



Technical Assistance Consultant's Report

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December 2007

Democratic Republic of Timor-Leste: Preparing the Urban Water Supply and Sanitation Project (Financed by the Japan Special Fund)

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For Ministry of Natural Resources, Minerals, and Energy Policy (Executing Agency)

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Asian Development Bank



**Project Preparation Technical
Assistance
ADB TA 4646-TIM**



FINAL REPORT

for the

Dili Urban Water Supply Sector Project

Volume 1 – Main Report and Appendices

6 December 2007



ADB TA 4646-TIM – Dili Urban Water Supply Sector Project

Final Report – Volume One

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Abbreviations

ADB	Asian Development Bank
AusAID	Australian Agency for International Development
DNSAS	National Directorate of Water and Sanitation
EARF	Environmental Assessment and Review Framework
EIRR	Economic Internal Rate of Return
EMMP	Environmental Monitoring and Management Plan
FIRR	Financial Internal Rate of Return
FY	Financial Year
IEE	Initial Environmental Examinations
JICA	Japan International Cooperation Agency
MDG	Millennium Development Goal
MOI	Ministry of Infrastructure
NDP	National Development Plan
NGO	Non-government Organization
NRW	Non-revenue Water
O&M	Operations and Maintenance
PfAND	Program for Accelerated National Development
PDAM	(Indonesian) semi-autonomous local government water enterprise
PPAR	Project Performance Audit Report
PPMS	Project Performance Monitoring System
SIP	Sector Investment Plan
SoSE	Secretary of State for the Environment
SPAR	Subproject Appraisal Report
TA	Technical Assistance
UFW	Unaccounted for Water
WSS	Water Supply and Sanitation

The monetary currency in Timor-Leste is the United States Dollar

throughout the report “\$” means United States Dollar

Until 8 April 2007, the Financial Year (FY) was from 1 July to June 30
the FY now runs from 1 January to 31 December
an interim budget is in place for the period 1 July to 31 December, 2007

ADB TA 4646-TIM – Dili Urban Water Supply Sector Project

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Executive Summary

The Project will (i) check, and refurbish, replace and install (as required) up to 35 primary and secondary distribution master meters; (ii) check and replace, as necessary, up to 51 kilometers of tertiary distribution (reticulation) water pipes; (iii) check and replace, as necessary, up to 2,950 household meters and 240 commercial and bulk meters; (iv) check and normalize, as necessary, up to 5,100 household connections and up to 170 commercial connections; (v) relocate up to 1,700 existing water service connections to allow the disconnection of up to 7,000 linear meters of old asbestos cement and other water mains; (vi) install up to 88 new stop valves; (vii) refurbish or replace nine chlorination dosing units at deep bores; (viii) undertake practical minor repairs to support operational efficiency and safety; (ix) train and support a Dili water demand management task force; (x) establish and give in-field mentoring for three leak detection teams; and (xi) train six sub-zone caretakers. The Project is being proposed under a sector modality.

Timor-Leste is one of the least developed countries in the world. Per capita gross domestic product (non-oil) was estimated at \$370 in 2006 and has fallen in most years since 2001. Timor-Leste's human development index remains the lowest amongst Southeast Asian countries. The Millennium Development Goal (MDG) target for water supply in Timor-Leste is to increase the proportion of people with improved access to water from 44% to 78%. Coverage of 24-hour safe water supply in Dili city remains low at 25–30%. About 50% of the water that is produced and distributed to Dili is lost through leaks and pilferage. Nonrevenue water is about 85%. The Government's draft water supply and sanitation sector investment plan for 2008–2012, will guide national budget decisions. Dili is a priority district in the investment plan. The Dili water supply system has good water production and good main distribution infrastructure. With reasonable investments in tertiary distribution and more attention to customer service, the system could achieve technical and financial self-sustainability. The proposed sector Project is the first step.

The proposed Project will use a zonal approach to totally rehabilitate the tertiary network and connections in six sub-zones, each with approximately 1,000 connections. The Government will use its own finances to implement the zonal approach in the remainder of the Dili service area, and then the second city, Baucau, followed by other district towns. The Asian Development Bank (ADB) Dili Water Supply Performance Improvement technical assistance (TA) will build capacity in the National Directorate for Water Supply and Sanitation (DNSAS) for demand management; unaccounted-for-water reduction; and better business planning, management and reporting. Another ADB TA, Infrastructure Project Management, will build project management capacity in DNSAS, including for managing environmental and social risks.

ADB's country program and strategy update for 2006–2008 identifies infrastructure development and management as the primary focus of ADB support to Timor-Leste. As a post-conflict country, Timor-Leste is eligible for grant financing from the Asian Development Fund.

The Project is expected to improve water supply services for households, businesses and institutions in Dili city. The expected outcome is improved hydraulic management of the Dili water supply system and more efficient tertiary distribution.

