ASIAN DEVELOPMENT BANK

RRP:FIJ 32200

REPORT AND RECOMMENDATION

OF THE

PRESIDENT

TO THE

BOARD OF DIRECTORS

ON A

PROPOSED LOAN

AND TECHNICAL ASSISTANCE GRANT

TO THE

REPUBLIC OF THE FIJI ISLANDS

FOR

THE SUVA–NAUSORI WATER SUPPLY AND SEWERAGE PROJECT

November 2003

CURRENCY EQUIVALENTS

(as of 14 November 2003)

Currency Unit	–	Fiji dollar (F$)
F$1.00	=	US$0.55
US$1.00	=	F$1.81

For the purpose of calculation in this report, a rate of US$1.00 = F$2.00, which was current at the time of loan appraisal, has been used.

ABBREVIATIONS

ADB	–	Asian Development Bank
COEP	–	code of environmental practice
EIRR	–	economic internal rate of return
EMP	–	environmental management plan
FIRR	–	financial internal rate of return
IA	–	implementing agency
I&I	–	inflows and infiltration
ICB	–	international competitive bidding
IEE	–	initial environmental examination
IRAP	–	institutional reform action plan
LCB	–	local competitive bidding
LIBOR	–	London interbank offered rate
lpcd	–	liters per capita per day
Ml(/d)	–	megaliters (per day)
MOF	–	Ministry of Finance
MWE	–	Ministry of Works and Energy
NWQL	–	National Water Quality Laboratory
PMU	–	project management unit
PSC	–	project steering committee
PWD	–	Public Works Department
TA	–	technical assistance
UFW	–	unaccounted-for water
WSC	–	Water and Sewerage Corporation
WSD	–	Water and Sewerage Department

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LOAN AND PROJECT SUMMARY

Borrower	Republic of the Fiji Islands
Classification	Primary: Poverty Intervention Secondary: Human Development, Environmental Protection
Environment Assessment	Category B An initial environmental examination was undertaken, and a summary of its conclusions and recommendations is attached as Appendix 14.
Project Description	The Project will (i) increase the delivery of safe water supply and sewerage services in the Suva–Nausori urban area, and (ii) enhance the sustainability of water supply and sewerage services throughout the Fiji Islands by means of appropriate institutional reforms. The Project will support improved water supply and sewerage management and operations, improved environmental monitoring related to water supply and sewerage operations, development and implementation of trade waste policies and procedures, conduct of public awareness campaigns, and a tariff study. It will also provide support for the creation of a water and sewerage department (WSD) followed by the creation of a water and sewerage corporation (WSC) with arrangements for governance similar to those of a commercial water and sewerage agency.
Rationale	The Fiji Island's principal urban areas suffer from deficiencies in their water supply and sewerage systems, to the extent that their economic and social development is being hindered and their environments are being adversely affected. Water shortages in the Suva–Nausori urban area are having an increasingly harmful effect on the local economy. No new connections are being given, which has effectively halted new land development. Many localities are not served by a piped sewerage system. Local land zoning regulations place restrictions on the density of development in unsewered urban areas. Lack of sewerage is holding back development and causing gross pollution in several localities. The Fiji Island's water supply and sewerage services—currently provided by the Public Works Department (PWD), which is responsible also for roads, buildings, and mechanical and electrical services—are suffering from ineffective management, a lack of maintenance, and shortages of funds. Water losses between production and consumption average 55%, and tariff collections average only 60% of billings. The Government of the Republic of the Fiji Islands has provided financial support, but it is now inadequate to carry out needed repairs and replacements. There is a need to establish a department focused on water and sewerage operations, with the potential to be converted into a

commercial corporation, based on the principles of a strong client orientation, an awareness of the value of water and sewerage services, an ability to collect and retain revenues fully covering the cost of the services provided, and transparency and accountability in its operations.

Objectives and Scope

The Project will address the need for improved water supply and sanitation services in the Suva–Nausori area. It will improve environmental conditions throughout the area, including in low cost and squatter housing areas. The Project will also help enhance the long-term sustainability of water supply and sewerage services through supporting implementation of more effective policies and institutional arrangements as well as providing investment for the development of these services.
The Project's physical works comprise the most urgent and immediate investment needs, as identified in master plans for water supply and sewerage development in the Suva–Nausori area.

Project outputs will include: (i) improvement of the coverage and quality of water supply and sewerage services in the Suva–Nausori area; (ii) improvement of the adverse environmental conditions that have been caused by inadequate sewerage services; and (iii) establishment of WSD/WSC for provision of water supply and sewerage services in the country's metered water supply areas, with arrangements for autonomy, transparency, and accountability similar to those of a commercial water and sewerage corporation.

Project activities will include: (i) rehabilitation and augmentation of water supply networks, water treatment, and water storage facilities; (ii) rehabilitation and augmentation of sewerage networks and sewage treatment facilities; (iii) development of a new source of water supply; (iv) establishment of stronger environmental management procedures; and institutional development of the proposed WSD/WSC, particularly in the fields of management, accounting and financial operations, operation and maintenance of water supply and sewerage facilities, environmental management, and customer relations.

Cost Estimates

The total cost of the Project is estimated at US$72.4 million equivalent, of which foreign exchange costs amount to US$48.0 million equivalent (66% including US$4.7 million for commitment charges, front-end fee, and interest during construction).

Financing Plan

The Asian Development Bank (ADB) will provide US$47.0 million for the Project. The Government will finance the balance of the costs.

Loan Amount and Terms

A loan of US$47.0 million from ADB's ordinary capital resources will be provided under ADB's London interbank offered rate

	(LIBOR)-based lending facility. The loan will have a 25-year term including a grace period of 5 years, an interest rate determined in accordance with ADB's LIBOR-based lending facility, a commitment charge of 0.75% per annum, a front-end fee of 0.5% and such other terms and conditions set forth in the draft Loan Agreement.
Period of Utilization	Until 30 June 2009
Estimated Project Completion Date	31 December 2008
Implementation Arrangements	The Executing Agency will establish a project management unit (PMU) for works and a PMU for reforms. The Government will create a project steering committee as a subcommittee of the existing capital works committee.
Executing Agency	The Ministry of Works and Energy will be the Executing Agency and WSD/WSC will be the Implementing Agency for the Project.
Procurement	Procurement of goods and services will be in accordance with ADB's *Guidelines for Procurement under Asian Development Bank Loans*. The principal civil works, equipment, and materials contracts will be awarded through ADB's international competitive bidding procedures. At present, nine international competitive bidding procurement packages are proposed, but this number may be reduced, depending upon considerations of economy and efficiency. Small contracts not exceeding US$2.0 million for construction and rehabilitation of pipelines in built-up areas and for minor construction works will be awarded through local competitive bidding procedures acceptable to ADB. International shopping will be used for procurement of equipment and materials in small contracts of less than US$500,000. Some small works (such as for replacement of consumer water meters, installation of small service pipes, and leakage detection and repairs) may be carried out under force account procedures acceptable to ADB.
Consulting Services	Consulting services will be provided in several packages for (i) project management-works; (ii) project management-reforms; (iii) water loss reduction, wastewater inflow/infiltration assessment, mapping, environmental monitoring and computerization; and (iv) detailed design and construction supervision. Packages (ii) and (iii) will be funded by ADB and packages (i) and (iv) will be funded by the Government. The consultants for package (i) will be selected as individuals, and the consultants for packages (ii), (iii), and (iv) will be selected as firms. For packages (ii) and (iii), consultants will be selected as firms by the Executing Agency using the quality- and cost-based process in accordance with the *Guidelines on the Use of Consultants by the Asian Development Bank and its Borrowers.* For package (i), it has been agreed that international consultants will be selected in a process in

accordance with the *Guidelines on the Use of Consultants by the Asian Development Bank and its Borrowers.* Package (iv) recruitment is under way. Suitably qualified and experienced consultants are being selected by the Executing Agency through a process of international quality- and cost-based selection, acceptable to ADB. A total of 825 person-months of consulting services will be required, comprising 615 person-months of international consulting services and 210 person-months of domestic consulting services.

Advance Action and Retroactive Financing

Advance action financing will be provided for recruitment of urgently needed consultants and for procurement of civil works and supply of equipment and materials of urgent water loss reduction activities begun after 1 January 2004 in an amount not exceeding US$1.0 million equivalent. Retroactive financing for water loss reduction activities require prior approval of ADB. Advance action for civil works, equipment and materials for other urgently needed water system rehabilitation and augmentation works will also be provided.

Project Benefits and Beneficiaries

There are high socioeconomic, economic, and environmental benefits associated with the Project. The beneficiaries of the Project's institutional development components will comprise the 450,000 inhabitants of the country's metered water supply areas. The beneficiaries of the Project's physical components will be the more than 262,000 residents of the Suva–Nausori area, more than 27% of whom live on or below the poverty line, and industries and commercial enterprises within the Suva–Nausori area.

Within the Suva–Nausori area, the rehabilitation and augmentation of water supply facilities will eliminate the acute water shortages that have been experienced in recent years, and will remove a major constraint to economic growth.

The sewerage components of the Project will alleviate serious pollution of streams, drains, and coastal waters, and alleviate unhealthy conditions in low income and squatter areas.

Nationally, benefits will accrue from the establishment of an efficient, autonomous water supply and sewerage agency that will provide effective and sustainable services for the future.

Cost recovery will be improved through a commercial approach to management, and costs will be reduced through water loss/inflow and infiltration reduction. Methods of increasing tariff revenues have been discussed, and a tariff study is provided under the associated technical assistance (TA) to assess alternatives and prepare detailed proposals. It has been agreed that WSD/WSC will recover, by 2006, the costs of operations, maintenance and debt service and by 2012, the costs of operation, maintenance, depreciation, and interest. To achieve the 2006 target will require

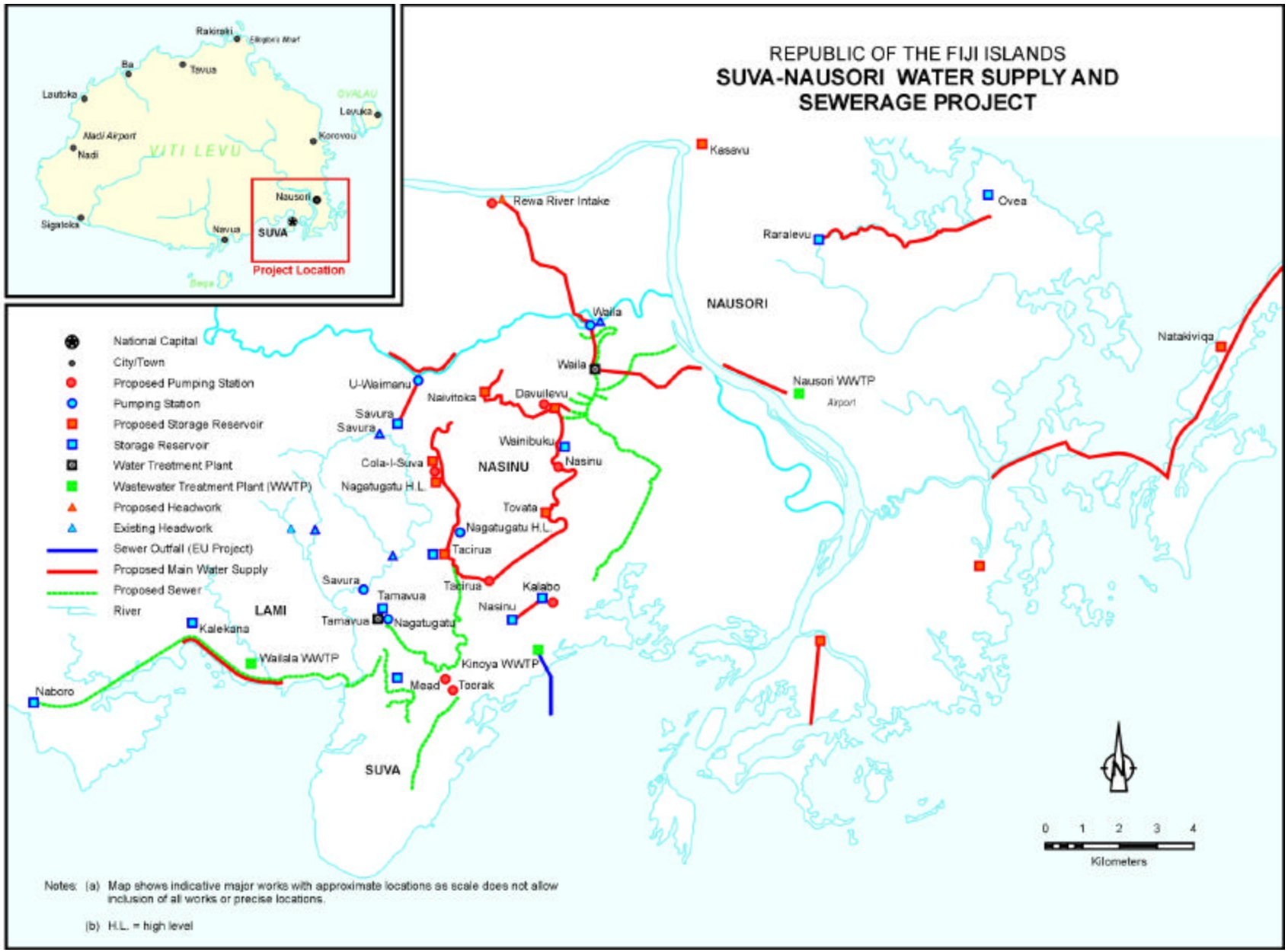
only a modest tariff increase of about 25%. However, to achieve the 2012 target will require further tariff increases of about 70%. It is understood that tariff increases will be undertaken as services improve, and will be designed to ensure that the services provided remain affordable for all population groups.

Risks and Assumptions

The main risk is that the institutional reforms, including the restructuring of PWD's water and sewerage services into a department, and the subsequent establishment of a commercially operated water and sewerage corporation, will be delayed or ineffective, and not result in the expected improvements in water and sewerage operations. A related risk is that cost recovery will be insufficient to ensure the sustainable provision of water and sewerage services. Another risk is that environmental conditions may not improve, despite the investments made in the Project, due to continued discharge of sewage by those without connections. However, the Government is strongly committed to the Project, which will be implemented in accordance with operational output targets reflected in assurances, and they will be closely monitored during project implementation.

Technical Assistance

The Government has requested an associated TA for capacity building in the provision of water supply, sewerage, and environmental services. The cost of the TA is estimated at US$978,000 comprising a foreign exchange cost of US$661,000 and a local currency cost of US$317,000. ADB, through its TA funding program, will finance US$783,000 on a grant basis. The objectives of the TA are to (i) build capacity in the fields of trade waste management, environmental management, health and safety procedures, community education and awareness; and to (ii) enhance cost recovery from customers through a tariff study that will identify the costs of various water supply and sewerage services and identify efficient, effective, and affordable changes in the tariff structure. The TA will complement capacity-building measures that are to be financed through the loan. Consultants engaged under the TA will be selected in accordance with *Guidelines on the Use of Consultants by the Asian Development Bank and its Borrowers*.


REPUBLIC OF THE FIJI ISLANDS
SUVA-NAUSORI WATER SUPPLY AND SEWERAGE PROJECT
Project Location
Rakiraki
Airport Wharf
Ba
Tavua
Lautoka
OVALAU
Levuka
Korovou
Nadi Airport
Nadi
VITI LEVU
Nausori
Sigatoka
Navua
SUVA
Beqa
National Capital
City/Town
Proposed Pumping Station
Pumping Station
Proposed Storage Reservoir
Storage Reservoir
Water Treatment Plant
Wastewater Treatment Plant (WWTP)
Proposed Headwork
Existing Headwork
Sewer Outfall (EU Project)
Proposed Main Water Supply
Proposed Sewer
River
Kasavu
Rewa River Intake
Ovea
Raralevu
NAUSORI
Natakiviqa
Waila
Waila
Nausori WWTP
Airport
U-Waimanu
Naivitoka
Davuilevu
Savura
Savura
Wainibuku
Nasinu
NASINU
Cola-I-Suva
Nagatugatu H.L.
Tovata
Nagatugatu H.L.
Tacirua
Savura
Tacirua
Kalabo
Tamavua
Nasinu
LAMI
Tamavua
Nagatugatu
Kalekana
Wailala WWTP
Kinoya WWTP
Naboro
Mead
Tocrak
SUVA
N
0 1 2 3 4
Kilometers
Notes: (a) Map shows indicative major works with approximate locations as scale does not allow inclusion of all works or precise locations.
(b) H.L. = high level

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan to the Republic of the Fiji Islands for the Suva-Nausori Water Supply and Sewerage Project. The report also describes proposed technical assistance (TA) for Capacity Building in the Provision of Water Supply and Sewerage Services, and if the Board approves the loan, I, acting under the authority delegated to me by the Board, will approve the TA.

II. RATIONALE: SECTOR PERFORMANCE, PROBLEMS, AND OPPORTUNITIES

A. Performance Indicators and Analysis

2. The urban water supply and sewerage systems of the Fiji Islands, which were well developed in the 1970s and 1980s, have not kept pace with demand and have suffered from deferred maintenance. Despite an ambitious capital investment program carried out over the last several years, deficiencies are widespread. Table 1 illustrates the extent and causes of deficiencies in the water supply and sewerage services in the Suva–Nausori area.

Table 1: Analysis of Water Supply and Sewerage Services Performance

Indicator	Current Situation and Performance
Poverty	
Urban poverty	Current estimates indicate that more than 27% of the 262,000 people who live in the Suva–Nausori urban area subsist below the poverty line.
Water Supply Indicators	
Service	About 243,000 persons, or 93% of the population of the Suva–Nausori area, have direct connections to piped water supplies.[a] Although the water supplied is in most cases potable, disruptions of service are frequent, and cause considerable hardship. Water users who lack connections either get their water from a neighbor's tap or depend upon wells and streams. While some wells are of good quality, many are badly polluted, particularly in low-lying areas.
Supply disruptions and deficiencies	During the early 1990s, disruptions occurred during "drought" years. By the mid-1990s, disruptions occurred during the drier periods of each year. Now, they occur during all periods of the year. Provision of water by tank truck, with storage in plastic tanks, which is very expensive, has become common.
Unaccounted-for water	Unaccounted-for water[b] has increased from about 30% of water supplied in the early 1990s to about 55% of water supplied in 2003. It comprises losses of water recorded as delivered to consumers due to physical leakages, or inaccurate or missing meters.
Leakages	Leakages occur in house connections, distribution system, reservoirs, pumping stations, and transmission mains. An ongoing leak detection survey shows considerable losses throughout the system, including in transmission mains , many of which are old and in need of replacement.
Gastroenteric disease	During 1995-2000, 10,000 cases of diarrhea were reported in the Suva–Nausori area, most among infants and in areas where piped water is not available or the quality of piped water is compromised.
Sewerage Indicators	
Sewerage coverage	About 71,000 persons, or about 27% of the population of the Suva–Nausori area, have access to a sewerage system. Most of the remainder are connected to septic tanks and some lack sewerage altogether. Sewage effluent flows to streams and coastal waters. High-density development is banned in areas without sewers, causing development to spread out, and increasing the demand for water.
Pollution of natural waters	Levels of indicator bacteria in streams and coastal waters demonstrate that many waters are unsuitable for contact activities. As these waters are used for fishing and shellfish gathering, they are a potential health risk.

