other places in Vanuatu, are attributed to the artificially eutrophic waters caused by seepage of enriched groundwaters.

16. Periodic collection of beche-de-mer is the only commercial fishery activity in the lagoons. There is, however, limited subsistence and recreational fishing

and collection of shellfish. Erakor villagers maintain fish traps at the mouth to Erakor lagoon, and fishing for village or small scale commercial purposes tends to take place in sheltered waters beyond Erakor Islands. Three tourist resorts front onto the lagoon, and tourists swim, snorkel, and participate in other water sports.

## **2. Luganville**

### **a. Topography and Soils**

17. The town of Luganville is situated on the island of Espiritu Santo on a narrow coastal strip bounded to the north by a limestone escarpment. The town area extends uphill into the less steep parts of the escarpment and on to the plateau area. Some areas along the Sarakata River are subject to flooding during the rainy season. The coastal side of the town is protected against the open sea by a line of steel sheet piles with a concrete capping, erected during the Second World War (WW II), which are severely corroded.

18. Soil distribution is virtually identical to Port Vila, with medium to deep ferrallitic soils, largely derived from volcanic ash, covering the plateau surface and shallow rendzinas on the steep slopes of the escarpment and on the young raised coral terraces along the coast. On the alluvial flats along the Sarakata River, immature alluvial soils are present; these are seasonally flooded and the groundwater table is at shallow depth.

### **b. Climate**

19. The general climatic pattern of Luganville is similar to that of Port Vila with a warm rainy season from November to April and a cooler dry season from May to October as a result of the southeast trade winds. The relatively high annual rainfall of 3,100 mm reflects the altitudinal range of the mountains in the hinterlands as well as the northerly position of the island. Temperatures are slightly higher than in Port Vila.

### **c. Water Resources**

20. The main surface water feature of the Luganville area is the Sarakata river, which has a large catchment extending over the south eastern part of Santo island and covering some 200 square kilometers (km<sup>2</sup>). All other surface water rapidly percolates into the highly permeable limestone until it reaches the aquifer which is at a depth of several tens of meters below surface.

21. Groundwater in the Luganville area is derived from an extensive aquifer within the highly permeable quaternary limestone sequence that make up nearly the entire Sarakata catchment. Permeability on the coral limestone is high throughout, and the hydraulic gradient of the water table is about 1:600, sloping seaward.

22. Water levels respond rapidly to rainfall events as is typical for karst areas, and there is no problem in terms of availability of water in the long term. Of considerable concern within the urban area is the increasing rate of pollution of the groundwater due to the presence of houses with pit-latrines and other kinds of waste in

the vicinity of the municipal pumping station. Water quality tests indicate a gradual increase of coliform bacteria.

#### **d. Coastal Resources**

23. Second Channel is fairly deep and thus chosen as a natural port for the US navy in WWII. No extensive monitoring has been carried out to date on the coastal marine waters of Luganville. A limited number of samples were collected in July 1994 between La Roserai and the main wharf, about 100m offshore, and water clarity was good except in the mouth of the Sarakata river. Nutrient concentrations were low throughout, and only one sample showed a relatively high level of COD of 50 milligrams per litre (mg/l), probably due to the seepage of wastewater from the nearby abattoir wastewater treatment plant.

24. Bacteriological tests gave very low counts of faecal and total coliform for samples in the Second Channel, but samples near the abattoir and in the Sarakata River showed a relatively high level of contamination. However, there is still a considerable degree of dilution in the Second Channel.

25. In Second Channel, there are only minor fringing communities of corals and seagrasses due to the deep nature of the harbour. The littoral zone through the town of Luganville is highly modified as a result of urban development and sea wall construction during WWII. There are no records of endangered flora and fauna within the project area although the distribution of species in Vanuatu is little studied.

26. Marine surveys in Second Channel (although some distance from the town) indicate coral communities dominated by *Acropora* and *Porites* are present on sandy slopes, but with little actual reef formation. There was significant damage to corals in the Second Channel in late 1980s attributed to crown-of-thorns starfish outbreaks. *Holothurians* are common in suitable substrates and shallow waters, but not in commercial numbers.

### **3. Human Economic Development of Port Vila and Luganville**

27. Present population of Port Vila is around 29,500 including some 2,000 expatriates. Luganville has about 9,600 inhabitants of which about 400 are expatriates.

28. The employment structure of Port Vila indicates that 4.5 per cent of the work force is in the primary sector (agriculture, forestry, fishing, mining and quarrying), 13.5 percent in the secondary or production sector (manufacturing, construction, utilities) and the remaining 82 percent in the tertiary or service sector.