Indicator	Current Situation and Performance
Overflows from the sewerage system	Most of Suva's 71 pumping stations overflow frequently, due to inflow of groundwater to sewers, together with blocked sewers, broken exposed mains, and sewage pump breakdowns.
Institutional Indicators	
Organization and management	Urban water supply and sewerage systems are developed and managed by the Water Supply and Sewerage Section of the Public Works Department (PWD) of the Ministry of Works and Energy. Management of the section is not substantially concerned with water losses or cost recovery. Response times to problems are long. Outside the Suva–Nausori area, even maintenance is shared with other sections of PWD.
Human resources	PWD has a shortage of personnel with appropriate managerial, financial, and technical qualifications and experience.
Financial Indicators	
Flow of funds	PWD is responsible for billing and collection. Revenues are turned over to the Government's consolidated fund and PWD is in turn financed through government budgetary allocation. There is little incentive for PWD to improve its financial efficiency.
Revenues	Revenues are presently insufficient to meet even cash operating costs.
Billing and collection	Collections efficiency is about 60% of potential revenues.
	Accounts receivable are currently about 300 days of sales.

[a] Based upon a household size of 4.6 persons per connection. Some sources put the proportion of the population with direct connections as low as 86%. Although the 2002 household income and expenditure survey of urban households put the proportion of the population in the Suva–Nausori region with some form of access to piped water supply at 97%, it may have underestimated the rural population in the water supply system service area.

[b] Defined here as the difference between water used in production as measured by meters at the treatment plant outlet and water provided to consumers as measured by meters at the point of consumption.

B. Analysis of Key Problems and Opportunities

1. Problems and Opportunities

3. The Suva–Nausori water supply distribution system, on which the physical works of the Project are centered, requires improvements from the source to the consumer tap. Consumers throughout the service area, particularly those living at high elevations, in locations distant from the treatment plants, and in slum and squatter areas, are suffering from frequent service interruptions. Substantial leakages are occurring throughout the system, including in transmission lines, distribution lines, and reticulation systems. Administrative losses result from under-registration of meters and unauthorized connections. Physical losses can be reduced through rehabilitation works and both types of losses, physical and administrative, can be reduced through better management. The existing water intake at Waila on the Rewa River is subject to saltwater intrusion during the dry season. The two water treatment plants require rehabilitation to achieve optimal treatment levels, particularly in the areas of backwash facilities, instrumentation, and chemical dosing. There is also the potential to increase water production through process improvements. The water transmission and distribution systems require optimization to better distribute the produced water to service areas in relation to relative demand. There is a need to decrease the loading on the Tamavua water treatment plant, which is currently operating at twice its design capacity, and to increase the loading on the Waila water treatment plant, which has recently been augmented and is operating substantially under its design capacity. Elimination of leakages in the distribution system will enable better services to be provided to the present and future population of the area and help minimize increases in treatment plant capacity. Illegal connections are substantial and should be eliminated. Improved

metering of consumers, of supply areas, and of water intakes will help in leakage reduction. Enhanced and expanded system instrumentation will enable better coordination and management of supplies, particularly during times of shortages. There is a need to enhance water supplies to better service both existing and new consumers.[1]

4. The wastewater collection and treatment system faces similar needs. The Kinoya sewage treatment plant currently has nearly 40% excess capacity for dry weather flows when inflows and infiltration (I&I) are at reasonable levels; however, even high tide results in higher flow and salinity levels, which reduce treatment efficiency. In the central Suva area, anecdotal evidence suggests I&I as high as 90% in wet weather. I&I also means exfiltration, that is, substantial raw sewage is discharged to the environment. This together with frequent overflows from deteriorated pump stations, and blocked and broken sewer mains, has resulted in serious pollution of the urban water environment. Rehabilitation of these facilities will allow the current system to achieve its desired environmental and public health benefits and allow connection of a larger percentage of the population, further improving the environment and taking advantage of the capacity of the Kinoya sewage treatment plant. The Kinoya sewage treatment plant, which includes an older trickling filter system for secondary treatment as well as a new sequencing batch reactor, generally operates effectively and achieves international wastewater discharge quality standards, but its capacity is limited by the inlet works. Odor control problems also occur. Sludge treatment and disposal facilities are inadequate. Improved instrumentation of the sewage treatment plant will allow overall treatment efficiency improvements and efficient balancing between the trickling filter and sequencing batch reactor plant.

5. The underlying problems of delivery of water supply and sewerage are often described as shortages of water in reservoirs and lack of finance. These problems exist, but they are not the fundamental problems. Water resources in the area are abundant, and the Government has poured substantial financial resources into capital works. Nevertheless, the works have not helped improve services as expected because of operational shortcomings.

6. Under the present institutional arrangements, senior staff of the Public Works Department (PWD) are responsible not only for water supply and sewerage but also roads, buildings, and mechanical and electrical works; management information systems are more focused on capital works than on operations or finances; and operations are bound up in bureaucracy. High unaccounted-for water (UFW) in the water supply system and high I&I in the sewerage system lead to unnecessarily high treatment plant, distribution, and collection system costs. The practice of permitting nonpaying customers, to remain connected reduces revenues, and the gap between costs and revenues prevents the mobilization of the financial resources needed for better asset management. Shortages of senior staff lead to substantial use of consultants in line positions and result in management deficiencies.

7. Achievement of the urgently needed service delivery improvements and the sustainability of these improvements require concurrent management and institutional reforms. The Government's Strategic Plan 2003-2005 and PWD's Corporate Plan for 2002 lay out a framework for moving ahead. The Strategic Plan provides for corporatization of water and sewerage services by 2005. Within this framework, PWD's Corporate Plan points out the need for creating an entity separate from other public works responsibilities to provide for better management and improved delivery of water supply and sewerage services. It proposes the reorganization of the water and sewerage section of PWD into an autonomous water and

[1] Supplementary Appendix A includes a demand assessment for water supply and the sewerage collection and treatment system.

sewerage corporation (WSC). The Government and staff of the Ministry of Works and Energy (MWE) have underlined the need to plan carefully for the transition. Underlying concerns include the need to maintain the present high level of accessibility to services, to avoid any harmful impacts on the poor, to retrain and redeploy staff rather than make them redundant, and to avoid substantial tariff increases until services can be improved. To minimize unexpected impacts, the transition from a water and sewerage department (WSD) to a WSC is being phased.

8. It is clear that the overall institutional framework for the water supply and sewerage sector needs improvement. Steps are being taken to create a water policy, and to strengthen controls over wastewater discharges through a public health and pollution control bill and a sustainable development bill. However, both bills have been under consideration for some time. No matter how strong the bills, administrative capacity to monitor water quality and control harmful waste discharges will continue to be limited. Nevertheless, it is important for the welfare of the country's urban population and the sustainability of its natural environment that the bills be finalized and passed as soon as possible. A sector road map, which has been discussed and agreed upon in principle with the Government, is in Supplementary Appendix B. Appendix 1 summary sector analysis links sector issues and project to ADB country strategy, ADB's water policy, and Government development goals.

2. Lessons Learned

9. The main lessons learned in similar projects in the Fiji Islands and throughout the Pacific include the need to (i) address institutional reforms including broad sector reforms as a part of the project, to ensure achievement of project service delivery objectives; (ii) provide for careful design and sequencing of institutional and financial arrangements; and (iii) plan for and mitigate undesirable outcomes; clearly identify arrangements for procurement, in particular for contracting versus force account works, to avoid ambiguity during implementation; and ensure adequate counterpart funding to carry out the project on schedule. Generally, counterpart staff have been suitably experienced and qualified for their assignments. Appendix 2 lists recent and current external assistance in this sector to the Fiji Islands.

III. THE PROPOSED PROJECT

A. Objective

10. The Project will contribute to the long-term goal of improving the delivery of urban water supply and sewerage services in the Fiji Islands. The objectives of the Project are to (i) increase delivery of safe water supply and sewerage services in the Suva–Nausori area through physical and institutional improvements, and (ii) enhance the sustainability of water supply and sewerage services throughout the Fiji Islands by means of appropriate institutional reforms.

B. Components and Outputs

11. The Project's outputs will include: (i) increased supply, delivery, and potable water reliability in the Suva–Nausori area; (ii) reduction in UFW; (iii) rehabilitated wastewater collection and treatment system; (iv) improvement in the adverse environmental conditions that have been caused by inadequate sewerage services; (v) strengthened institutions and legislative frameworks for wastewater management and environmental management; and (vi) establishment of an entity dedicated to provision of water supply and sewerage services in metered water supply areas, operated in manner similar to those of a commercial water supply

and sewerage agency. The Project works are part of a water and sewerage master plan developed through ADB assistance.[2] The Project Framework (Appendix 3) includes specific targets for the outputs.

12. The Project is divided into two parts, one for construction of water supply and sewerage facilities and one for institutional reforms and development. The first component (Part A) is divided into Part A1 (water supply) and Part A2 (sewerage works). The second component (Part B) is the institutional reform program that provides assistance for the transition of the water and sewerage division of PWD to an effective independent utility agency.

1. Component A: Water Supply and Sewerage

13. The water supply component of the Project includes: (i) implementation of a program for water loss reduction comprising leak detection, replacement of about 50 kilometers (km) of leaking distribution mains, replacement of about 15,000 leaking service pipes and 27,000 malfunctioning meters, rehabilitation of the Tamavua main storage reservoirs and the Upper Waimanu pumping station, and a demand management program; (ii) optimization and augmentation of the distribution system comprising installation and upgrading of pumping stations in four locations, construction of additional service, storage, and balance reservoirs with a capacity of about 29 megaliters (ml), construction of about 40 km of additional mains, and installation of about 13,000 new house connections; (iii) augmentation of water sources, including construction of a new water supply intake and pumping station on the Rewa River, and construction of about 11 km of new source and rising mains and related pump station improvements; (iv) augmentation of existing water treatment plants, including rehabilitation of mechanical facilities in the Tamavua treatment plant, construction of a new clear water reservoir at Waila, upgrading and installation of instrumentation systems, construction and upgrading of sludge and backwash facilities at Waila and Tamavua, and upgrading laboratory facilities; and (v) detailed design and construction supervision. Emphasis is placed on distribution network rehabilitation and development and implementation of a strong UFW reduction program. Components such as meter testing, meter replacement, service pipe replacement are included in the Project, even though they involve numerous small works, because they are essential to the UFW reduction program.

14. The sewerage and sewage treatment component of the Project includes: (i) rehabilitation and upgrading of existing collection networks, including I&I rehabilitation works, comprising rehabilitation and replacement of about 8 km of trunk mains, gravity mains, rising mains, and pump stations; (ii) improvement of the Kinoya sewage treatment plant, including inlet works, odor control and sludge treatment, dewatering and disposal systems; (iii) construction of about 15 km of new trunk sewer mains, collectors and reticulation, with related pumping stations; installation of about 6,300 new sewerage connections in backlog areas and in presently unserved areas; (iv) design and implementation of a trade wastewater program; (v) upgrading of maintenance facilities and the existing national water quality laboratory at Kinoya; (vi) development and implementation of improved management systems, including mapping and geographic information systems, receiving water quality monitoring, and infiltration assessment and related design; and (vii) detailed design and construction supervision. Emphasis is placed on rehabilitation works, addressing I&I issues as well as the trade wastewater management program. New service connections are included in the Project because they are essential to the delivery of the Project's outputs. As with the water supply component, installation of a

[2] ADB. 1998. *Suva-Nausori Water Supply and Sewerage Project.* Manila.

supervisory data control and data acquisition system is already underway and so it is excluded from the project.

2. Component B: Institutional Reform and Development

15. The institutional reform and development component of the Project, includes (i) implementation of an institutional reform action plan (IRAP) (Appendix 4) and a financial action plan (Appendix 5) aimed at creating a WSC by 2005; (ii) implementation of a management information reporting system facilitating well-integrated, effective and efficient water supply and sanitation operations; (iii) implementation of an accounting system for WSD that provides data on costs and revenues, by district, by month, and for WSC that provides data as required for commercial operations; (iv) implementation of agreed recommendations from the tariff study completed under the TA associated with the loan; (v) improvement of operations, including provision of consumer services and metering, adoption of water loss reduction and I&I reduction programs, and mechanizing water and sewage treatment operations; (vi) upgrading of human resource management systems; (vii) strengthening of environmental monitoring and environmental management systems; (viii) upgrading of computerized information systems through the provision of new hardware and software; (ix) conduct of a water awareness program; and (x) training of WSD/WSC staff.

16. An accompanying TA will provide support for development of a trade waste program, health and safety procedures, environmental legislation and regulations, a community education and awareness program, and a tariff study.

C. Special Features

17. The proposed IRAP which resulted from extensive dialogue between ADB and the Government provides an appropriately incremental approach to necessary institutional reforms. It is agreed that the development of the WSC requires careful planning and dialogue among stakeholders, including those in civil society. The guiding principles are that it be dedicated solely to the delivery of water supply and sewerage services, well governed, autonomous of government red tape, and able to mobilize the staff and financial resources necessary to provide water supply and sewerage services sufficient to meet demand effectively and efficiently. To avoid monopoly issues, it should be a partly or wholly government-owned corporation operating with a clearly defined social purpose, under strict regulatory control. In order to avoid unintended negative impacts, the creation of the corporation should be preceded by creation of a WSD dedicated to the provision of water and sewerage services, with support services including, but not limited to, administration, personnel, finance, and planning.[3]

18. The IRAP will be implemented in stages, allowing the process to carefully consider each step and gain the necessary stakeholder support. In this way, broad ownership should be achieved that will improve the sustainability of the reforms, physical improvements completed under the project and improvements in operation and maintenance management.

D. Cost Estimates

19. The cost of the Project is estimated at US$72.4 million, of which the foreign exchange cost is US$48.0 million (67%) including US$4.7 million in interest during construction, the commitment charge, and the front-end fee on the loan; the local currency cost is US$24.4

[3] Currently proposed structure of proposed water and sewerage department is shown in Supplementary Appendix C.

million (33%). The cost of the physical components includes the cost of land; equipment and materials; civil works; and consultants for surveys, preparation of detailed designs, and construction supervision. The cost of the institutional development component and the project management component includes the cost of equipment and materials and consultants. Table 2 gives summary of estimated costs of the Project. Cost estimate details are in Appendix 6.

Table 2: Summary of Estimated Costs
(US$ million)

Item		Foreign Exchange	Local Currency	Total Cost
A.	**Base Costs**			
	1. Water Supply Rehabilitation and Expansion	20.2	5.7	25.9
	2. Sewerage Rehabilitation and Expansion	14.2	5.8	20.0
	3. Management – Works	1.2	1.3	2.5
	4. Management – Institutional Development	1.6	0.4	2.0
	Subtotal A	**37.2**	**13.0**	**50.4**
B.	**Taxes, Duties, and Contingencies**			
	1. Taxes and Duties	0.0	8.6	8.6
	2. Physical Contingencies	4.0	1.5	5.5
	3. Price Contingencies	2.1	1.1	3.2
	Subtotal B	**6.1**	**11.2**	**17.3**
C.	**Interest During Construction, Commitment Charge,[a] and Front-End Fee**	**4.7**	**0.0**	**4.7**
	Total Project Costs	**48.0 (67%)**	**24.4 (33%)**	**72.4 (100%)**

Note: Project costs include value-added tax at 12.5%, resulting in total taxes and duties of 14.5%.
[a]Interest during construction and commitment charge assume an Asian Development Bank loan at a fixed rate of 3.89% for 5 years (based upon a London interbank offered swap rate of 3.29% as of 4 May 2003).
Source: Appraisal mission estimates, based upon the feasibility study, suitably updated.

E. Financing Plan

20. The Government requested a loan of US$47 million, about 65% of total project cost, to finance about 96% of the foreign exchange costs, including all of the foreign exchange costs of civil works, equipment and materials, part of the foreign exchange costs of consultants and the cost of interest during construction, and part of the local currency costs of consultants.[4] The Government will finance the foreign exchange cost of consulting services for detailed design and construction supervision, and the other local currency costs of the Project, including the costs of land, the costs of duties and taxes, and part of the costs of civil works, equipment and materials, and consultants. The Government prefers to provide all the funding for the consultants for detailed design and construction supervision, in order to simplify project financial administration. The proposed financing plan is in Table 3 and detailed in Appendix 6.

Table 3: Financing Plan
(US$ million)

Source of Financing	Foreign Exchange	Local Currency	Total	%
Asian Development Bank Loan	45.9	1.1	47.0	65%
Government	2.1	23.3	25.4	35%
Total	48.0	24.4	72.4	100%

Source: Appraisal mission estimates.

[4] The loan of $47 million would be 65.0% of the cost of the Project excluding the cost of the TA. Under ADB's cost-sharing policy, Fiji is a group C country, and therefore eligible for 65% of the project cost.

21. The loan will be from ADB's ordinary capital resources, under ADB's London interbank offered rate (LIBOR)-based lending facility. The loan will have a 25-year term, including a grace period of 5 years; an interest rate determined in accordance with ADB's LIBOR-based lending facility,[5] a commitment charge of 0.75% on undisbursed loan balances; and a front-end fee of 0.5%.[6] The Government has stated that its decision to borrow under ADB's LIBOR-based lending facility on the basis of these terms and conditions was its own independent decision and was not made in reliance on any communication or advice of ADB.

F. Implementation Arrangements

1. Project Management

22. The Ministry of Works and Energy (MWE) will be the Executing Agency, and its WSD/WSC will be the Implementing Agency (IA) for the Project. Two project management units (PMUs) will be established within WSD/WSC, one for Part A of the Project and one for Part B (Supplementary Appendix D). Although the two PMUs will operate independently, they will meet on a quarterly basis to review progress and identify any areas needing common action. The PMU for Part A will report to the head of the IA and will be responsible for implementation programming, selection and engagement of consultants, procurement of goods and services, management of construction, maintenance of project records, progress reporting, financial management, identification of problems and issues that may arise during implementation, staff training, and preparation of recommendations for adjustments in the Project, if any. The PMU for Part A will be headed by a project manager with suitable expertise, and experience in similar projects. There will also be two assistant project managers, one for water and one for sewerage, as well as a senior valuer, a land acquisition officer, a community relations officer, an accountant, and support staff. Design and supervision consultants will report to the project manager. The PMU for Part B will report to the head of MWE and will be responsible for implementation programming, selection and engagement of consultants, procurement of goods and services, supervision of consultants, maintenance of records, progress reporting, identification of problems and issues that may arise during implementation, staff training, and preparation of recommendations for adjustments in the Project, if any. The PMU for Part B will be headed by an institutional development specialist with relevant expertise and experience in similar operations. In addition, it will have an assistant institutional development manager, short-term advisors, and support staff. WSD/WSC will provide the two PMUs with secretarial and other support services. WSD/WSC will operate and maintain the project facilities on completion. The establishment of the PMU-Works and the PMU-Reform, and the designation of each of their heads —acceptable to ADB— will be conditions of loan effectiveness. A consultative process will be established under which WSD/WSC will keep members of community groups (including members of squatter settlements and indigenous peoples settlements) informed about the Project, and seek their support in matters such as location of facilities, land acquisition, and identification of sewage overflows.

23. A project steering committee (PSC) will be constituted from among the members of the capital works committee, which was established during the preparation of the master plan for the development of water and sewerage service in the Suva–Nausori area, and for the feasibility study for the Project. The PSC will comprise, but not be limited to, representatives of the

[5] Following standard ADB practice a 5-year LIBOR swap rate (3.3% plus 0.6%) has been assumed in the financial analysis.

[6] The front-end fee of 0.5% is a reduced rate approved by ADB's Board of Directors. In the event the loan is not approved in 2003, the front-end fee will revert to the standard rate for OCR loans as determined by the Board of Directors.

Ministry of Finance and National Planning, MWE, and the Lands and Survey Department. The PSC's prime roles are high-level coordination, particularly among government departments, and identification and rectification of any issues that may arise during project implementation.

2. Implementation Period

24. The Project will be implemented over a 5-year period approximately from April 2004 to April 2009. The implementation schedule is given in Appendix 7.