29. Housing conditions vary greatly from Western style luxury bungalows to shanty dwellings in informal settlement areas. The present housing conditions reflect the lack of an appropriate urbanization and housing policy and the projected increase in urban population will further aggravate the problem.

30. Most of the infrastructure facilities date back prior to independence in 1980. The sealed road network in Port Vila covers about 73km and some roads are in a state of disrepair. All areas urbanized after 1980 are only served by unpaved roads.

31. The sealed road network in Luganville, comprising some 23km, dates back to WWII. Although in need of maintenance, the size of the roads and the structure of the road network are more than sufficient to cope with the traffic generated by the small urban community.

32. The Port Vila water supply was privatized at the beginning of 1994 and is now run by Union Electric de Vanuatu Ltd (UNELCO). Water quality is good, the only treatment required being chlorination. About 86 per cent of the population is connected to the water system, of which 75 percent use septic tanks and the remainder use pit latrines.

33. In Luganville, the Public Works Department is responsible for all reticulated water supplies. About 81 percent of the population is served by the water supply system, of which about 57 percent utilizes septic tanks for wastewater disposal. The rest of the population uses pit latrines.

#### **D. Screening of Environmental Impacts and Mitigation Measures**

34. Because of the great similarity in physical characteristics and environmental parameters between Port Vila and Luganville, the environmental impacts do not vary greatly between the two areas despite their difference in size. Therefore, the possible environmental impacts for the two towns are treated jointly in this section in order to avoid unnecessary repetitions.

35. The major environmental concern is the status of the coastal waters and, in particular, the two lagoons in Port Vila. Data are too limited to permit a full assessment of the present status and future development of the coastal waters. Therefore, it will be necessary to undertake a proper inventory and monitoring of the lagoons and the coastal waters of Port Vila Bay and the Second Channel at Luganville through biomonitoring. A water quality study will be undertaken (to be funded by Australian Agency for International Development [AusAID] --see the main Report) to permit an objective assessment of the present environmental dynamics and degree of contamination, as well as the prediction of impacts of future development. This will allow recognition of degradation early, while mitigating measures can still be undertaken.

##### **1. Environmental Problems Related to Site Location**

###### **a. Necessity to Locate Proposed Development in Coastal Zone**

36. Since the existing town areas are in the coastal zone, there is no alternative to the proposed coastal locations. All land proposed for development is in the immediate vicinity of the present towns, and a basic road infrastructure already exists. No areas of natural vegetation will be affected both along the immediate coastline or further inland. Any alternative location of future town expansion further inland would involve removal of natural or seminatural forest and bush land and the construction of a totally new road infrastructure. The proposed development is therefore considered to be in harmony with existing infrastructure facilities and is the best suited for these sites.

**b. Soil Erosion and Slope Stability**

37. The proposed sites for town expansion are all on stable slopes with virtually no risk of slope failure and minimal risk of soil erosion. This is primarily a function of the general flatness of much of the area. On steeper slopes, the lack of slope failures can be attributed to the stability of the limestone bedrock and its high degree of permeability not allowing water pressure to build up and causing reduction in shear resistance. The steep escarpments within the proposed development area should be kept as protected areas in their present state.

**c. Groundwater Recharge**

38. Groundwater recharge areas have been delineated and are to become watershed protection zones, and should thus be free from settlement incursions. Groundwater recharge is through the highly permeable coral limestones and, in Port Vila, also from the alluvial aquifer of the Tagabe valley, and no inhibition through surface sealing is to be expected.

**d. Coastal Erosion**

39. Because of the generally steep coast and the protected nature of much of Port Vila Harbor and Erakor Bay, coastal erosion will not be a problem. Any proposed development along Mele Bay would need to be at sufficient distance from the coastline to ensure that beach ridges and foredunes are not disturbed.

40. In Luganville, the Project activities are situated on the Sarakata floodplains, well away from the coast. However, the present town area of Luganville experiences some problems related to coastal, and, to a minor extent, riverbank erosion. The waterfront is protected by a sea wall consisting of a line of steel sheet piles with a concrete capping which is badly corroded; in some sections the piles have already collapsed. There have been proposals to reconstruct the seawall and even relocate sections further seaward with a cap-stone-covered rubble mound seawall. Such a proposal, however, must be considered with great caution both from an environmental and an economic point of view, and is not considered for inclusion under the present Project.