3. Procurement

25. Civil works contracts greater than US$2.0 million in value, and equipment and materials supply contracts greater than US$500,000 in value, will be tendered through international competitive bidding (ICB) procedures, in accordance with ADB's *Guidelines for Procurement* dated January 2001. Civil works contracts smaller than US$2.0 million will be undertaken under local competitive bidding (LCB) procedures acceptable to ADB. Equipment contracts of US$500,000 or less may be awarded through international shopping procedures acceptable to ADB. Prequalification of contractors will be carried out in accordance with procedures acceptable to ADB. Some small and moderate-sized works such as UFW detection and repairs; pump and motor replacement; and replacement and installation of new water and sewerage service pipes, house connections, and meters will be carried out through force account works, acceptable to ADB, which in aggregate will have a value of not more than US$5 million. The force account works would be too small and scattered to be of interest to contractors, and the IA has adequate facilities and the capability to undertake the works expeditiously and at reasonable cost. Vehicles, computers, and other equipment with a value of less than US$100,000 per item may be purchased under off-the-shelf or direct purchase procedures, the latter to ensure compatibility with existing equipment. Vehicles and equipment purchased under the Project for use by PMU staff and consultants will be handed over to the IA at the end of project implementation. Detailed designs for each physical component of the Project shall be submitted to ADB for approval prior to issuance of bidding documents. Indicative procurement packages are in Appendix 8 and a procurement summary is in Supplementary Appendix E.

4. Advance Procurement Action and Retroactive Financing

26. The Government has requested that advance procurement action be provided for (i) the recruitment of urgently needed consultants for the PMU-Reform; (ii) urgent water loss reduction activities undertaken with prior approval of ADB; and (iii) other civil works, equipment and materials for the water supply system rehabilitation and augmentation incurred under the Project prior to the loan effective date. The Government also requested that retroactive financing be provided for items (i) and (ii) procured after 1 January 2004. The retroactive financing will facilitate project implementation. To be eligible for ADB financing, such recruitment and procurement will follow ADB's *Guidelines for Procurement* dated January 2001. Retroactive financing will be considered for such recruitment and procurement in an amount not exceeding US$1.0 million. The Government has been advised that ADB's approval of the advance action and retroactive financing does not commit ADB to provide funding for the Project. MWE's capacity to carry out advance action has been found adequate.

5. Consulting Services

27. Consulting services under the loan will be provided in several packages: (i) project management-works; (ii) project management-reform; (iii) water loss reduction, infiltration assessment, mapping, environmental monitoring and computerization; and (iv) detailed design

and construction supervision (multiple contracts). All of the consultants except those for project management-works and detailed design and construction supervision would be funded under the loan. The consultants for package (i) will be selected as individuals and the consultants for packages (ii), (iii), and (iv) will be selected as firms. For packages (ii) and (iii), it has been agreed that consultants will be selected by MWE in accordance with ADB's *Guidelines on the Use of Consultants* using quality- and cost-based procedures. Package (iv) recruitment is under way; consultants are being selected by MWE through a process of international quality and cost-based selection, similar to that of ADB except that shortlisting was not used. For package (i) and (iv), ADB and the Government will agree on the terms of reference prior to consultant recruitment. For package (iv), the invitation materials, the draft contract, the results of the evaluation and the proposals of the first-ranked consultants will be provided to ADB for review before contract signing. For package (i), a list of the candidates, their qualifications, the evaluation of their qualifications, and the draft contract will be furnished to ADB for review before contract negotiations, and ADB will be provided with a copy of the signed contract. Appendix 9 gives the summary responsibilities for consultants and summary terms of reference are in Supplementary Appendix F.

6. Land Acquisition and Resettlement

28. Although project land acquisition and resettlement requirements are not considered to be significant by the standards of ADB's *Policy on Involuntary Resettlement,* there is still enough uncertainty in land acquisition requirements, particularly for sewerage, that land acquisition and resettlement needs must be monitored carefully. Preliminary sites have been selected for water supply reservoirs and pumping stations, and PWD has made preliminary enquiries with the Lands and Survey Department to ascertain land status and availability. About 20 hectares (ha) of land will be permanently required for the construction of access roads, water supply pumping stations, service reservoirs, and intake works, and about 4 ha of land will be temporarily required for the construction of a main water supply pipeline from the proposed Rewa pumping station to the Waila water treatment plant. For the water supply component, permanent resettlement of approximately five households (about 30 persons) will be required. For the sewage component, which is less extensive, but more focused on densely built-up areas, resettlement of about the same number of households and persons could be expected.

29. The Government's procedures for acquiring land, compensating landowners, and dealing with resettlement issues are described in a Land Acquisition and Resettlement Plan (RP), presented in Supplementary Appendix G and summarized in Appendix 10. It was agreed that the Government will ensure that all land and rights-of-way required by the Project will be made available in a timely manner and that the provisions of the RP, including compensation and entitlements for affected persons, will be implemented in accordance with all applicable laws and regulations, and with ADB's *Policy on Involuntary Resettlement,* following procedures acceptable to ADB. A community relations officer in the PMU will assist in community liaison, land acquisition, and resettlement. The Government will ensure timely provision of sufficient counterpart funds for land acquisition and resettlement activities and meet any obligations in excess of the RP's budget estimate. The Government will ensure that resettled persons will be at least as well off as they would have been in the absence of the Project. Adequate staff and resources will be committed to supervision and monitoring of the implementation of the resettlement plan. The plan will be updated regularly to reflect any significant material changes of the project scope or other causes, and such changes will be subject to ADB approval.

7. Disbursement Arrangements

30. Disbursements for contracts awarded under ICB and LCB procedures, as well as for

contracts for consulting services, will be by ADB's direct payment or reimbursement procedures. All disbursements will be in accordance with ADB's *Loan Disbursement Handbook* dated 2001 and detailed arrangements agreed upon by the Government and ADB. ADB will not provide funding for civil works unless consultants acceptable to ADB are recruited or unless staff acceptable to ADB are designated to provide for construction supervision.

8. Accounting, Auditing, and Reporting

31. MWE will maintain separate records and accounts for the Project, and will have the project accounts and financial statements, audited annually by independent private auditors acceptable to ADB. The project accountant, engaged under the PMU-Works, will have experience in ADB's requirements for project accounting and audit procedures. MWE will provide ADB with copies of the audited project accounts and financial statements no later than 9 months after the end of the fiscal year to which they relate. MWE will provide ADB with quarterly progress reports on project implementation. Within 3 months of the physical completion of the Project, MWE will provide ADB with a project completion report. Progress reports will be compiled by the two PMUs, and consolidated by the PMU-Works.

9. Project Performance Monitoring and Evaluation

32. In consultation with ADB, the two PMUs will establish and maintain a project performance monitoring system expanding on the project framework. Project performance reports will be included in both PMUs' regular project reporting procedures, and will indicate the progress made in meeting national institutional performance targets, as well as physical targets for the project area. Performance indicators will include but not limited to, populations served, availability of water supplies, UFW, billing and collection efficiency, degree of completion of detailed design work, award of contracts, disbursements and cost recovery. The proposed project performance monitoring system is described in Supplementary Appendix H.

10. Project Review

33. ADB will carry out regular reviews of the progress of the Project in conjunction with the PMUs, at least twice per year. Reviews will include progress of policy and institutional reforms, as well as of physical works. Reviews will particularly focus on project performance indicators. The Government and ADB will carry out a comprehensive midterm review approximately 2.5 years after project implementation begins. The midterm review will include a review of progress toward achieving the Project's policy and institutional objectives, as well as progress in physical components, procurement arrangements, disbursement arrangements, the performance of the PMUs, and the performance of project consultants.

IV. TECHNICAL ASSISTANCE

34. ADB will provide an associated TA for institutional development and capacity building in WSD/WSC. The TA will enhance water and sewerage management by improvements in trade waste management, tariffs, environmental management, health and safety, and community awareness of water issues. It will produce the following outputs: (i) water sewerage tariffs study; (ii) a trade waste program; (iii) a health and safety system for WSD/WSC; (iv) environmental legislation and/or regulations recommendations; and (v) a community awareness and education program, with training products and course materials for incorporation in school and community education curricula. A TA framework is in Supplementary Appendix I.

35. The trade waste program will include an assessment of the source, quality, and quantity of trade wastes; development of legislation and regulations; and preparation of recommendations for an action plan to effectively control and manage trade wastes. Environmental legislation advice and recommendations will support the finalization of the Sustainable Development Bill, the Public Health and Pollution Control Bill, and for preparation of ambient and discharge standards and implementing regulations. The health and safety system will be comprehensive. The development of community education and awareness materials will include subjects such as water conservation, water handling, sanitation, water-related diseases, civic awareness, and other related topics. Although the TA will be community-wide, the community awareness component will have a subcomponent focused on slum and squatter settlements. The tariff study will identify tariff needs for acceptable levels of cost recovery, cost recovery mechanisms, tariff structures, and implementation mechanisms, as required to achieve commercial operations and meet debt servicing requirements for the Nadi–Lautoka and Suva–Nausori systems. The tariff study will ensure that any proposals are affordable and consistent with current government policies. MWE will be the Executing Agency for the TA, which will be carried out over a 1-year period starting in July 2004 and finishing at end of July 2005. Consulting services will comprise 26 person-months of international consulting services and 27 person-months of domestic consulting services. The consultants will be recruited as a firm through a process of quality- and cost-based selection in accordance with ADB's *Guidelines on the Use of Consultants.* The following specialists will be required: tariff specialist, community education specialist, environmental legislation advisor, trade waste specialist, public relations specialist, health and safety specialist, environmental management specialist, and environmental engineer. Reporting will include a brief inception report that focuses on any necessary changes to the scope of work or work program, and interim, draft final, and final reports. In addition, each consultant will be required to produce draft final reports relevant to their inputs for discussion with the Government, ADB, and other stakeholders, with the final report to be submitted within 1 month of receipt of comments from ADB and the Government. Consultants will also prepare briefing papers for periodic consultation workshops.

36. The cost of the TA is estimated at US$978,000 comprising a foreign exchange cost of US$661,000 and a local currency cost of US$317,000. ADB, through its TA funding program, will finance US$783,000, on a grant basis, for the entire foreign costs of US$661,000 and US$122,000 equivalent of local currency costs. The consultants' summary terms of reference and detailed cost estimates are given in Appendix 11.

V. PROJECT BENEFITS, IMPACTS, AND RISKS

A. Benefits

37. The project area extends for about 25 km from industrial areas around Lami to the west Suva, to rural areas around Nausori in the east. It is home to over 262,000 people or about one-third of the country's total population and almost 60% of its urban population. With in-migration from other areas of the country, the population is expected to increase at about 3% per annum.

38. There are high socioeconomic benefits associated with the Project. The benefits from the investments made in water include meeting suppressed demand of existing domestic and commercial customers, avoiding further deterioration of the system, avoiding tankering of water and conserving water through better demand management. The benefits from the investments in sewerage include smaller housing plot sizes for residential development under Suva town planning codes, increased economies of land use and avoidance of the costs of constructing and maintaining septic tanks. The discharge of raw sewage, has damaged the environment to

the detriment of all residents and visitors. This degradation has negative effects on residents' ability to continue to enjoy the use of the rivers and harbor areas, and it could detract further from Suva's tourist potential. The development of improved water supply and sewerage services will contribute to reducing health risks, especially for the poor households in informal squatter settlements. Increases in water and sewerage tariffs will be held in check through efficiency improvements in water and sewerage operations. The poor will benefit more than others because they will be protected by maintaining a lifeline block for basic water needs.

1. Economic Internal Rate of Return

39. The economic internal rate of return (EIRR) for water was calculated for the Project and for the master plan with and without tariff increases. Quantified benefits included the value of meeting suppressed demand and the demand of new customers, saved cost of water tankering, saved cost of small systems absorbed into the larger area, the value of incremental UFW actually supplied to consumers, and the value of connection revenues. Replacement and rehabilitation of assets was provided at 2.5% of total capital costs every 5 years. The resulting EIRR was 26.2% for the Project, 24.9% for the master plan without a tariff increase, and 21.4% for the master plan with a tariff increase, which results in decreased consumption.

40. An EIRR for sewerage was calculated for the master plan. Since I&I has not been quantified, and the benefits of I&I reduction would pertain more to the Project than to the master plan, this could be expected to yield a conservative result lower than that for the Project. Quantified benefits included land value, value increases in areas provided with sewerage, plus the avoided cost of constructing and deluding septic tanks. Replacement of rehabilitation of assets was provided at 2.5% of capital costs every 5 years. The resulting EIRR for the master plan was 9.8%, which is reasonable given that because of lack of data it was not possible to calculate either the value of improved receiving water and environmental quality in areas affected by water and environmental quality changes or the cost savings due to decreased I&I. The EIRR for the water and sewerage master plans combined, assuming a water tariff increase that would decrease consumption, was 18.5%; this result provides a strong economic justification for the Project. Details can be found in Appendix 12 and Supplementary Appendix J.

2. Poverty

41. A detailed poverty assessment carried out in parallel with project processing has confirmed that in 2002 more than 27% of the population of the project area are poor, meaning that their incomes are insufficient to meet basic needs. Such households may have enough to eat but be unable to provide schooling for their children or health care for their sick. Urban Indo-Fijians suffer from a slightly higher amount of poverty (31%) although ethnic Fijians are close behind (27%). The incidence of urban poverty has increased since the mid-1990s, due to the slowdown of the sugar economy and lack of urban job creation; unemployment increased by 122% between 1996 and 2002. Although some urban poor may live in small formal housing, about half of them live in informal and squatter settlements.[7] Although many informal and squatter settlements have piped water available to them, it is often available to only a few of the residents and the others must share. Few informal and squatter settlements have sewerage facilities, and suffer from poor sanitation as well as create pollution for others. Pit latrines, water seal toilets, and some flush toilets to septic tanks are the main types of toilets in such areas. A

[7] An informal settlement is one in which occupation rights have been given by the landowner but the rights of the occupant have not been recorded. A squatter settlement is one in which occupation rights have not been given. Most squatter settlements are on marginal and/or state-owned land.

participatory hardship assessment carried out in 2002 revealed that people in such areas gave water supplies a high priority. Even those with taps experienced frequent service interruptions and those without taps were anxious to be connected. Where shared connections were used, people were often paying significantly more for their water taps since the stepped tariff discriminates against large users. Many people in such areas rely on surface and well water for nondrinking purposes, that is frequently contaminated, raising the risk of illness. Lack of sewerage is a serious problem, particularly in the low-lying informal and squatter communities.

42. Although the Government has a policy of providing metered water supply connections to individual dwellings in informal settlement areas, such connections require the landowner's permission, which often takes time or is difficult to secure. The Government also has a program for regularizing squatter settlements, but it depends upon assessments of the suitability of regularizing each settlement. In cases where the settlement has not been regularized or will not be regularized, a few occupants will usually succeed in getting a water connection but they do so despite lacking the required documentation (an occupancy permit and a building permit). To address these problems, the IA will prepare a program to improve the provision of water and sewerage in poor communities and submit it to ADB for review.

43. The Project's water supply component will help reduce health risks, such as infantile diarrhea, that are due to the lack of water and contamination of water arising from low pressure in the piped system. It will also provide water for cooking, washing, and bathing, and reduce the cost of boiling water. Improvements to sewage disposal to prevent contamination of waterways will benefit the poorest that live in swampy, low-lying, poorly draining areas near the coast such as in Vatuwaqa and the Samabula River. These communities use these waterways for fishing and supplementing their food sources. The environmental benefits of the Project's sewerage component will improve the quality of life for the poorest people.

44. A quantitative assessment was carried out of the Project's net benefit distribution. Several stakeholder groups were identified, of which the poor were one, and the Project's net economic benefits to them were estimated, as calculated in the economic analysis described in paragraphs 39 and 40, less any changes in the cost to the poor of the improved services. In aggregate, the water and sewerage components of the Project generate total net economic benefits of about US$40 million, of which it is estimated that about US$14 million will accrue to the poor. This gives a combined project poverty impact ratio of 35%, which is above the proportion of poor households and substantially above the proportion of poor household income in the project area. The sewerage component yields more than half the net benefits, underlining the importance of implementing sewerage improvements as well as water supply improvements in such communities. A summary poverty reduction and social strategy is in Appendix 13 and a poverty impact assessment is in Supplementary Appendix K.

3. Financial Aspects

45. The financial internal rate of return (FIRR) of the water supply part of the project is 4.0% with present tariffs. Since the effects of the short-term sewerage investment cannot be separately identified, it is not possible to provide an estimate for the FIRR of the combined water and sewerage project. The net financial flows for the water supply and sewerage master plans were combined to provide an FIRR for the overall master plan. The master plan FIRR is 3.1% with present tariffs and 5.6% with a 60% tariff increase in 2006 required to set the overall FIRR equal to the weighted average cost of capital. Corporatization requires a reasonable prospect of such a tariff increase, and will require an explicit subsidy payment from the Government until profitability is achieved. For long-term sustainability of the master plan, as well as from the

standpoint of long term sustainability of water and sewerage operations it will be necessary to double the water tariff and triple the sewerage tariff.[8]

46. Several options are available to allow such tariff increases without causing affordability problems. In the case of water, the present tariff for nondomestic customers is only about half of full costs and could be increased without causing economic distortion. The size of the first lifeline domestic supply block could be reduced provided that arrangements are made to ensure that needy households sharing a water connection are not unduly penalized. In the case of sewerage, the tariff should be restructured to be similar to the water tariff. Such changes could generate the increase in revenues required for commercial operations without creating hardship for existing consumers. For a population already spending substantial amounts for bottled and tankered water, it can be expected that willingness to pay will exist provided the services provided are of suitable quality. Tariffs at the levels proposed are affordable for both average and low-income households. In 2008, the expected tariffs represent a water and sewerage bill equivalent to 2.6% of the income of an average household, a moderate increase as compared with the current level of 1.4%. For a low-income household, when the basic needs covered by the lifeline block (equivalent to consumption of about 60 liters per capita per day) are met, the water and sewerage charges will amount to 1.5% of income in 2008, as compared to 0.9% in 2001. An internationally acceptable level of affordability for water and sewerage is regarded as 3–5% of monthly household income, indicating that the proposed tariffs are affordable.

B. Social and Environmental Impacts

1. Social

47. The Project will have a positive social impact. The risk of waterborne disease outbreaks will be decreased. More reliable and improved water supplies will be provided to almost all residents and industries; the latter will lead to improved production and economic stability. The trade waste policy, industrial discharge connections, and sewerage system upgrading will result in cleaner waterways and an improved quality of life. Communities will be better informed about water and sanitation issues, and improved operational performance will result from such awareness. There will be improved public confidence in the provision of water supply and sewerage services. Although there will be increased tariff charges for average water and sewerage users, the poor will be protected through maintaining a small lifeline block, and increased tariff charges will be offset by reduced taxes.

2. Environment

48. The Project will have a positive benefit to the environment through (i) substantial reduction of sewage entering the groundwater, streams, and the sea due to inadequate treatment in septic tanks; (ii) substantial reduction of sewage pump station failures and consequent overflows, which often seriously affect low-lying communities near coastal waters; and (iii) provision of sludge treatment facilities at the two project WTP. Altogether, these improvements will help to alleviate serious pollution of streams, drains, and coastal waters in the project area. Improvements in coastal water quality are closely linked to the extension of the sewage outfall that is being funded by the European Union, and assurances have been included to ensure reporting on the progress of outfall completion. Sustainable improvements in stream, ground, and marine water quality will be supported through assurances for the enactment of key environmental legislation, including the Sustainable Development Bill and the Public Health and

[8] Detailed financial projections are included in Supplementary Appendix L.

Pollution Control Bill, or other legal measures that will help clarify and strengthen the basis for regulation and control of waste discharges. The strengthening of PWD's water quality laboratory and improvement of PWD's environmental guidelines will help ensure the monitoring of project impacts and benefits, including the sustainability of water quality benefits.

49. The initial environmental examination (IEE) completed under the feasibility study and the updated assessment during appraisal, the recommendations of which are summarized in Appendix 14, concluded that the Project would have these environmental benefits but also noted potential negative impacts may be experienced due to increased water withdrawals from the Rewa River. However, it is expected that these impacts would be minor, however, since the data used in the modeling and assessment was very limited, this issue will require further assessment during detailed design. Negative impacts, such as erosion and sedimentation, are possible during construction works, but can be mitigated through standard engineering and environmental control practices. An updated environmental assessment will be prepared for all components during detailed design to confirm the conclusions of the IEE and develop environmental management plans (EMPs), satisfactory to ADB, for each project component and the overall Project. Particular attention will be given to the Rewa River intake works and the sludge treatment and disposal facilities at the two WTP. Disbursement of funds for these components will require detailed environmental examinations and EMPs acceptable to ADB. Project environment monitoring will be provided by MWE through its own staff, civil works supervision consultants, and an environmental monitoring consultancy. MWE will ensure that the Project is implemented in an environmentally sound manner, in accordance with the recommendations of the summary IEE, updated EMPs and all applicable laws of the Fiji Islands, ADB's *Environmental Policy,* and ADB's *Environmental Assessment Guidelines* from 2003. The full summary IEE is in Supplementary Appendix M.

3. Gender

50. Lack of water places an extra burden on women and children by adding to their workload in the collection and storage of water. Women are most inconvenienced by intermittent cuts in water supply. In both indigenous Fijian and Indo-Fijian cultures, women are at the center of the domestic sphere with prime responsibility for water and sanitation at home. They are principal carers for children and have control over food preparation, bathing, toileting, and hygiene of these children. Thus, the Project will have a profound effect on women in terms of improving environmental conditions, improving water supply, and improving their and their children's health conditions. The community education and awareness program also targets women.

C. Risks

51. Institutional reforms are necessary in order to provide the quality and quantity of water and sewerage services proposed and to sustain the project facilities. However, many of the reforms to be implemented under the Project have been under discussion for at least 5 years, and the corporatization of water supply and sewerage services, actually begun in 1998, was first postponed by the government in power in mid-1999, and then halted by the present government in late 2001. Since then, the Government has put the corporatization of water supply and sewerage into its strategic plan for 2003-2005, while also expressing a strong desire to maintain accessibility to water and sewerage services, avoid tariff increases until services are improved, and avoid redundancies. The success of the Project will depend upon the thoroughness with which institutional reforms are prepared and Government commitment to the reforms.

52. Improved cost recovery and improved operations and maintenance are closely linked to the institutional reforms. It is important that the management of WSD/WSC receive the political

support and the autonomy necessary to operate more efficaciously. Operations and maintenance improvements are essential to reducing UFW, the high level of which contributes to financial inefficiency. Tariff increases are necessary to sustainably operate and maintain the system. A tariff study is included in the Project to reduce the risk that the Government will not raise tariffs by providing recommendations that address all aspects of tariff systems, including necessary cost recovery levels, cost recovery systems and mechanisms to implement them, as well as systems for the Government to meet social obligations for affordable water and sewerage services where these otherwise may not be commercially viable.

53. Improved environmental management is necessary to effectively manage sewage and other pollution sources and improve environmental quality. The public awareness program, environmental legislation assistance, and trade waste study included under the Project will mitigate risk of Government reducing its current efforts to promulgate the Sustainable Development and Public Health and Pollution Control Bills. The awareness programs and the environmental monitoring program together with the further environmental requirements included in the detailed design and construction phases will prevent or mitigate potential risks associated with the water intake and water treatment plant sludge disposal system.

54. The Government's limited familiarity with ADB's procedures for quality- cost-based selection procedures and PWD water and sewerage division's lack of recent experience with ADB's procurement procedures could result in delays in the early phases of implementation. This risk has been mitigated through relevant discussions during Appraisal and provision of guidelines. A project implementation seminar in the Fiji Islands for the EA is also planned.

D. Overall Assessment

55. While there are substantial risks associated with the Project, resources have been built into the project to avoid them. Political commitment will be a key component in risk reduction, and this depends on a clear and consistent presentation of the rationale and sequencing of project reforms. From the available evidence the Project benefits will outweigh the costs and the Project sufficient robust to be beneficial under the likelihood of various risk occurring. The Project contributes to ADB's strategy for the Fiji Islands and its development goals.

VI. ASSURANCES

A. Specific Assurances

56. In addition to the standard assurances, the Government has given the following specific assurances which are incorporated into the Loan Agreement:

(i) The Government will comply with, or cause PWD/WSD/WSC to comply with, the IRAP, as endorsed by Government's Cabinet of Ministries on 5 November 2003, in particular,

(a) by 30 June 2004, the Government will have appointed WSD's advisory board;

(b) By 1 July 2004, WSD will have developed a staffing plan for WSD with position descriptions for senior staff, resourcing strategies, position evaluations and redeployment plans; and, by 1 July 2004, WSD and the Borrower's Public Service Commission will have entered into a senior

officer's employment agreement, based on key performance indicators, with every senior WSD officer.

(c) by 30 September 2004, the Government will have completed the separation of those units, staff, assets, and records currently within PWD that will make up the new WSD;

(d) by 30 June 2005, the Government will have submitted to Cabinet a memorandum reviewing the progress of reorganization to that date, and outlining the further steps to corporatization; and

(e) by 30 September 2005, the Government will have submitted to Cabinet a memorandum presenting for approval the charter, organization plan, staffing plan, outline chart of accounts, management information reporting system, and the financing and regulatory arrangements for WSC. The Government will cause Cabinet consideration of this cabinet memorandum to take place not later than 31 December 2005.

(ii) To ensure transparency and accountability, WSD/WSC will make available to the public its annual corporate plan within 3 months after the commencement of each year, and its annual report and financial statements within 6 months after completion of each year. The results of the tariff study will also be made public, so that the community is prepared for these increases.

(iii) The following operational improvements will be under taken:

(a) The Government will cause WSD/WSC to establish client services units in each major service area, with the objective of responding to all customer complaints. WSD/WSC will respond to any such complaints involving interruptions of services, leaks, or blockage of sewage within 48 hours, and complaints involving errors in bills and similar matters within 30 days. WSD/WSC will establish the client services unit in the Suva-Nausori area by not later than 31 December 2004.

(b) By 1 July 2004 and continuing thereafter, WSD/WSC will undertake a program of community awareness of water issues, including water demand management, water handling, waterborne disease, and sanitation.

(c) WSD/WSC will undertake a program for provision of water supply and sewerage services in poor urban and rural communities, including squatter settlements. The program will aim at universal access to water and sewerage services at cost levels affordable and acceptable to the poor. The program will be provided to ADB for review by 31 December 2004.

(d) By 31 January 2004, PWD/WSD will have adopted a water loss reduction program satisfactory to ADB, providing for reduction of UFW in the Suva–Nausori area to not more than 30% by 31 December 2007.

(e) The Government will ensure (a) by 31 December 2005, the implementation of a sewer rehabilitation program designed to reduce inflows and infiltration; and (b) by 31 December 2006, the implementation of a trade waste program with a discharge permit system to cover all non-domestic discharges to wastewater system with adequate standards, appropriate treatment requirements, and monitoring and enforcement provisions.

(f) The Government will develop and implement a long-term program for

monitoring the quality of receiving waters and the aquatic biological environment affected by the Project.

(g) The Government will, through its regular quarterly reports, keep ADB apprised of progress on the extension of the Kinoya sewage outfall, and inform ADB of any delays, changes, or problems that could affect the performance of the Project.

(iv) The following financial management improvements will be undertaken:

(a) The Government will cause WSD to set up an accounting system, following existing government accounting procedures, which will provide data on costs and revenues by district by month. Overhead costs will be reported separately and allocated in the management information reporting system to be set up under the Project.

(b) The Government will cause WSD/WSC to conduct a tariff study that will consider and agree appropriate levels of cost recovery and mechanisms for cost recovery systems, including means for the Borrower to meet social obligations for affordable water supply and sewerage, consider and agree appropriate tariffs to ensure that poor families sharing a connection are not penalized by high block rates, and review and discuss existing demand forecasts. The Borrower will ensure this report is released to the public.

(c) Beginning from 1 January 2004, PWD/WSD will establish a debt collection unit to enforce a disconnection policy with the objective of reducing the outstanding debts to 90 days by 31 December 2004, and to 60 days by 31 December 2005. Disconnections will be initiated when a water or sewerage bill is more than 30 days in arrears, and will be carried out within 30 days of being ordered, in line with prevailing government regulations.

(d) By 30 April 2005, WSD will establish an accounting system able to produce an income statement, balance sheet, and cash flow/flow-of-funds statements following accrual accounting procedures and other generally accepted accounting policies.

(e) By 31 December 2007, taking into account the results and recommendations of the tariff study, the Government will cause WSD/WSC through improvements in operations and financial management to achieve recovery of the costs of operations, maintenance and debt service.

(f) WSC, once established, will operate in a financially sustainable manner, within a social policy and regulatory framework established by the Government. To the extent that WSD agrees to undertake social services, and these require subsidies, these will be subsidized by the Government.

(v) The Government will ensure, and will cause MWE, WSD and/or WSC as the case may be to ensure, that the Project facilities are designed, constructed, operated, maintained and monitored in strict conformity with: (a) all applicable government laws, regulations, permits and approvals, including national and local environmental protection, social development, health, labor, child protection, and occupational safety regulations and standards; (b) all mitigation and monitoring measures detailed in the various environmental assessments and plans relating to the Project, e.g., the initial environmental examination (IEE), and all relevant

environmental assessments (EAs) and environmental management plans (EMPs); and (c) ADB's *Environment Policy* and ADB's *Environmental Assessment Guidelines, 2003.*

(vi) Without limiting the generality of the foregoing: (a) the Government will ensure that during the detailed design stage of the Project, EAs and EMPs, all satisfactory to ADB, are completed for each phase of the Project; (b) the Government will ensure that environmental mitigation measures identified as a result of the IEE, EAs or EMPs are incorporated as relevant into the various design and bidding documents, and later into each contract of works under the Project; (c) with regard to the water and environmental monitoring referred to above, the Government will cause the water and environmental monitoring program to be undertaken under the guidance and supervision of the Environment Department and the Health Department and will ensure monitoring information is included in project progress reports submitted to ADB; and

(vii) The Government will complete passage of the Public Health and Pollution Control Bill and the Sustainable Development Bill by 30 June 2005 or effect other legal measures needed to achieve the sewage system connection, trade waste management, watershed protection, water quality standards, and environmental monitoring programs required under the Project.

(viii) The Government will ensure that all land and rights-of-way required for the Project will be made available in a timely manner, and that the provisions of a land acquisition and resettlement plan, including compensation and entitlements for affected persons, will be implemented in accordance with all applicable laws and regulations, and to the satisfaction of ADB. The plan will be revised and updated based on detailed designs and submitted to ADB for review and approval before implementation of the related physical works.

B. Conditions for Loan Effectiveness

57. Approval of the organization and staffing plan for WSD acceptable to ADB by the Public Service Commission; designation of the head of WSD, who will be suitably qualified and experienced for the position; the establishment of a PMU-Works and a PMU-Reform, with in each case a designated head acceptable to ADB; and appointment of the change manager to oversee the reform process within PWD/WSD will be conditions of loan effectiveness.

VII. RECOMMENDATION

58. I am satisfied that the proposed loan would comply with the Articles of Agreement of ADB a+nd recommend that the Board approve the loan of US$47,000,000 to the Republic of the Fiji Islands for the Suva–Nausori Water Supply and Sewerage Project from ADB's ordinary capital resources with interest to be determined in accordance with ADB's LIBOR-based lending facility; a term of 25 years, including a grace period of 5 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.

Tadao Chino
President

20 November 2003

SUMMARY SECTOR/SUBSECTOR ANALYSIS

A. Introduction and Scope

1. The relevant sub-sectors in the analysis included water supply and urban wastewater management. This appendix briefly summarizes the status of the subsectors, including (i) relevance to ADB's Water Policy and country strategy; (ii) indicators, such as environmental quality and access to sanitation; and, (iii) institutional framework. Appendix 4, Institutional Reform Action Plan, Supplementary Appendix A, Demand Assessment, and Supplementary Appendix B, Sector Roadmap provide the relevant details for indicators and necessary institutional, legislative, policies technical, planning needs, and action plans.

B. ADB Sector Focus and Country Strategy and Program

2. ADB's Water Policy supports integrated water resource management improved and expanded delivery of water services, foster cooperation and awareness, promote regional cooperation, facilitate the exchange information and improve governance. It further emphasizes the need for autonomous management of water utilities, cost recovery and private sector participation while ensuring access and equitable service to the poor and vulnerable. The Country Strategy and Program for Fiji aims at promoting economic growth and improve the quality of life, especially for those left behind or vulnerable to external shocks or natural disasters. The strategy is consistent with the Government's strategic development plan for 2003-2005. ADB will focus on public investment in physical infrastructure in key sectors, strengthen associated policy institutional and regulatory framework frameworks, and promote private sector participation in public enterprises. The CSP update is well aligned with the millennium development goals. The project supports ADB's strategy for the Fiji Islands and the ADB Water Policy through (i) fostering good water and environment governance; (ii) improving living conditions and, (iii) at promoting private sector growth improved environmental infrastructure.

C. Indicators

3. A large majority of the population (50%) have access to potable water. And 75% has access to safe sanitation, In Suva-Nausori approximately 93% have access to safe water and about 27% are served by the wastewater collection system and most of the remainder by septic tanks, though some have no facilities (specific data are not available). Marine and urban stream water quality in the Suva-Nausori area has been significantly degraded as a result of the inadequate sanitation and poor condition of the sewer system. Water quality monitoring data shows definitive evidence of sewage contamination.

C. Institutional Framework

4. Present institutional arrangements for water supply and sewerage and environmental management are weak. Water and sewerage operations are managed from a division within the public works department, which leads it to compete for human and financial resources, resulting in management deficiencies. The Government's strategic development plan for 2003-2005 recognizes the need for institutional reform to achieve acceptable operations and maintenance and cost recovery levels and thus calls for corporatization of water supply and sewerage service by end of 2005. Environmental legislation is limited, which also has constrained development of appropriate management system; however, the Government is in the process of promulgating a sustainable development bill and public health and pollution control bill.

D. Need for the Project

5. Rehabilitation, optimization and expansion of the water supply and sewerage systems are urgently needed. Institutional reforms included in the Project that will in turn result in improved operations and maintenance and cost recovery ensure sustainability of Project outputs.

EXTERNAL ASSISTANCE

Source and Year	Description	Amount (US$ million)
Asian Development Bank		
1996	Technical Assistance No. 2621-FIJ: Corporatization of the Water and Sewerage Section of the Ministry of Public Works, Infrastructure, and Transport	0.6
1998	TA No. 3055-FIJ: Suva-Nausori Water Supply and Sewerage Project	0.8
1999	TA No. 3170-FIJ: Implementation of Corporatization of Water Supply and Sewerage Services	0.1
Australia		
1977 – 1982	Suva Water Supply Augmentation (design and supply of equipment for the Waila water treatment plant)	1.0
1980 - 1987	Small Grant Scheme. – supply of pipes and equipment; preparation of Coral Coast Master Plan	0.4
1981	Suva Water Supply Augmentation – supply of pipes and equipment	0.5
1981	Suva Sewerage Scheme – construction of tunnel	0.5
1982	Suva Sewerage Scheme – supply of pipes, equipment and plant	0.6
1982	Lautoka Sewerage Scheme – outfall pipeline	0.8
1983 – 84	Preparation of Suva Water Supply Master Plan	0.2
1984	Suva Sewerage Scheme – supply of laboratory equipment	0.2
1988	Suva Water Supply – supply of pipes and pumps	0.4
1989 – 1991	Suva Water Supply – supply of pipes, pumps, and consulting services	2.5
European Union		
2000	Kinoya sewage treatment plant – outfall pipeline	3.8
Japan		
1999 -2003	Nadi – Lautoka Water Supply Project	15.0

Source: Appraisal Mission data.

PROJECT FRAMEWORK

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
Goal ▪ Enhanced human development particularly for the urban poor	▪ Enhanced consumer satisfaction with piped water supplies ▪ Reduced inconvenience and cost due to purchasing water from tank trucks and having to filter and boil it for drinking ▪ Reduced illness and death due to waterborne diseases, particularly among children ▪ Infertile diarrhea reduced from 10,000 cases per annum during 1995–2000 ▪ Gastroenteritis, infectious hepatitis, and typhoid also reduced ▪ Increased consumer usage of stream and foreshore waters ▪ Restoration of plant and animal life in streams and foreshore waters	▪ News media, ▪ Consumer surveys ▪ Health statistics ▪ Environmental surveys built into the Project ▪ Absence of tank trucks and consumer water filtering and boiling activities ▪ Socioeconomic surveys ▪ Progress reports ▪ Review missions	▪ Improved water supplies will result in increased consumer satisfaction ▪ Services to the poor will improve ▪ Improved water supplies will result in better health ▪ Health statistics are accurate ▪ Reduced sewage flows achieved under the Project will not be offset by continued unserviced growth
Outputs ▪ Increased coverage and quality of water supply in the Suva-Nausori area.	▪ Increased delivery of potable water in the Suva-Nausori area without significant service interruptions, for a population of 288,000 persons (95% of the population) served in 2008 as compared to 243,000 (93%) served in 2003 ▪ Reduction in unaccounted for water from 55% of water produced to 30% ▪ Increase in water production capacity from 145 megaliters per day (Ml/d) to 160 Ml/d ▪ Saltwater intrusion into source waters prevented ▪ Water supplied 24 hours a day, 7 days a week to entire system ▪ Water quality meets World Health Organization standards	▪ Consumer surveys ▪ National Water Quality Laboratory tests ▪ Water loss monitoring data ▪ Utility statistics ▪ Progress reports ▪ Review missions	▪ Operational performance is actually improved, ▪ Internal incentives are in place to make operational changes. ▪ Squatter settlement access issues are resolved.
▪ Increased coverage and effectiveness of wastewater collection and treatment services provided in the Suva-Nausori area.	▪ Increased coverage of sewerage service with 121,000 persons (42% of the population) served in 2008 as compared to 71,000 (27%) served in 2003 ▪ Reductions in discharges of raw sewage from the collection system that have resulted from pipe breakages and pump station failures	▪ Consumer surveys ▪ Review missions ▪ Water loss monitoring data ▪ Inflows and infiltration (I&I) monitoring data	▪ Operational performance is improved. ▪ Legal provision for sewerage connection enacted and enforced. ▪ I&I study-identified rehabilitation requirements are implemented.
	▪ Reductions (by 50%) in I&Is that currently increase sewage flows and overload the sewage treatment plant	▪ Utility water quality monitoring ▪ Utility statistics ▪ Progress reports	

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
• Improved quality of the water in the streams and foreshore waters of the Suva-Nausori region	▪ Establishment of a trade wastewater management system ▪ Improvement in the adverse environmental conditions that have been caused by inadequate sewerage services ▪ Improved environmental quality monitoring and regulatory framework for environmental management	▪ Review missions ▪ Monitoring program developed under the Project ▪ Progress reports ▪ Review missions ▪ Institutions developed, laws and regulations developed under the Project	▪ Improved sewage collection and treatment will result in improved stream and coastal water quality ▪ Improved institutions, laws, and regulations will result in more effective systems of incentives and controls
▪ Capacity to deliver water and sewerage services in accordance with demand and mandated levels of service	▪ Establishment of an entity dedicated to provision of water supply and sewerage services in the Fiji Island's metered water supply areas, with arrangements for autonomy, transparency, and accountability similar to those of a commercial water supply and sewerage agency	▪ Cabinet papers, laws, and regulations ▪ Agency reports ▪ Progress reports ▪ Review missions	▪ An autonomous agency will deliver services in accordance with demand and mandated services. ▪ A suitable governance, regulatory and financial framework can be developed and will work as planned. ▪ Government can mobilize stakeholder and public support for change. ▪ Entrenched interests resistance to change will not derail the process.
Outputs and Activities ▪ Rehabilitated water supply system, increased water source supply, increased water production capacity, and extended service area	▪ Implementation of a program for water loss reduction comprising leak detection, replacement of 50 kilometers (km) of distribution mains, replacement of about 15,000 leaking service pipes and 27,000 malfunctioning meters; rehabilitation of the Tamavua main storage reservoirs and the upper Waimanu pumping station, and a demand management program	▪ Project progress reports ▪ Project review missions	▪ Adequate project management units (PMU) and utility staffing ▪ Adequate counterpart funding