**e. Aesthetic Suitability**

41. The town expansion will be guided as far as possible by the character of the existing town although draft town plans have not been formally adopted. The Project design would need to take account of the aesthetic quality of the two municipalities in view of their importance in promoting tourism.

**2. Environmental Problems Related to Design**

42. The terrain is suitable for most kinds of building activity. The bedrock has a high degree of stability and can support the intended structures. Because of the lack of surface runoff, no erosion nor increase in sediment load is to be expected.

43. A small bore sewer system for the sewage collection, and a biological pond system are planned for the sewage disposal in Port Vila. Careful planning plus promotion of improved drainage system should be made. No environmental problems related to the design are expected.

44. Since the development takes place entirely in an already settled area, no natural vegetation will be removed. Where small remnants exist such as east and south of the Erakor Lagoons and along the escarpment in Luganville, they will be preserved.

### **3. Environmental Problems Related to Construction**

#### **a. Construction Stage**

45. The limestone bedrock provides an excellent foundation. No serious soil erosion problems are expected because of the combination of a high rock permeability and good soil structure. Care has to be exercised in the employment of heavy machinery with a high demand on fuel since any fuel spillage will quickly reach the groundwater and eventually seep into the coastal zone. Fuel storages therefore need to be safeguarded against accidental spillage. Dust development will not be a serious problem as long as the limestone rocks are not crushed into small particles. During periods of drought and strong winds, dust emission become a nuisance and the sites under construction have to be watered. Solid waste can be disposed of adequately in the municipal waste disposal area. Noise and vibration from construction operations and associated traffic will temporarily affect people living nearby. Because of the anticipated modest size of the works, however, this can be kept to a minimum.

46. Consideration has also to be given to natural hazards such as earthquakes and cyclones, and emergency plans have to be drawn up to cope with such a situation.

47. In Port Vila or in Luganville there will not be any incursion into natural landscapes or traditional custom land. Although it is too early to assess specific environmental problems that may be encountered during the construction of the various projects, no serious problems are expected. For all types of construction, excavation, backfilling etc., the bedrock and soil do not pose any restrictions. The limestone bedrock is highly stable and the shallow and well structured soil is not prone to wind and water erosion. In addition, surface flow is minimal because of the high degree of permeability of the limestone.

#### **b. Postconstruction Stage**

48. Valuable economic activities are not expected to be disrupted and no degradation of natural resources will take place. Groundwater supplies will be situated within a watershed-protection zone where no construction will be permitted; therefore no danger exists for the urban water supply. Migration of the local rural population into the urban centers has been in progress for some time and this is expected to continue. Considering the processes that have taken place over the last decade as a measure, no serious problems are expected.



#### **E. Institutional Requirements and Environmental Monitoring Program**

49. The main areas of environmental concern are the coastal and lagoon waters of Port Vila and to a lesser degree also of Luganville. It is therefore proposed to set up a biomonitoring program for the coastal waters, to be carried out in close cooperation with the Department of Geology, Mines and Water Resources (DGMWR) and the Environment Unit. The program will also involve strengthening the DGMWR's laboratory facilities. Although highest priority will be given to monitoring the lagoons, the coastal waters of Port Vila Bay and of Luganville will also be included.

#### **F. Summary and Conclusions**

50. The positive impacts of the town development including road maintenance, water supply, sanitation and sewerage wastewater treatment, and waste disposal as envisaged in this report far outweigh any negative impacts that may occur. There is no alternative to the expansion of the town areas because of the population increase; however, this has to proceed along a well structured plan to avoid social and environmental problems. The sites for expansion provisionally proposed are on lands that are already settled or under agricultural use, even though the present density of occupation is low. A water quality monitoring program, to be funded starting in 1996 by AusAID and undertaken over a 5-year timeframe, will enable the effects of sanitation and drainage improvements to be quantified. This program will be undertaken by DGMWR, and the results will be monitored by the Environment Unit.

51. Apart from the biomonitoring study of the coastal waters, no further environmental impact assessment or monitoring appears necessary at this stage.

52. If the plans are implemented as set out, no serious environmental problems are likely to occur. On the contrary the benefits of improved infrastructure far outweigh any negative impacts, most of which will be relatively minor and temporary. The major environmental concern is the status of the coastal waters and in particular of the two lagoons in Port Vila. Their sound environmental status is of crucial importance for the people of Port Vila and it constitutes a major attraction for visiting tourists, therefore representing an economic asset. The same applies to the coastal waters of Port Vila Bay and the Second Channel at Luganville.