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
	▪ Optimization and augmentation of the distribution system comprising installation and upgrading of pumping stations in 4 locations, construction of additional service, storage, and balance reservoirs with a capacity of about 29 megaliters, construction of about 40 km of additional mains, and installation of about 13,000 new house connections ▪ Augmentation of water sources, including construction: of a new water supply intake and pumping station on the Rewa River, and construction of about 7 km of new source and rising mains and related pump station improvements ▪ Augmentation of existing water treatment plants, including rehabilitation of mechanical facilities in the Tamavua treatment plant, construction of a new clear water reservoir at Waila, upgrading and installation of instrumentation systems, construction and upgrading of sludge and backwash facilities at Waila and Tamavua, and upgrading laboratory facilities		
▪ Rehabilitated sewerage system, upgraded wastewater treatment plant, and extended sewerage system	▪ Rehabilitation and upgrading of existing sewerage collection networks, including rehabilitation works identified by the I&I study, comprising rehabilitation and replacement of about 8 km of trunk mains, gravity mains, rising mains, and pump stations ▪ Improvement of the Kinoya sewage treatment plant, including inlet works, odor control and sludge treatment, dewatering and disposal systems ▪ Construction of about 15 km of new trunk sewer mains, collectors and reticulation, with related pumping stations; installation of about 6,300 new sewerage connections in backlog areas and in presently unserved areas ▪ Design and implementation of a trade wastewater program ▪ Upgrading of maintenance facilities; and the existing national water quality laboratory at Kinoya ▪ Development and implementation of improved management systems, including mapping and geographic information systems, receiving water quality monitoring, and infiltration assessment and related design	▪ Project progress reports. ▪ Project review missions	▪ Adequate PMU and utility staffing ▪ Adequate counterpart funding

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
▪ Institutional Reform and Development	▪ Implementation of an institutional reform action plan aimed at creating a water and sewerage department (WSD) during 2004 and a water and sewerage corporation (WSC) by 2005 ▪ Implementation of a management information reporting system facilitating well-integrated, effective, and efficient water supply and sanitation operations ▪ Improvement of operations, including provision of consumer service units and metering, adoption of water loss reduction and I&I reduction programs, and mechanizing water and sewerage operations ▪ Upgrading of human resource management systems ▪ Strengthening of environmental monitoring and management systems ▪ Upgrading of computerized information systems through the provision of new hardware and software ▪ Conduct of a water awareness program ▪ Training of WSD/WSC staff ▪ Development of a trade waste program, improved health and safety procedures, environmental legislation and regulations, a community education and awareness program, with a component focused on slum and squatter communities, and a tariff study	▪ Consultants reports ▪ Cabinet papers ▪ Legislation and regulations ▪ Utility reports ▪ Project progress reports ▪ Review missions	▪ Continued high level support for reforms ▪ Adequate PMU staffing ▪ Consultants produce the required outputs ▪ Adequate agency staffing
▪ Implementation of a financial action plan including recommendations from the tariff study completed under the technical assistance (TA) associated with the loan	▪ Implementation of an accounting system for WSD that provides data on costs and revenues, by district by month, and on overhead costs, and for WSC that provides data as required for commercial operations ▪ Revision of the sewerage act to provide for cutting off water services for failure to pay the sewerage bill ▪ Update an earlier valuation of assets to enable introduction of commercial accounting under WSC ▪ Recovery of cost of operation and maintenance and debt service by 31 December 2006 ▪ Recovery of cost of operation and maintenance and debt service and 25% of capital expenditures, or operation and maintenance interest and depreciation, whichever is greater, by 31 December 2012 ▪ Arrears reduced to 60 days by 31 December 2005 ▪ Average age of consumer meters reduced from 20 years to 7 years	▪ WSD/WSC reports ▪ Progress reports ▪ Review missions	▪ Willingness to restructure and increase the tariff to the extent required. ▪ Willingness to implement an arrears reduction policy ▪ Willingness to implement an effective metering program

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
▪ Affordable access program	▪ Government subsidy/community service obligation identified and implemented ▪ Public informed of program	▪ Project progress reports. ▪ Project review missions.	▪ Government commitment
▪ Improved urban coastal area and stream water quality	▪ Water quality meets adopted standards 60% of the time.	▪ Utility monitoring data ▪ Progress reports ▪ Review missions	▪ Government enactment and enforcement of environmental legislation and standards ▪ European Union - funded outfall extension constructed
Inputs ▪ Government staffing Investment loan Design consultants Civil works contracting Institutional consultants Project management assistance consultants Environmental monitoring consultants Equipment and software Associated grant TA	Under the loan: ▪ 1,005 government and consultant professional person-month inputs (government 180, consultants 825) ▪ Consultants for (i) project management-works, (ii) project management-reforms, (iii) leak reduction, I&I surveys, trade waste reduction and mapping and (iv) detailed design and construction supervision ▪ Total budget of US$72.4 million with US$47.0 million Asian Development Bank (ADB) loan Under the TA: ▪ Consultant inputs of 53 person-months, 26 international and 27 local ▪ Total budget of US$978,000 with US$783,000 ADB grant	▪ Project progress reports. ▪ Project review missions. ▪ Utility records	▪ Counterpart staff are available ▪ Counterpart budget is available on a timely basis. ▪ Civil works contractors supervised carefully to ensure quality performance ▪ Associated TA grant approved at indicated funding level

INSTITUTIONAL REFORM ACTION PLAN
(October 2003, Adjusted to Reflect Loan Technical Discussions)

Stage 1 – Internal Reorganization - Preliminaries		
1.1 Cabinet decision endorsing the creation of a Water and Sewerage Department (WSD) and the reform timetable contained in this institutional reform action plan.	Desirable Actual	30 Jun 2003 Aug 2003
1.2 Appoint change manager/s to oversee reform process.	Desirable Present Target	15 May 2003 Oct 2003
1.3 Engage organizational development support consultancy[a]	Desirable Actual	15 May 2003 Jul 2003 (Complete)
1.4 Develop and agree initial reorganization plan and targets. • Plan prepared • Plan adopted by PWD • Plan approved by PSC	Desirable Actual Present Target Present Target	30 Sep 2003 Aug 2003 Nov 2003 Mar 2004
1.5 Develop staffing plan with position descriptions for senior staff, resourcing strategies, position evaluations and redeployment plans.	Desirable Present Target	31 Oct 2003 Jul 2004
1.6 Briefing / training of staff including consultation with unions.	Original Present Target	30 Nov 2003 31 Mar 2004
1.7 Develop WSD chart of accounts, production areas, budgets, funding mechanisms and delegations. • Outline chart of accounts • Budgets, funding mechanisms and delegations	Original Present Target Present Target	31 Oct 2003 31 Dec 2003 Jun 2004
1.8 Develop outline Management Information Reporting (MIR) system by district and monthly, for initial operation of WSD. • Preliminary Design • Detailed Design	Original Present Target Present Target	31 October 2003 31 October 2003 Mar 2004
1.9 Upgrade rates collection database to suit WSD production areas, MIR and water loss reduction program requirements and undertake validation of customer records.	Upgrade Validate records	31 Dec 2003 30 June 2004
1.10 Test run WSD accounts and MIR in parallel with existing accounts.	Original Present Target	30 Nov 2003 July 2004
1.11 Designate Department Head, and finalize a Senior Officers Employment Agreement based on key performance indicators as per PSC Regulations.	Desirable Present Target Completed	31 Dec 2003 31 Mar 2004 Jul 2004
Stage 2 – Internal Reorganization – Implementation.		
2.1 Appoint WSD Advisory Board	Original target Present target	31 Mar 2004 30 June 2004
2.2 Implement separation of units including staff, assets and records. • Commencement • Completion	 Original target Present target Original target Present target	 31 Dec 2003 1 Jan 2004 30 Jun 2004 30 Sep 2003 (ties with Schedule 6)
2.3 Establish service agreements with Public Works Department and performance agreements with Public Service Commission and Ministry of Finance and National Planning for senior management	Start Completion Comment	31 Dec 2003 30 Jun 2004 Dependent on outcome of SES negotiations/trials
2.4 Prepare a Corporate Plan for WSD setting out performance targets and development goals.	Original Present target	28 Feb 2004 Jul 2004
2.5 WSD accounts, funding and MIR activated.	Original Start Fully underway	31 Jan 2004 31 Jul 2004 Jan 2005

[a]ADB TA funded.

2.6 Appoint senior positions and commence progressive implementation of staffing plan. • Commencement (Existing staff) • Completion (New Staff)	Original Present Original Present	31 Jan 2004 Jul 2004 (existing staff) 31 Jul 2004 Jan 2005 (New Staff)
2.7 Implement institutional development in management, community relations, health & safety, environment, trade waste management, water loss reduction, training, planning and operation of treatment, distribution and collection systems.	Original Present start Continuing	From 31 Jan 2004 31 Jul 2004 1 Jan 2005
2.8 Increase revenue collection through development of policy, staffing and community education and awareness.	65% 70%	30 Jun 2004 30 Jun 2005
Stage 3 – Water & Sewerage Corporation (WSC) – Preparatory Phase		
3.1 Conceptual design of WSC considering major urban, minor urban, peri-urban and rural service areas.	Complete	1 Jan 2005
3.2 Inventory and value water supply and sewerage assets	Complete	1 Jan 2005
3.3 Undertake tariff study to meet commercial, social and demand management objectives of government, define costs and establish financial performance indicators of WSC.	Complete	1 Jan 2005
3.4 Design WSC double entry accounting system, following accrual accounting procedures and other generally accepted accounting policies.	Complete	1 Jan 2005
3.5 Determine the level of cost recovery required by each cost center, need for subsidies, arrangements, and a detailed financing plan.	Complete	30 Jun 2005
3.6 Address issues of degree of autonomy, staff recruitment and remuneration policies, outsourcing, cost recovery, and sources of funds.	Complete	30 Jun 2005
3.7 Conceptual design of WSC organisation plan, staffing plan, investment plan and financial plan	Complete	30 Jun 2005
3.8 Develop a governance and regulatory framework for WSC pursuant to the Public Enterprise Act of 1996.	Complete	30 Jun 2005
3.9 Conduct a review of WSD to determine the progress of reorganization, the performance improvements achieved through creation of a department focused on water supply and sewerage and further steps to be taken.	Original Present	31 Mar 2005 30 Jun 2005
3.10 Submit to Cabinet a proposal for consideration by Cabinet for creation of a WSC, backed up by an appropriate implementation plan.	Original Present	30 Jun 2005 30 Sep 2005
3.11 Cabinet consideration of WSC formation	Original Present	30 Sep 2005 31 Dec 2005

FINANCIAL ACTION PLAN

- The Water and Sewerage Department (WSD), and its corporatized successor the Water and Sewerage Corporation (WSC), will operate in a financially sustainable manner, within a social policy and regulatory framework established by the Government. It will seek to generate the funding necessary to maintain its facilities and to contribute substantially to the cost of new facilities through user charges.

- The WSD will set up an accounting system, following existing government accounting procedures, which will provide data on costs and revenues by district by month. Overhead costs should be reported separately and consideration should be given to allocating them in the management information system to be set up.

- Revenues collected by the WSD through the Water Rates Office will continue to be transferred to the Government's consolidated fund.

- The WSD and the Ministry of Finance (MOF) will oversee the tariff study planned under the loan to ensure that (I) alternative definitions of full cost recovery are defined and discussed; (ii) appropriate levels of cost recovery for different types of system and for the operation as a whole are discussed and agreed upon; (iii) consideration is given to the possibility of varying tariffs by system; (iv) means are set up to ensure that poor families sharing a connection are not penalized by high block rates; (v) consideration is given to lowering the size of the first domestic block (band); and (vi) existing demand forecasts are reviewed, discussed, amended as necessary, and a system for continuous review and updating is set up.

- WSD will review and update an earlier valuation of water and sewerage assets and liabilities and prepare financial statements to enable them to be transferred to the WSC on its creation (not later than 31 December 2005).

- The WSC will assume the assets and liabilities of the water and sewerage systems for which it becomes responsible.

- The WSC will use a double entry accounting system and will follow accrual accounting procedures and other generally accepted accounting policies.

- The WSC will continue the procedure set up by WSD to provide monthly data on costs and revenues by district. Consideration will be given on the appropriateness of the district as cost center.

- In conjunction with MOF, the WSC will determine the level of cost recovery required by each cost center. If these agreed levels imply the need for subsidies, arrangements will be made for them to be recorded in the WSC books. MOF might wish to fund these subsidies directly. If not, they should be used to increase government equity. They should be allowed for in any required cost recovery for the WSC as a whole.

- The act or other legislation setting up the WSC will enable the board to retain relevant revenues collected by the Water Rates Office.

- MOF will pass on to the WSC, in Fiji dollars, any international and local loans taken out to finance its operations and expansion so that they appear on the entity's books of account.

- The WSC will be charged with paying debt service on those loans to MOF.

- If tariff revenues are not sufficient to make full loan payments, the residual will, after negotiations, be used to increase government equity in the WSC.

- The Government will clarify the tariff basis (monthly or quarterly), strengthen meter reading, billing and collection procedures, and enforce a well-publicized disconnection policy for nonpayment, with the objective of reducing the outstanding debtors from the presently estimated 300 days to 90 days by 31 December 2004, and to 60 days by 31 December 2005.

- Customers whose water or sewerage bill is more than 30 days in arrears will be informed that if they do not pay within 30 days they will be disconnected. Following disconnection, the service will not be restored until the debt and a reconnection charge are paid.

- To the extent that the WSD/WSC agrees to provide water or sewerage to social services, and that these require subsidies, the latter will be provided by the Government. WSD will obtain the repeal of the ordinance that provides rebates to customers for water losses after their meter.

- Not later than 31 December 2004 the Government will submit to Parliament a bill to amend the Sewerage Act to provide for disconnection of water services in the event of nonpayment of the sewerage bill.

- The WSC will through improvements in operations and financial management achieve the following levels of cost recovery: (i) operation, maintenance, and debt interest, not later than 31 December 2006; and (ii) operation, maintenance, and the higher of (a) debt service and 25% of capital costs or (b) depreciation plus interest, not later than 31 December 2012.

- The Government will monitor the financial situation of WSD/WSC and, in the event the above targets are not expected to be met, take action to enable their achievement, including further improvements in operational efficiency, tariff adjustments, or tariff increases.

DETAILED COST ESTIMATES AND FINANCING PLAN

Table A6.1: Cost Estimate

Item			Foreign Exchange (US$'000)	Local Currency (US$'000)	Total Cost (US$'000)
A.	Water Supply Rehabilitation and Augmentation Works and Equipment				
	1.	Water Loss Reduction Program	5,543	1,937	7,480
	2.	Other Rehabilitation	1,106	129	1,235
	3.	System Optimization	2,656	467	3,123
	4.	Distribution Pipe Network Augmentation	2,562	798	3,360
	5.	Distribution Pumps Augmentation	124	4	128
	6.	Service Reservoirs Augmentation	581	48	629
	7.	Water Sources Augmentation	5,450	854	6,304
	8.	Water Treatment Plants Augmentation	1,258	66	1,324
	9.	Land Acquisition	0	400	400
	10.	Water Loss Consulting Services	270	0	270
	11.	Design and Supervision Consulting Services	680	1,020	1,700
		Subtotal A	**20,230**	**5,723**	**25,953**
B.	Sewerage Rehabilitation and Augmentation Works and Equipment				
	1.	Network Rehabilitation and Replacement	4,398	1,063	5,461
	2.	Existing Pump Station and Mains Upgrading	636	134	770
	3.	Distribution Network Expansion	2,093	409	2,502
	4.	Distribution Network Infill	2,164	854	3,018
	5.	Sewerage Treatment Plant Augmentation	2,529	373	2,902
	6.	Workshop and Laboratory Facilities Upgrading	507	35	542
	7.	Trade Waste Management	208	67	275
	8.	Land Acquisition	0	600	600
	9.	Infiltration Assessment and Related Design	200	300	500
	10.	Mapping and GIS	180	120	300
	11.	Environmental Monitoring	240	360	600
	10.	Design and Supervision	1,000	1,500	2,500
		Subtotal B	**14,155**	**5,815**	**19,970**
C.	Sewerage Rehabilitation and Augmentation				
C1.	Project Management-Works				
	1.	Project Manager/Senior Engineer	480	0	480
	2.	Senior Engineers (2)	672	0	672
	3.	Engineers (2)	0	252	252
	4.	Senior Valuer, Accountants (2)	0	480	480

Item		Foreign Exchange (US$ '000)	Local Currency (US$'000)	Total Cost (US$' 000)
5.	Senior Assistants (5)	0	480	480
6.	Assistant (4)	0	0	0
7.	Equipment	18	0	0
8.	Reports	0	19	19
9.	Housing and Per Diem	0	132	132
10.	Domestic Transportation	0	96	96
11.	International Transportation	22	0	22
	Subtotal C1	**1,192**	**1,267**	**2,459**
C2.	Project Management-Reforms			
1.	Project Manager Senior/Institutional Development Specialist	450	0	450
2.	Institutional Development Specialist	270	0	270
3.	Financial Management Specialist	240	0	240
4.	Short-Term Specialists	300	0	240
5.	Senior Technical Assistant	0	108	108
6.	Support Staff (3)	0	81	81
7.	Equipment	18	0	18
8.	Reports	0	19	19
9.	Housing and Per Diem	0	99	99
10.	Domestic Transportation	0	72	72
11.	International Transportation	24	0	24
	Subtotal C2	**1,302**	**379**	**1,681**
C3.	Computerization			
1.	Works and Equipment	275	0	275
2.	Consultants	38	0	38
	Subtotal C3	**313**	**0**	**313**
	Total Base Cost	**37,192**	**13,184**	**50,376**
D.	Taxes, Contingencies, and Charges			
1.	Physical Contingencies	4,055	1,450	5,505
2.	Price Contingencies	2,062	1,170	3,232
3.	Taxes and Duties[a]	0	8,571	8,571
4.	IDC, Commitment Fee, Front-End Fee	4,691	0	4,691
	Subtotal D	**10,808**	**11,191**	**22,000**
	Total Project Cost	**48,000**	**24,375**	**72,376**

IDC= interest during construction.
[a] Project costs including value-added tax at 12.5% resulting in total taxes and duties of 14.5%.
[b] IDC and commitment fee assumes Asian Development Bank loan at a 5-year London interbank offered rate swap rate of 3.29%
Source: Appraisal Mission estimates.

Table A6.2: Financing Plan

Item			ADB (US$'000)	Funded by Government (US$'000)	Total (US$'000)
A.	Water Supply Rehabilitation and Augmentation				
	1.	Works and Equipment	20,356	3,227	23,583
	2.	Land	0	400	400
	3.	Consulting Services	0	0	0
	a.	Water Loss	270	0	270
	b.	Design and Supervision	0	1,700	1,700
		Subtotal A	**20,626**	**5,327**	**25,953**
B.	Sewerage Rehabilitation and Augmentation				
	1.	Works and Equipment	13,269	2,201	15,470
	2.	Land	0	600	600
	3.	Consulting Services	0	0	0
	a.	Infiltration, Mapping, Environmental Monitoring	815	585	1,400
	b.	Design and Supervision	0	2,500	2,500
		Subtotal B	**14,084**	**5,886**	**19,970**
C.	Project Management and Institutional Development				
C1.	Project Management-Works				
	1.	Consultants	0	1,343	1,343
	2.	Staff	0	1,116	1,116
		Subtotal C1	**0**	**2,459**	**2,459**
C2.	Project Management-Reforms				
	1.	Consultants	1,332	89	1,420
	2.	Staff	0	261	261
		Subtotal C2	**1,332**	**350**	**1,681**
C3.	Computerization		313	0	313
		Total	**36,354**	**14,022**	**50,376**
D.	Taxes, Contingencies, and Charges				
	1.	Physical Contingencies	3,920	1,581	5,505
	2.	Price Contingencies	2,014	1,222	3,232
	3.	Taxes and Duties	0	8,571	8,571
	4.	IDC, Commitment Fee, Front-End Fee	4,691	0	4,691
		Subtotal D	**10,625**	**11,375**	**22,000**
		Total Project Financing	**46,979**	**25,397**	**72,376**

ADB = Asian Development Bank, IDC= interest during construction.

Source: Appraisal Mission estimates.

IMPLEMENTATION SCHEDULE

Activity	2003	2004	2005	2006	2007	2008
A. Institutional Reform						
Water Loss Program Development						
Asset Management Plan						
Information System Development						
Environmental System Development						
Financial System Development						
Operations Development & Training						
Implementation						
B. Water Supply						
Land Acquisition						
Detailed Design						
Tendering						
Construction						
C. Sewerage						
Land Acquisition						
Detailed Design						
Tendering						
Construction						
D. Support Activities						
Environmental Monitoring						
Community Education and Awareness						
Inflows and Infiltration Study						
Associated Technical Assistance						

Source: Appraisal Mission estimates.

INDICATIVE PROCUREMENT PACKAGES

Package Number	Method	Description	Estimated Cost (US$ million)
W-1	ICB	Construction of a new water intake and pumping station on the Rewa River. Construction of a 760 millimeter (mm) diameter rising to the Waila water treatment plant.	5.92
W-2	ICB	Rehabilitation and refurbishment of the Waila and the Tamavua water treatment plants. Duplication of the DN600 raw water main from the Savura balance tank to the Tamavua water treatment plant. (Possibly 3 contracts)	8.55
W-3	LCB	Construction of backwash treatment and sludge disposal facilities at the Waila and the Tamavua water treatment plants. (Minimum 3 contracts)	1.89
W-4	LCB	Rehabilitation and replacement of trunk water supply pipelines, and construction of water distribution pipelines, pumping stations, water supply service reservoirs, and associated works. (Minimum 6 packages)	4.51
W-5.	LCB	Duplication of raw water mains from the sources in Savura Creek to Tamavua water treatment plant and repair of the main service reservoir.	1.89
W-6	ICB	Construct Wainibuku/Navitoka reservoir system and Nausori Rewa Delta system.	2.67
W-6a	LCB	New service connections and reticulation to new HA subdivisions.	2.19
W-7a	LCB	Network leak detection and repair program (water loss program). (Minimum 3 packages)	2.36
W-7b	Force Account	Network leak detection and repair program- minor repairs (multiple activities/packages over the project period) and meter repair and replacement program. Replacement of dilapidated service pipes.	2.64
W-8	LCB	Commercial and domestic water meter replacement program. (3 packages)	0.84
W-9	LCB	Expansion of the Suva/Nausori telemetry system	0.13
W-10	ICB	Construction of a new main pumping station, inlet works, odor control, sludge digesters, and sludge dewatering and disposal facilities; installation of instrumentation and controls at the Kinoya sewage treatment plant.	2.83
W-11	LCB	Rehabilitation and replacement of existing sewers, pumping stations, and sewage rising mains, and construction of trunk sewers, sewerage reticulation, pumping stations, and rising mains.	2.47
W-11a	ICB	Inflows and infiltration rehabilitation works.	2.65
W-11b	Force Account	Rehabilitation of minor sewage pump stations.	0.89
W-12	LCB	Construction of trunk sewers, sewerage reticulation, sewage pumping stations, sewage rising mains, and house connections in developed areas (“backlog sewerage” works). (4 packages)	3.17

Package Number	Method	Description	Estimated Cost (US$ million)
W-13	LCB	Construction of new trunk mains, rising mains, and pump stations to new HA subdivisions (Minimum 2 contracts)	2.62
W-14	LCB	Construction of a new workshop and store, and upgrading of the existing National Water Quality Laboratory at Kinoya	0.26
W-15	LCB	Asset register and GIS development.	0.26
E-1	IS	Water pipes force account works.	0.925
E-2	IS	Supply of sewerage maintenance tools and equipment; supply equipment to laboratory. (2 packages)	0.31
E-4	IS	Supply of equipment for National Water Quality Laboratory.	0.09
E-5	IS	Computers	0.275
		Total	**50.34**

E=equipment and materials, ICB=international competitive bidding, IS=international shopping, LCB=local competitive bidding, W=civil, mechanical, and electrical works.

[a] Costs shown are base costs.

[b] Consideration will be given to combining small contracts to make them attractive to international contractors.

Source: Asian Development Bank estimates based on Public Works Department estimates of contract package costs.

SUMMARY RESPONSIBILITIES FOR CONSULTING SERVICES

A. Project Management-Works

1. Engineer

1. The project manager and two senior engineers will provide for the overall coordination of the Project and its subcomponents and undertake day-to-day operations. This includes management, design supervision, construction supervision, budgeting, procurement and tendering, quality control, and reporting. The engineering team will ensure that all aspects of the Project including subproject management, design, and supervision consultants and contractors comply with the administrative, technical, environmental, economic, and social requirements of the Government and the Asian Development Bank (ADB). It will ensure that the time, cost, and quality objectives of the Project are met and that notices of noncompliance and corrective actions are prepared and enforced. It will also facilitate the hand-over of project facilities to the Water and Sewerage Department (WSD)/Water and Sewerage Corporation (WSC).

1. Accountant

2. The project accountant will be respondible for the financial management of the Project including (i) maintaince of the official project accounts comprising all financial transactions of the Project in compliance with the prescribed accounting procedures of the Government, the auditor general, the Fiji Institute of Accountants, the Fiji Islands Revenue and Customs Authority, the VAT Unit, and ADB; (ii) prepare all financial transactions, including payments for processing and loan withdrawal applications for the Project; and (iii) all financial reporting. Reporting will include, but is not limited to, monthly, quarterly, and annual expenditure reports of project activities, financial statements, and audited financial accounts that conform to the requirements of the Executing Agency and ADB.

2. Senior Valuer

3. The senior valuer will facilitate the acquisition of land required for the Project including any related resettlement in consultation with landowners, lessees, and other stakeholders. This will include all aspects from valuation of properties and assets to consultation and liaison with stakeholders. All activities will be conducted in accordance with the Government's and ADB's land acquisition and resettlement policies. Reports on all activities and progress of land acquisition will be provided to the project manager for inclusion with regular reports to ADB and the Executing Agency.

B. Project Management-Reforms

1. Institutional Development

4. The project manager and an institutional development specialist will coordinate the implementation of the institutional reform action plan, financial action plan, and operational improvement activities. These tasks will encompass institutional organization issues, financial management, personnel management systems, and legal and legislative requirements. they will require regular review of the effectiveness and appropriateness of all systems associated with the mandate of the water supply and sewerage operations of the Public Works Department (PWD) and its successors: WSD and WSC. The institutional development team will prepare inputs to the quarterly project reports and the project completion report.

2. Financial Management

5. The financial management specialist will assess the financial information systems and procedures of the PWD and WSD/WSC and direct the development of an appropriate financial management system for WSC. This will include systems for day-to-day financial management as well as financing of capital projects, auditing systems, and budgeting, and implementation of the recommendations from the tariff study completed under the technical assistance associated with the Project. The team will also provide training in basic accounting and financial management report in skills throughout the organization.

3. Management Information and Operations

6. The specialists will (i) review the management information systems in place and make recommendations on system improvements, including integration of performance benchmarking, and help implement the approved system; (ii) review asset management procedures currently being undertaken by WSD and integrate them into a planned maintenance program; (iii) investigate and where appropriate implement improvements to asset management; (iv) develop a planned maintenance program including recommendations on hardware and software requirements; (v) review present operational approaches to water and sewerage treatment and to system management in different parts of the Fiji Islands; and identify possible operational improvements for consideration; (vi) prepare recommendations for improvements, with justification; (vii) prepare detailed recommendations for implementation of the proposed improvements, including those recommended under the related technical assistance, including for trade waste management, health and safety procedures, and community education and awareness; (viii) assist in implementation of selected improvements; (ix) in consultation with WSD, develop benchmarking performance parameters for technical, financial, and administrative operations; and (x) train staff in the systems developed.

4. Information Technology

7. The specialist will work with the Executing Agency to define specifications and appropriate software and hardware for standard accounting systems and management information systems. The specialist will also complete procurement and tendering for the identified systems and supervise their installation. An information technology strategy to guide future system development and configuration in both the short and medium term will also be developed.

5. Training

8. The training specialist will identify training needs and develop a training program with specific targets for technical, managerial, supervisory, customer relations, and financial and skills. The specialist will arrange and monitor training, including international secondments.

6. Subproject Management, Design, and Supervision

9. The consultants will review and verify the findings and recommendations of the previous reports prepared under the ADB-funded feasibility study in light of the current status of the water supply and sewerage system and complete detailed design of each assigned works package in accordance with the policies and guidelines of the Government and ADB. These services will be comprehensive and will include environmental assessments, preparation of environmental management plans, detailed identification of land acquisition and resettlement, social

assessments as well as technical water system and sewerage system design and engineering services. Environmental and resettlement and land acquisition assessments and implementation of related programs must be in compliance with all applicable ADB policies and guidelines. The consultant will prepare preliminary or concept drawings, cost estimates, and construction schedules, and will assist the project management unit of the PWD with all tendering activities, supervision of construction, and quality control on works. The consultant will also assist in establishing long-term maintenance procedures for all works, oversee the preparation of as-built drawings, and prepare subproject reports for inclusion in all regular reporting and the project completion report in accordance with Government and ADB procedures.

C. Water Loss Reduction

10. The consultant will devise and implement a comprehensive water loss reduction program in association with existing leak detection and meter replacement projects being undertaken by PWD. The program will encompass physical losses, metering problems, illegal connections and other nonrevenue water use, and communication and awareness programs.

D. Inflow and Infiltration

11. The consultant will devise and implement a strategy for the detailed investigation of inflow/infiltration with approval of PWD. This will include identification of data needs, priority subcatchment identification, data collection and analysis, modelling, quality assurance/quality control, and reporting. The consultants will use the results of the study to develop a program and estimated budget for a rehabilitation program and assist PWD in the development of tendering documents for the detailed design and civil works for the rehabilitation program.

E. Environmental Monitoring

12. The consultant will review the feasibility study, schedule of works, and initial environmental examination (IEE) and develop a detailed environmental monitoring program for the Project and all operations of the PWD/WSC/WSD. Project environmental monitoring will comply with the recommendations of the IEE and the summary IEE, ADB's environment policy, and ADB's *Environmental Assessment Guidelines* from 2003. The program will cover pollution sources; surface, ground, and foreshore water quality, including sampling locations; parameters, sample schedule; quality assurance/quality control; reporting format; and budget. The consultant will implement the program and contribute to the regular Government and ADB reports. The consultant will assist the WSC/WSD in disseminating this information and incorporating its results into public relations and community awareness programs. The consultant will identify and work with nongovernment organizations in an appropriate capacity.

F. Mapping and Geographic Information Systems

13. The consultant will review the maps, aerial photographs, and other information presently available for the Suva-Nausori region, and identify a cost-effective and sustainable approach to development of maps and geographic information systems to be used in design of this Project and thereafter. It will involve recommending systems and assisting with procurement, installation, and institutionalization of geographic information systems into the operations of WSD/WSC.

SUMMARY LAND ACQUISITION AND RESETTLEMENT PLAN

A. Introduction

1. This summary resettlement and land acquisition plan, prepared in accordance with the Government of the Republic of Fiji's laws and regulations and the related policy of the Asian Development Bank (ADB), provides a framework of compensation for the Suva-Nausori Water Supply and Sewerage Project. As detailed design confirms land needs, the Government will update and revise the plan in accordance with ADB's resettlement guidelines with assistance from the design consultants, particularly to ensure that the sewerage component's land needs are clearly identified.

B. Land Acquisition and Resettlement

2. About 20 hectares (ha) of land will be permanently acquired and another 4 ha temporarily acquired for water supply system improvements. Three categories of land acquisition and resettlement have been identified: (i) permanent acquisition of approximately 5 ha and resettlement of approximately five households to acquire additional land adjacent to existing pump stations; (ii) permanent acquisition of approximately 15 ha of uninhabited native land for access roads, pump station sites, storage reservoirs, and intake works; and (iii) temporary acquisition of native and freehold land belonging to about 5 native landowners, 5 freehold owners, and a maximum of 10 lessees without resettlement as easement and associated access for the laying of 6.3 kilometers of main water supply pipeline, temporary access routes, construction areas, stockpiles, and storage areas. Most water supply pipelines will use existing main road reserves. Project land acquisition and resettlement requirements are not considered to be "significant" according to ADB policy; the landowners are unlikely to be considered to be poor and no more than 50 indigenous persons will be affected.

C. Government Policy, Legal, and Institutional Framework

3. In the Fiji Islands there are three types of land: native land, freehold land, and state land. The majority of land is classified as native and is under the administration of the Native Land Trust Board. Such land is very important to native landowners as a link to their ancestral past and identity. The Department of Lands and the Public Works Department (PWD) have a written procedure on land acquisition based on the Crown Acquisitions of Lands law. The law, however, does not provide for resettlement, only cash compensation. In practice, aside from cash, PWD provides "goodwill" compensation to landowners such as employment opportunities, playgrounds, water supply systems, and footpaths. Under the current legal framework, the PWD has the right to enter land and construct easements, access roads, or pipelines for the public good. Under the Sewerage Act, it can enact compulsory acquisition of land, but this right has not been claimed in the last 20 years. Negotiation with the landowners is the preferred operational procedure, which involves forwarding the application to the Department of Lands and either purchasing the land outright or leasing it for up to 99 years. In practice, land is usually leased rather than purchased. The Native Land Trust Board is involved in negotiations when native land is involved. The Department of Lands makes acquisition payments directly to landowners, except in the case of native land, where the money is channeled to the trust board for distribution to landowners.

D. Resettlement and Land Acquisition Principles

4. Adverse impacts on existing human settlements, land, buildings, and other assets and

livelihoods will be minimized if not avoided to the greatest extent possible. In the case of any adverse impact, persons so affected will be compensated at replacement cost and offered assistance to maintain, if not improve, their standard of living, access to basic services, production levels, and income-earning capacity.

E. Entitlements

5. The Lands Acquisition Compensation Act also provides for loss of rents and profits. Under the current system for crop compensation, PWD staff pay compensation directly to farmers according to a comprehensive schedule published by the Department of Primary Industries and updated annually. The schedule covers mature and immature plants by type of plant. There are three types of people eligible for compensation: landowners, lessees, and sublessees. Table A8.1 shows the compensation entitlement scheme.

Table A10.1: Entitlement Matrix

Type of Loss	Entitled Persons	Compensation and Rehabilitation Measures	Implementation Issues
1. Loss of Land			
A. Temporarily Affected Agricultural, Residential, or Commercial Land	Legal owners or occupants identified during the census	Cash compensation for loss of income, standing crops, and trees and the cost of soil restoration and damaged infrastructure during construction.	
B. Permanently Affected Agricultural, Residential, or Commercial Land	Legal owners or occupants identified during the census	Cash compensation for affected houses and structures at replacement cost without deduction for depreciation or salvageable materials. Cash compensation for crops and trees at current market values.	Valuation may be required by independent registered valuer to determine appropriate value of land. Crop value is to be determined with staff input.
2. Loss of Houses and Other Structures			
Affected Houses and Structures	Owners identified during the census Tenants renting houses/structures	As a priority, the tenants and owners will be provided adequate notice to relocate their buildings, with transportation and/or dismantling/reconstruction help provided. Local builders could be contracted for this exercise. If above is unsuccessful, for permanent houses and structures, cash compensation equivalent to replacement cost without depreciation or salvageable materials is offered.	Competitive bidding must be use to appoint builders for relocation assistance. Registered quantity surveyor must provide valuation of building and materials.
3. Loss of Crops and Trees			
Crops and Trees	Owner or person with customary usage rights	Cash compensation is offered for full replacement cost at current market value.	Appropriate staff assist in determining market value.

F. Consultation and Grievance Procedures

6. To acquire native land, PWD and the Department of Lands meet with members of respective clans in their own villages and any lessees individually to explain their intent, answer questions, and get consensus from landowners. On freehold lands, the department's Valuation

Section prepares a sale and purchase agreement and approaches the landowner to explain and execute the document after the landowner's agreement. PWD and the Department of Lands start consultations and approach landowners at least 6 months prior to project implementation. In the case of a dispute, landowners can take the Government to court to obtain an injunction and stop the land acquisition, a rare but well-established procedure. For compulsory acquisition, PWD applies to the Solicitor General's Office for approval. The Project will ensure that there is no disturbance to sacred sites such as burial grounds or the house sites of ancestors. Consultation with landowners is essential to ensure there is no conflict about the location of water and sewerage infrastructure. Several meetings with landowners will be required.

G. Resources, Financing, and Implementation Arrangements

7. Funds for land acquisition (purchase or leasing), compensation, and resettlement are appropriated in the annual budget of the Ministry of Works and Energy. Contingencies are provided in accordance with annual budgetary appropriations. The principal institutions concerned in the process are all well established as is the process itself. The Department of Lands prepares a schedule to monitor negotiations, payment, survey, and other arrangements. Table A8.2 summarizes the anticipated funding and implementation arrangements. The Government has committed itself to funding any necessary resettlement and land acquisition.

Table A10.2: Financing and Implementation Schedule

(F$)

Activity	Total	2004	2005	2006
Resettlement of Squatters	450,000	200,000	150,000	100,000
Permanent Land Acquisition	725,000	300,000	22,500,000	200,000
Temporary Easement Acquisition	325,000	150,000	100,000	75,000

Source: Government estimates.

H. Monitoring and Evaluation

8. The project management unit, with the assistance of project consultants, will monitor the implementation of the resettlement and compensation plan and report to the Government and the ADB on a quarterly basis.

OUTLINE TERMS OF REFERENCE AND COSTS FOR TECHNICAL ASSISTANCE CONSULTANTS

A. Objectives and Scope

1. The technical assistance (TA) will help enhance water and sewerage services management by improvements in health and safety, community understanding of water issues, trade waste management, environmental management, and tariffs. It will also help build capacity for improved service delivery and environmental management. It will produce the following outputs: (i) a trade waste program; (ii) a community awareness and education program; (iii) a health and safety system for the public works department (PWD) and its successor, the water and sewerage department/water and sewerage corporation;[1] (iv) recommendations on environmental legislation and regulations; (v) water and sewerage tariffs recommendations; and (vi) enhanced capacity of staff. For all these areas the consultants will provide on-the-job training to counterpart staff. The consultants associated with the TA will perform the tasks outlined in this appendix and described in greater detail in Supplementary Appendix F.

B. Terms of Reference

1. Trade Waste Program

2. In discussion with the Government and industry, develop a trade waste management (industrial wastewater) program; (ii) take inventory of industrial discharges to the wastewater system, analyze these discharges, and assess the pre-treatment being provided if any; (iii) determine appropriate pollutant loadings and pre-treatment requirements for discharge to the municipal system; (iv) develop a proposed trade waste discharge program, including monitoring and enforcement systems, costs, and an implementation system; (v) assess the impacts, costs, and benefits of the program recommended; and (vi) determine appropriate discharge fees

2. Health and Safety Procedures

3. Review existing health and safety procedures in PWD and prepare comprehensive procedures covering operational and construction safety issues appropriate to a water and wastewater utility, including the (i) operation of water and sewerage treatment works (laboratory, electrical and mechanical, toxic chemicals, confined spaces, infectious diseases); (ii) water supply and sewerage networks (traffic management, excavations, materials handling, avoidance of services); and (iii) engineering workshops.

3. Community Education and Awareness Program

4. Assist the Government in preparing and implementing a program to raise public awareness of the following issues (i) water conservation, (ii) urban water systems and their needs and costs; (ii) hygiene education, health, and environmental effects of pollution; and (iii) consumer responsibilities in water and wastewater management. Assist the water utility in the development of a proactive public relations program that will identify and respond to potential community concerns in a timely manner. The tasks include (i) carrying out a needs assessment to identify target audiences, action required, content of the message, and approach for the

[1] PWD and the water and sewerage department/corporation are used interchangeably and the activities described in these terms of reference apply to all forms of the water supply and sewerage organization.

identified area and in refining baseline data for the project performance management system; (ii) developing a detailed schedule for promotional activities, which will occur regularly during the project implementation period; (iii) developing education and awareness materials including posters, brochures, issues papers, facts sheets, teaching aids, and television promotions in English, Hindi, and Fijian languages as appropriate; (iv) helping to implement planned community awareness activities in a variety of settings over a 3-year period, and assisting in community consultation, information meetings, and preparation of news media releases concerning the Project; (v) consulting with Government, nongovernment organizations, and private sector and involve these stakeholders in awareness activity preparation and implementation; (vi) coordinating activities with the project management unit of the overall Project; and (vii) evaluate the outcome of the Project and the community education and awareness program and prepare a report on the results.

4. Environmental Legislation

5. Review existing and proposed legislation and regulations, including the Municipal Act, Town Planning Act, Public Health Bill, and Sustainable Development Bill; (ii) assess the effectiveness of present and proposed legislation and regulations, (iii) provide advice and assistance in improving and promulgating the legislation.

C. Tariff Study

6. In discussion with the Government, develop cost recovery objectives and targets for the water supply and sanitation sector, and in particular for major systems and for minor systems; (ii) identify the average incremental costs (for the Nadi–Lautoka and Suva–Nausori systems, and for four smaller representative systems where adequate cost data is available; (iii) determine average financial tariffs necessary to meet operation and maintenance costs, debt service, and full cost recovery on the selected water supply systems; (iv) assess the affordability of average tariffs, and develop tariff structures that ensure affordability of water and sanitation services to the low-income sector of the community; (v) consider development of separate tariff structures for different size of systems, level of service, and affordability; (vi) update financial projections for the sector and assess ability of tariffs to meet cost recovery objectives; (vii) identify subsidies as necessary to ensure the continued provision of services to the poor; and (viii) help develop a public awareness campaign for the introduction of the new tariff.

6. Resourcing

7. The consultants' inputs are estimated as 26 person-months of international consultants with the following expertise areas: tariff systems, community awareness, environmental legislation, trade waste (environmental engineering), public relations, and health and safety; and 27 person-months of domestic consultants in the areas of community education/awareness, public relations, environmental management, and environmental engineering. The following table shows the cost estimate and financing plan for consulting services related to this TA.

Table A11: Cost Estimates and Financing Plan

($'000)

Item	Foreign Exchange	Local Currency	Total Cost
A. Asian Development Bank Financing[a]			
1. Consultants			
a. Remuneration and Per Diem			
i. International Consultants	475.0	0.0	475.0
ii. Domestic Consultants	0.0	115.0	115.0
b. International and Domestic Travel	30.0	0.0	30.0
c. Reports and Communications[b]	18.0	0.0	18.0
2. Equipment[c]	10.0	0.0	10.0
3. Training, Seminars, and Conferences[d]			
a. Facilitators	0.0	0.0	0.0
b. Training Program	10.0	0.0	10.0
4. Surveys	0.0	0.0	0.0
5. Miscellaneous Administration and Support Costs	0.0	0.0	0.0
6. Contingencies	118.0	7.0	125.0
Subtotal (A)	**661.0**	**122.0**	**783.0**
B. Government Financing			
1. Office Accommodation and Transport	0.0	50.0	50.0
2. Remuneration and Per Diem of Counterpart Staff	0.0	125.0	125.0
3. Others	0.0	20.0	20.0
Subtotal (B)	**0.0**	**195.0**	**195.0**
Total	**661.0**	**317.0**	**978.0**

[a] Financed by the Asian Development Bank's TA funding program.
[b] Includes production of community awareness materials.
[c] Includes desktop computer, color printer, copier, fax machine, projector, materials include disposable materials as necessary for technical assistance operation and administration.
[d] Estimated at seminars or workshops. This will be confirmed during the technical assistance inception stage

Source: Asian Development Bank estimates.

SUMMARY ECONOMIC AND FINANCIAL ANALYSES

A. Methodology and Assumptions

1. The economic and financial analyses were carried out for both the initial 5-year program, to be financed by the Asian Development Bank (ADB) loan being appraised, and for the entire water supply and sewerage 20-year master plan. As is to be expected, the benefits of the immediate project are higher than those of the master plan since major parts of the early benefits will be water loss reduction, requiring comparatively little investment, and increases in collection efficiency. Decisions regarding options for the master plan were evaluated using economic least-cost analysis. The following general assumptions have been adopted:

(i) Prices in general are adjusted to 2003 constant prices from the 2002 prices used previously. By agreement with the Ministry of National Planning, the local inflation rate was taken at 2.5%.

(ii) The least-cost analyses carried out in the 1999 master plan used 1999 constant prices; it is unnecessary to update them since the options have not changed and price adjustments will affect all equally.

(iii) Each project component is assumed to have a useful economic life of 40 years after construction for civil works and 15 years for electrical and mechanical components. For the ADB-funded project, replacements have been included at 2.5% of previous investment once every 5 years.

(iv) The period of the master plan investment program is 20 years. An allowance is made in year 30, equivalent to 5% of project capital costs, to provide for the replacement of mechanical and electrical equipment and vehicles over the balance of the evaluation period, years 21 to 40. No residual values are assumed in year 40.

(v) Financial flows are discounted at the estimated weighted average cost of capital of 4%. This is a minimum to be applied when the calculated weighted average cost of capital is lower.[1]

(vi) The economic opportunity cost of capital employed in the economic analysis is assumed to be the standard 12% per annum.

(vii) The average household size is 5.5 persons. Based on 2002 water consumption data, they consumed 187 litres per capita per day (lpcd). Supplies are assumed to have constrained demand, which is estimated to be 190 lpcd with present incomes and present tariffs.

(viii) Incomes have been allowed for in the demand forecasts by assuming per capita income growth of 2% per annum and an income elasticity of 0.60.

(ix) The effects of tariff increases have been estimated using price elasticities of –0.20 for domestic and –0.05 for nondomestic. These figures are based on international rather than the Fiji Islands data. They are low as a result of the present low level of tariffs.

(x) Wastewater generation is estimated at 85% of water consumption.

(xi) Capital costs include physical contingencies (10% for water and 12% for sewerage) but exclude price contingencies and interest during construction.

(xii) All economic costs, in particular of imported tradeable inputs, are net of duties and taxes. Financial costs include (a) duties and taxes at 2.0% of total base costs, based on taxes and duties on imported items of 10% for pumping and

[1] ADB. 2002.*Guidelines for the Financial Governance and Management of Investment Projects.* Manila.

electrical equipment and 27% for building materials such as reinforcing steel; and (b) value-added tax at 12.5% on all purchases (an increase over 10% in 2002).

(xiii) The economic opportunity cost of raw water provided to the project is assumed to be zero. There are no competing uses of the raw water such as irrigation in the Suva-Nausori area.

(xiv) The average official exchange rate of F$2.00 per US$1.00 (as of April 2003) has been employed in converting foreign exchange costs to their local currency equivalent.

(xv) In economic pricing, domestic price numeraire in local currency unit (F$) was used. Based on 1999 imports and customs revenue data, weighted average tariff rate = 14.1% percent, therefore a shadow exchange rate factor is approximated by 1.141 (this is equivalent to a standard conversion factor of 1/(1+WATR) = 0.88).

(xvi) It is assumed that there are no significant distortions in the wage rates for skilled labor. In the case of unskilled labor, underemployment exists in the Fiji Islands economy resulting in the opportunity cost of unskilled labor being less than the minimum wage. In the third Fiji Road Upgrading Project[2] a shadow wage rate of 0.860 was calculated. This factor has also been adopted for the current project.

B. Least-Cost Analysis

2. The least-cost analysis has been carried out in economic prices. It is used to determine which development option (or combined options) is preferred economically where a number of viable technical alternatives exist. Four components were subjected to the least-cost analysis.

3. **Development of a New Water Source.** Three options to supply Suva-Nausori water demands for the next 20 years were considered: Rewa run-of-river, Waldina run-of-river, and storage dams on the upper Waimanu and Sovi rivers, with and without hydroelectric generation capacity. The least-cost option was found to be developing a new intake and pumping station on the Rewa River, and continuing to take water from the existing Waila intake. Water from both sources would be treated at Waila. Least-cost analysis was also used to evaluate the proposed Rewa River rising main diameter.

4. **Transfer of Treated Water to Suva City**. The demand for treated water from the existing Waila water treatment plant is expected to double during the next 20 years. Accordingly, it will be necessary to increase the transfer of water from the Waila treatment plant, through pipelines in King's Road, to lower and medium pressure water distribution zones in central Suva. Three options were considered: duplication of the trunk main from Wainibuku to Mead Road, booster pumping from one of the trunk mains at Wainibuku reservoir, and reduced pumping from Wainibuku and construction of a new section of trunk through the high point in King's Road. The least-cost option was found to be duplicating a trunk water supply pipeline from Wainimbuku to Mead Road, with sufficient capacity to overcome the low pressures in King's Road.

5. **Augmentation of Water Treatment Plants.** Three options for augmenting the water treatment to meet maximum day demands from year 5 to year 20 were considered. They included maintaining the existing Tamavua water treatment plant capacity and providing 20 megaliters per day (Ml/d) capacity increase at Waila in 2002 and 2011; increasing the capacity of Tamavua by 9 Ml/d and providing 20 Ml/d capacity increases at Waila in 2003 and 2015; and

[2] ADB. 1997. *Third Road Upgrading (Sector)*. Manila.

increasing Tamavua by 16 Ml/d and providing 20 Ml/d capacity increases at Waila in 2010 and 2019. The least-cost option was found to be increasing the output of the Tamavua water treatment plant during droughts to by 16 Ml/d by duplication of the Upper Waimanu rising main and using three pumps, and providing 20 Ml/d additional capacity at Waila in 2010 and 2019.

6. **Sewerage and Sewage Treatment.** Two broad options have been identified for future treatment and disposal of Suva's sewerage: (i) a "centralized" strategy, which assumes that all sewage, except sewage from Nausori, will be diverted to and treated at the existing plant in Kinoya; and (ii) a "localized" strategy, which envisages utilizing the existing plant at Kinoya, together with new plants to be located in growth areas at the extremities of Suva's sewerage system, at Waila and Lami. The centralized strategy was found to be least cost.

C. Economic Analysis

1. Water Supply

7. Capital and operating costs were forecast for 2 years for the ADB Project and for 20 years for the master plan. After these periods, operating costs are held constant with an allowance made for replacement and rehabilitation at 2.5% of project capital costs every 5 years. No residual values are assumed at the end of 40 years. Operating costs used in the master plan and feasibility study analyses included only direct operation and maintenance and did not include salaries and wages or overheads. The latter have been added at rates derived from the analysis of the likely costs of a Fiji Water Authority, given in the feasibility study. They were obtained from Ministry of Works costs and add 57% and 15%, respectively. The inclusion of these costs does mean that both the costs and benefits of corporatization have been included.

8. The physical project will provide water for sale, mainly through decreased physical and financial losses. The assumptions made for total losses are: 2003, 56% (2002 actual); 2004, 50%; 2005, 45%; 2006, 40%; 2007, 35%; 2008 plus, 30%. The effect of not decreasing losses below 40% is included in the sensitivity analysis. The present share of financial losses is assumed to be 12% of production.

9. Nonincremental benefits include the following: (i) meeting the demand of new customers at present satisfied demand levels; (ii) saved cost of water tankering in drought conditions, (iii) cost savings from absorbing small systems into the greater Suva-Nausori network. Incremental benefits include the following: (i) meeting suppressed domestic and commercial demands, (ii) non-evenue water consumed under the Project; (iii) the cost of new connections, assumed equal to willingness to pay. Valuation of these items is summarized in Table A10.1. Note, however, that the incremental benefit differentiation is less relevant when the Project is not replacing water from an alternative, normally traditional, source.[3]

[3] Nonincremental costs to the user are then higher than incremental and the downward sloping demand curve can be used to value the latter. In this study, as in others when water is being replaced by water of higher quality and/or reliability, expressed willingness to pay for the incremental is higher than actual payments for the nonincremental. If taken simplistically, this would imply an upward sloping demand curve. That is the reason why the survey-based willingness to pay value has been used for both incremental and nonincremental sales.

Table A12.1: Economic Benefit Values for Water

Benefit	Numerator	Value	Comment
A. Nonincremental			
Domestic	F$/cumulative	0.85	Willingness to pay based on survey data
Nondomestic	F$/cumulative	8.00	Based on costs paid for tanker water
Water Tanker Costs Saved	F$ per annum	582,000	10% rising to 100% of 2002 actual
Cost Savings Two Small Systems	F$ per annum	15,000	Estimated (2008 and 2014)
B. Incremental			
Suppressed Domestic Demand	F$/cumulative	0.85	Willingness to pay based on survey data
Suppressed Non-omestic Demand	F$/cumulative	8.00	Based on costs paid for tanker water
Incremental Nonrevenue Water	F$/cumulative	0.85	Willingnes to pay based on survey data
Connection Revenues	F$/connection	230	At cost

Source: Appraisal Mission estimates.

10. The estimated base case economic internal rate of return (EIRR) for the water supply component of the ADB-funded 5-year project is 26.2%. For the 20-year master plan it is 24.8%. With tariff increases to provide the required financial return, sales would be less and the EIRR would fall to 21.4%.

59. Sensitivity analyses indicate that the economic viability is robust to adverse changes, especially to cost increases. Benefits are a combination of unit benefits, as shown in Table A10.1, and m3 sales and so the range in possible results is larger. The number of items involved is large (volumes and values for each of the items in Table A10.1) and to show the sensitivity to each would be confusing. Therefore, the sensitivity to a relatively large fall in total benefits is shown in Table A10.2. As can be seen, benefits associated with the overall growth in satisfied water demand, particularly to the non-domestic sector, are the largest item in these benefit flows and so would account for much of the variation shown. This is the result particularly of the assumed additional unit benefit to the non-domestic sector, at least in terms of willingness to pay.

Table A12.2: Economic Sensitivity Analysis for Water

Item		ADB Project		Master Plan No Tariff		Master Plan Tariff	Increase
	Change	EIRR	SV	EIRR	SV	EIRR	SV
Base Case		26.2%		24.9%		21.4%	
A. Capital Costs	+ 20%	22.3%	36.5%	20.9%	32.6%	18.1%	28.8%
B. Operating Costs	+ 20%	25.6%	243.7%	24.3%	232.0%	20.9%	184.0%
C. Total Benefits	- 20%	20.9%	27.1%	19.6%	24.4%	17.0%	21.3%
A + B + C		17.4%	16.2%	16.1%	14.7%	14.0%	12.7%
D. Minimum Losses	40%	25.8%	358.6%	24.4%	285.1%	20.9%	212.4%
E. Maximum Collection Efficiency	75%	26.2%		24.9%		21.4%	

EIRR=economic internal rate of return, SV=switching value.
Source: Appraisal Mission estimates.

2. Sewerage

11. The time frame of the analysis is the same as that of the water supply ADB and master plan projects. Operating costs are held constant with an allowance for replacement and rehabilitation at 2.5% of project capital costs every 5 years. Salaries, wages, and overheads have been added to direct operation and maintenance. No residual values are assumed at the end of 40 years.

60. There are two main ways to evaluate a sewerage program economically. These are: (a) standard benefit cost analysis (BCA); (b) measure the project's output against relevant standards, on the assumption that those standards have been set to reflect costs and benefits[4]. The latter approach is difficult for the Project since there are no accepted river water quality standards in the Fiji Islands and the water whose pollution is being controlled goes all but directly into the ocean.

61. Standard BCA requires a means to estimate peoples' willingness to pay (wtp) for the project benefits. The various alternative methods to do this can be summarised as (a) contingent valuation surveys, (b) estimation of direct costs such as health and environment, (c) estimates of land value increases; (d) avoided costs of installing own septic tanks and/or replacing septic tanks on new and existing properties and dislodging costs. Data is not available for the first two of these. For land values it is possible to use building densities allowed by the planners for properties in areas where a sewage connection is possible. This is a potential benefit based upon ability to subdivide and has been measured separately from the actual connection. Therefore it can be assumed to be additional to the direct avoided cost benefits. The assumptions used to measure these two benefits are given in Table A10.3. These benefits do not include health and amenity benefits to people living along polluted rivers or using the ocean into which they discharge.

Table A12.3: Economic Benefit Values for Sewerage

Benefit per New Connection	Unit	Value	Rationale
Increased Land Use Values			
New Housing Authority Plots	F$/conn. or 400 m^2 plot	3000	Increased plot value
New (Small) Private Plots	F$/conn. or 600 m^2 plot	5000	Increased plot value
Backlog Sewerage Connections	F$/conn. or plot	10,000	Increased plot value
Avoided Costs of Septic Tanks			
Avoided Initial Capital Cost or Replacement	F$/conn. per annum	239	F$2,000 per 15 year life tank
Avoided Cost of Desludging	F$/conn. per annum	40	F$120 per 3 year trip

m2=square meters, conn=connection.
Source: Appraisal Mission estimates.

12. The sewerage program is long term and it is all but impossible to separately identify the benefits that would accrue from the ADB-funded 5-year project. If it were to be assumed that there would be no further investment and so no additional sewerage connections, economic benefits would be less than costs in all future years. This is not a reasonable assumption, however, so the economic analysis of the sewerage component is based on the investments and benefits identified in the master plan. The former have been adjusted to allow for the presently expected costs of the project. It can also be noted that a major benefit of the project

[4] Economic Issues in the Design and Analysis of a Wastewater Treatment Project, Technical Note 4, ERD, ADB, July 2002.

will be returning the system to its design efficiency, but that will provide economic and financial benefits that are difficult to estimate.

13. Making connections in areas already served (the backlog) would be the result of institutional rather than physical project change. Therefore results have been obtained for both the physical project and for that project plus institutional change (which would ensure that places that could connect actually do so). With these assumptions the estimated base case physical project EIRR is –6.3%. The EIRR of the total project, including institutional change to ensure use, is 9.8%.

62. Due to the low base level, sensitivity tests indicate that the economic viability is not particularly robust to adverse changes, as shown in Table A10.4. The difference between the EIRRs with and without backlog connections indicates how important it will be to ensure that all who could use the system do.

63. It is probable that these comparatively low levels are because not all the environmental etc benefits are captured by the assumed land value increases. This will apply particularly to users of presently polluted streams and coastal areas, all of whom would have some willingness to pay to be able to use unpolluted waters.

Table A12. 4: Economic Sensitivity Analysis for Sewerage Master Plan

Item	Change	EIRR	Switching Value
A. Base Case, Including Backlog		9.8%	
B. Capital Costs Increase	20%	3.7%	-3.5%
C. Operating Costs Increase	20%	4.6%	-4.1%
D. Total Benefits Decrease	-20%	negative	not calc.
B+C+D		negative	not calc.
E. Base Case, Excluding Backlog		-6.3%	-6.3%

EIRR=economic internal rate of return.
Source: Appraisal Mission estimates.

3. Water Supply and Sewerage Combined

14. Since the effects of the short-term sewerage investment cannot be separately identified, it is not possible to provide an estimate for the economic viability of the combined water and sewerage ADB-funded investment. The net economic flows for the water supply and sewerage master plans were combined to provide an EIRR for the overall project. The estimated EIRR is 15.8%, including allowance for decreased sales due to tariff increases and the benefits of institutional reform. Sensitivity tests for the combined project show that the economic viability of the combined master plan, although low, is reasonably robust to adverse changes in various assumptions (Table A10.5).

Table A12.5: Economic Sensitivity Analysis for Water and Sewerage

Item	Change	EIRR	Switching Value
A. Base Case		18.5%	
B. Capital Costs Increase	20%	14.9%	18.0%
C. Operating Costs Increase	20%	17.6%	66.8%
D. Total Benefits Decrease	-20%	13.2%	12.3%
B+C+D		9.7%	7.4%

EIRR=economic internal rate of return
Source: Appraisal Mission estimates.

D. Financial Analysis

1. Water Supply

15. The water supply financial analysis has been conducted for both the physical project and the institutional project. The latter will increase the efficiency of revenue collection and so will provide benefits to both project and nonproject cash flow. Agreement was reached during the appraisal mission that consideration could be given to tariff increases once the benefits of the project start to become obvious to customers, and this point has been reached. The criterion used was to set the FIRR above the 4% weighted average cost of capital. This would ensure the long-term viability of the project but would not ensure that cash flows are available at all times to meet capital, operating, and debt service requirements on an annual basis. This would require analysis of the cash flows of the enterprise as a whole. That in turn would require decisions as to the nature of the enterprise and the extent to which it would be charged with meeting debt payments.

16. In addition to revenues from decreased losses provided by the physical project, the institutional part of the project will provide revenues from increased revenue collection efficiency. The assumptions made for the latter are: 2003, 57% (2002 actual); 2004, 60%; 2005, 70%; 2006, 75%; 2007, 80%; 2008, 85%; 2009, 90%; 2010 plus, 95%. The effect of not increasing losses above 75% is included in the sensitivity analysis.

17. The capital and operating cost streams are those used in the economic analysis, before shadow pricing. Financial benefits are summarized in Table A10.6.

Table A12.6: Financial Benefits for Water Supply

Benefit	Numerator	Value	Comment
A. Nonincremental			
1. Domestic	F$/cumulative	0.361	Present average domestic rate
2. Nondomestic	F$/cumulative	0.529	Commercial rate
3. Water Tanker Costs Saved	F$ per annum	582,000	10% rising to 100% of 2002 actual
4. Cost Savings Two Small Systems	F$ per annum	15,000	Estimated (2008 and 2014)
B. Incremental			
1. Suppressed Domestic Demand	F$/cumulative	0.439	Middle domestic rate
2. Suppressed Nondomestic Demand	F$/cumulative	0.529	Commercial rate
3. Connection Fees, Domestic	F$/connection	22	Present fee
4. Connection Fees, Non-domestic	F$/connection	101	Present fee

Source: Appraisal Mission estimates.

18. The application of four efficiency levels, applied both with and without nonproject sales, gives the eight possible FIRRs per project and per tariff level. They are shown in Table A10.7 for the 5-year ADB project and the master plan. For the latter, they are shown at present tariff levels and for the master plan with a 60% tariff increase in 2006, sufficient to provide an FIRR for the combined water and sewerage project of 4% (the weighted average cost of capital).

Table A12.7: Effects of Collection Efficiency on the Water Supply FIRR

Item		ADB Existing	Project Tariffs	Master Plan Existing	Master Plan Tariffs	Master Plan 60% Increase	Master Plan Tariff in 2006
Alternative	Collection Efficiency	Project Sales	Plus Non Project Revenues	Project Sales	Plus Non Project Revenues	Project Sales	Plus NonProject Revenues
Present	64%	negative	negative	-9.4%	-9.4%	-1.4%	-1.4%
Department	85%	-4.9%	2.2%	-3.0%	1.3%	1.7%	4.3%
Corporate	96%	-2.4%	5.5%	-1.2%	4.2%	2.9%	6.7%
Assumed	rising to 95% in 2010	-2.7%	4.0%	-1.4%	3.1%	2.6%	5.6%

Source: Appraisal Mission estimates.

19. Conceptually, it might be argued that the true project FIRR should not include the effects of increased collection efficiency on nonproject revenues. If this is the case, the FIRR for the ADB project would be negative with present efficiency and minus 2.7% with assumed efficiency. The FIRR for the master plan would be minus 1.4% with assumed efficiency and minus 9.4% with present efficiency. The tariff increase in 2006 required to raise the water and sewerage master plan FIRR to 4.0% would be 60% with assumed efficiency and around 100% with present efficiency. It would give a water supply FIRR of 5.6%.

20. These required increases demonstrate the importance of efficiency change. They also imply that without them, the physical project will simply not succeed. For this reason alone, it is better to think of the project as including institutional change. In this case the ADB project FIRR is 4.0% with present tariffs. The master plan project is 3.1% with present tariffs and 5.6% with the 60% tariff increase in 2006 required to set the overall FIRR equal to the weighted average cost of capital.

21. Standard sensitivity analyses indicates that the financial viability with the assumed collection efficiency, albeit low, is robust to adverse change, especially to cost increase. The major single item is the benefit associated with increased efficiency in the collection of revenues, as shown in Table A10.8.

Table A12.8: Financial Sensitivity Analysis for Water

Water Sensitivity Tests		ADB Existing	Project Tariffs	Master Existing	Plan Tariffs	Master Increased	Plan Tariffs
Financial	**Change**	**FIRR**	**SV**	**FIRR**	**SV**	**FIRR**	**SV**
A. Base Case		4.0%		3.1%		5.6%	
B. Capital Costs	20%	2.9%	0.1%	1.9%	-7.4%	4.3%	12.8%
C. Operating Costs	20%	2.7%	0.1%	2.1%	-8.5%	4.9%	22.9%
D. Total Benefits	-20%	1.1%	0.0%	0.4%	-3.3%	3.3%	6.9%
B+C+D		-2.0%	0.0%	-2.1%	-1.7%	1.3%	3.7%
E. Minimum Losses	40%	2.6%	0.1%	1.6%	-5.8%	4.1%	10.6%
F. Maximum Collection Efficiency	80%	-2.4%		-2.1%		1.8%	

ADB=Asian Development Bank, SV=switching value.
Source: Appraisal Mission estimates.

2. Sewerage

22. The capital and operating cost streams include taxes and duties. Unit financial benefits are based on the present tariff which is F$0.198 and F$0.225 per cubic meter m3 of water consumed for domestic and commercial customers, respectively. These rates are applied to customers identified as being connected to the sewer system. Identification and collection are both poor and at present only some 32% of the estimated revenue potential is collected. It is assumed that the tariff collection efficiency will improve only marginally to 40% in 2005, when corporatization should occur. It is then assumed to increase more rapidly to 95% in 2009. In order to maintain consistency between the sectors the same 60% tariff increase in 2006 assumed for water is also assumed for sewerage.

23. The sewerage program is long term and it is all but impossible to separately identify the revenues that would accrue from the ADB-funded 5-year project. If it were to be assumed that there was no further investment and so no additional sewerage connections, financial benefits would be less than costs in all future years. This applies even with the 60% tariff increase in

2006 calculated as necessary to give overall master plan project financial viability. This is not a reasonable assumption, however, so the financial analysis of the sewerage component is based on the investments and benefits identified in the master plan. The investments have been adjusted to allow for the presently expected costs of the immediate 5-year project.

24. In spite of the assumed efficiency increases, the estimated base case FIRR is not calculable since revenues would never be more than costs. This means that for any form of financial viability tariffs would have to be increased. No increase would be required to cover direct operation and maintenance; 135% increase would be needed to cover operation and maintenance plus salaries and wages; and a factor of 18 increase would be needed for full cost recovery.

3. Water Supply and Sewerage Combined

25. Since the effects of the short-term sewerage investment cannot be separately identified, it is not possible to provide an estimate for the financial viability of the combined water and sewerage ADB funded investment. The net financial flows for the water supply and sewerage master plans were combined to provide an FIRR for the overall master plan. To raise the FIRR to the required weighted average cost of capital level of 4% would require a tariff increase of 60% in 2006.

SUMMARY POVERTY REDUCTION AND SOCIAL STRATEGY

A. Linkages to the Country Poverty Analysis

Sector identified as a national priority in country poverty analysis? Yes (Country Poverty Assessment prepared in draft)	Sector identified as a national priority in country poverty partnership agreement? No (country poverty partnership agreement pending)

Contribution of the sector/subsector to reduce poverty in the Fiji Islands:
Poor persons in the Suva-Nausori area, who number about 71,700, suffer from poor quality of water supplies, lack of sanitation and pollution of the streams and underground water. Infantile diarrhea is fairly common, and such household is often forced to boil their drinking water to purify it, which is costly. The project will help provide reliable potable water service to poor households in the project area. It will also make sewage collection available, although with a lower coverage than water, to a substantial number of poor households and it will help improve the quality of water in the streams and coastal areas along which many poor people live. The project will very substantially benefit the poor, by improving the quality of their water supply, improving their sanitation, reducing pollution and eliminating the need for boiling drinking water for those with pipes/water connections. Since the cost of water and sewerage to the poor will decrease, the net benefit flows will be substantial.

B. Poverty Analysis

Poverty Analysis	Proposed Classification	
Beneficiaries will comprise all urban households, including the poor and those in informal and squatters settlements; industries, hotels, restaurants, schools, health facilities.	Thematic: Poverty Classification:	Human Development, Environmental Protection Poverty Intervention

C. Participation Process

Stakeholder analysis completed	Done during project processing. The project is designed through gradual development of water and sewerage institutions to minimize negative impacts on stakeholders
Participation strategy: Yes	The EA will implement the project through a consultative process under which all stakeholders will be consulted and kept informed about the project. An advisory board will be established, as well as client service units.

D. Gender and Development

Strategy to maximize impacts on women: The project will significantly benefit women, who will be consulted as implementation proceeds.

Gender plan prepared? No

E. Social Safeguards and other Social Risks[a]

	Significant/ Nonsignificant/ None	Strategy to Address Issues	Plan Required[a]
Resettlement[b]	Not significant	Land acquisition and resettlement plan prepared, to be updated during project implementation.	Short Resettlement Plant
Indigenous Peoples	Not significant	Indigenous peoples, including those in traditional villages, will be consulted and benefit from the project.	No
Labor	Not significant	A carefully sequenced institutional reform action plan will be so designed as to avoid redundancies.	No
Affordability	Not significant	The project will increase water and sewerage charges, as services are improved and public awareness of the need for cost recovery grows but these have been shown to be affordable (see financial analysis in Appendix 12).	No
Other Risks/ Vulnerabilities	Not significant	It will be important for the Government to undertake a public awareness campaign designed to sustain public support for the reforms proposed and develop an understanding of need for consumer-oriented commercial operation utility.	

[a] A plan is required if any of the potential issues are found significant.
[b] Significant involuntary resettlement requires a full resettlement plan; not significant requires a short resettlement plan

CONCLUSIONS AND RECOMMENDATIONS OF THE INITIAL ENVIRONMENTAL EXAMINATION

1. The initial environmental examination (IEE) was prepared as part of the feasibility study[1] that was completed in 1998. Due to the length of time since the IEE was prepared and the addition and deletion of some components from the Project, the Project was reassessed during the Appraisal Mission[2] and the summary IEE (Supplementary Appendix M) reflects the appraisal's conclusions and recommendations as well those of the IEE. This appendix summarizes the findings of both the IEE and the summary IEE.

A. Institutional Requirements

2. Environmental legislation and control in the Fiji Islands are in their infancy. There is no national water quality policy or management strategy, and no water or land resource management legislation, environmental impact assessment (EIA), or management legislation. In some instances, sectoral legislation incorporates environmental management components, e.g., EIAs are called for through the Town and Country Planning Act 1946; however, it is not legally binding, and the development of in-house or corporate environmental management strategies and codes of environmental practice (COEPs) is becoming increasingly common. Two key items of environmental legislation are under development: the Sustainable Development Bill and the Public Health Pollution Control Bill. The former addresses overall environmental management and policies, including EIA, and the latter addresses waste management, pollutant discharges, and monitoring.

3. The Public Works Department (PWD) has adopted in-house standards for water quality and sewerage effluent. These standards are well founded and useful as an interim measure, but there is little or no incentive to achieve compliance. Also, PWD) lacks the capacity to supervise compliance.

4. The Project includes several activities to improve, the environmental performance of PWD and its successors, including (i) introduction of an appropriate environmental management framework, through the promulgation of its own COEP; (ii) establishing an environmental section; and (iii) upgrading of the National Water Quality Laboratory (NWQL).

B. Water Quality Monitoring Program

5. A water quality monitoring program, related mainly to the chemical and microbiological quality of water supplies, is maintained by the NWQL, which is managed by the Water and Sewerage Department. This program is frustrated by lack of equipment, training, and resources. It will be improved by increasing and making routine the monitoring of water treatment plant sludge and backwash water; sewage sludge; and pesticides, *Giardia*, and *Cryptosporidium*. A "noncompliance procedure" and a quality assurance program also will be developed.

6. Water quality monitoring will be undertaken early in the Project to establish solid baseline data provide for monitoring of project effects, e.g., urban streams near failing pump stations and sewers, near the Kinoya treatment plant outfall, near water treatment plant outfalls. The monitoring program will be designed to be an integral part of the water and sewerage utilities and Ministry of Health or Department of Environment's monitoring program. Water

[1] ADB. 1998. *Suva Nausori Water Supply and Sewerage.* Final Feasibility Study. Manila.
[2] 1 April to 16 April 2003.

quality monitoring will also be undertaken during construction to ensure that erosion and sedimentation mitigation measures are effective and that construction does not result sewage spills or overflows. Water quality and effluent data will be made available to the Department of Environment and to the general public.

C. Public Consultation and Disclosure

7. Public consultations during the feasibility study focused on the issues of land availability and social impact assessment of the various project components. In particular, the feasibility study team met with village leaders and a group of women fisherfolk in the Rewa River area. Such consultation with the affected communities will be an ongoing process under the Project.

D. Findings and Recommendations of the IEE

8. The findings of the IEE of the proposed Project are as follows:

(i) The current water supply system provides water of adequate quality. However, the system is failing to provide a reliable supply and is not meeting the demand for new connections.
(ii) A new raw water source is needed based on the feasibility study, and the Rewa water intake is the most suitable location, but additional modelling and environmental assessment should be undertaken during detailed design to confirm safe yields and identify the most appropriate environmental controls as well as to continue public consultations.
(iii) The condition of the sewerage infrastructure is poor and there is a serious and increasing public health risk from wide-scale leakage of raw and partly treated sewage. Continued and increasing levels of sewage containing high levels of nutrients and industrial contaminants are leaked to creeks, waterways, and the inshore environment with serious impacts on the aquatic ecology.
(iv) The Project has the potential to make a major beneficial impact in reducing public health hazards and improving the aquatic biology of creeks and the inshore environment.
(v) Water quality monitoring must be undertaken early in the Project to establish solid baseline data with specific attention to project-affected areas, i.e., urban streams near failing sewers and pump stations and near the Kinoya wastewater treatment plant outfall. The monitoring program should be designed to be an integral part of the water and sewerage utilities and Ministry of Health or Department of Environment monitoring program.
(vi) PWD's current environmental management capability is inadequate.
(vii) Environmental controls during construction and operation of the river water intake will be important to protecting the Kai (fresh water mussels) fisheries and the communities that depend on them.

9. The following recommendations of the IEE and summary IEE will be implemented:

(i) In line with its existing environmental management approach, and with the draft Sustainable Development Bill, PWD will draw up a COEP, based on the International Standards Organisation 14000 series.
(ii) An environmental management plan (EMP) for the entire Project will be prepared during detailed design. The EMP will include identification of potential impacts,

specific mitigation measures, monitoring program for during and postconstruction, budgets for environmental measures and monitoring, and a public consultation and reporting program. EMP implementation will be a specific and performance-evaluation element of all civil works contracts.

(iii) A detailed environmental assessment will be undertaken, with particular attention to the Rewa water intake, to support the development of the EMP, confirm preliminary designs, and identify the most appropriate environmental controls as well as continue public consultations. Funds will not be disbursed for the Rewa water intake component until an EMP satisfactory to the Government and the Asian Development Bank (ADB) has been prepared.

(iv) The Project will provide a technical specialist to help PWD to prepare the COEP and provide training to its staff.

(v) Adequate residual flow for aquatic ecology needs to be left in the Waimanu River during very low flows. A policy for the quantum of residual flows will be a component of the COEP. To ensure that adequate flows can be left, the system will have the capacity to transfer off-take to the Rewa River source during very low flows in the Waimanu River.

(vi) A rigorous ongoing monitoring program will be implemented for pollutants in streams used as water sources, and this information will be available to the public.

(vii) The current use of copper sulphate during water treatment to minimize algae growth will be phased out as soon as possible.

(viii) The sludge deposition site at the Waila water treatment plant will be chemically characterized and rehabilitated if it is contaminated.

(ix) Effluent (backwash water) from the Tamavua and Waila water treatment plants will be collected and disposed of in an environmentally safe manner.

(x) A rigorous regular (monthly or quarterly) monitoring program will be developed for water quality in the streams in the project area, and for Laucala Bay receiving waters, including Suva and Walu bays, and this information will be available to the public. At a minimum, the water quality monitoring program will include typical sewage contaminants such as biochemical oxygen demand, total and fecal coliforms, suspended solids, dissolved oxygen, nitrogen, and phosphorous,

(xi) PWD will upgrade its attitude and ability to respond to sewage overflows.

(xii) NWQL will be upgraded and several changes will be made to its monitoring program.

(xiii) Sewage sludge from the Kinoya sewage treatment plant will be stored on a prepared site at Kinoya according to the sludge management strategy. Sludge disposal will be a component of PWD's COEP, and the sludge will be analyzed on at least a monthly basis. Odor complaints from the plant's neighbours will be recorded and, if found to be excessive, the disposal strategy will be reviewed.

(xiv) The Sewerage Act will be amended to ensure connection by industry and house owners to sewer lines when they are put in place.

(xv) The Sustainable Development Bill and the Public Health and Pollution Control Bill or other legal measures will be finalized and submitted to Parliament.

E. Conclusions

10. The Project will have a positive benefit to the environment through substantial reduction of sewage presently entering the groundwater, steams, and the sea due to inadequate treatment in septic tanks, pump station and pipeline failures, and lack of water treatment plant sludge disposal facilities. The improvements in coastal water quality possible through the sewerage components of this Project are closely linked to the extension of the sewage outfall that is being funded by the European Union.

11. Sustainable improvements in stream, ground, and marine water quality will be supported through project works and the enactment of key environmental legislation, including the Sustainable Development Bill and the Public Health and Pollution Control Bill, or other legal measures, which will help clarify and strengthen the basis for regulation and control of waste discharges. The strengthening of the PWD's water quality laboratory and improvement of PWD's environmental guidelines will help ensure the monitoring of project impacts and benefits, and the sustainability of the Projects' water quality benefits. The Project will upgrade PWD's environmental management capacity, and will establish a sound operating policy and implementation framework.

12. The IEE has been thoroughly carried out, environmental issues have been identified, and mitigation strategies have been included in the Project. It is not considered that an ADB EIA needs to be conducted. However, environmental assessments acceptable to ADB and the Government should be carried out as a basis for EMPs, acceptable to ADB, for all project components with particular attention given to the Rewa River water intake.