The total project cost is estimated at \$7.5 million, including contingencies, taxes and duties and the Financing Plan is summarized in the table below. A grant of \$6,000,000 from ADB's Special Funds resources will be provided to finance the 80% of the total project cost. The Government will provide the remaining \$1,500,000 (20%).

Source	Total (\$ million)	Percent
Asian Development Bank	6.0	80
Government	1.5	20
Total	7.5	100

The Project will be implemented over 29 months. The preconstruction activities—detailed design, preparation of bidding documents, tendering, and award of contracts—will start in July 2008. Commencement of civil works is targeted for January 2009, and completion in November 2010. The Executing Agency for the Project will be the Ministry of Infrastructure

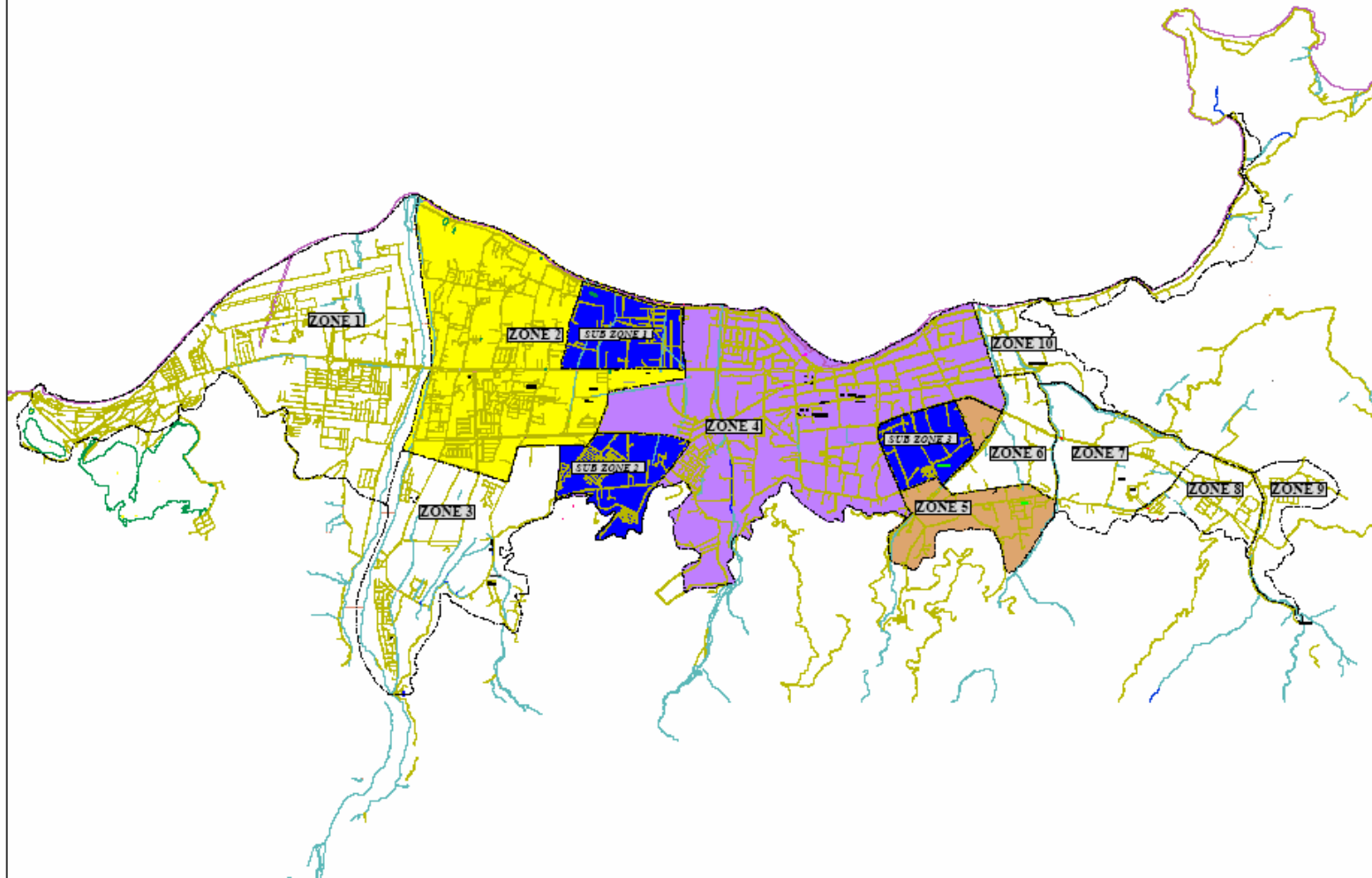
All procurement under the Project, including both ADB and Government-financed packages, will follow ADB's *Procurement Guidelines* (2007, as amended from time to time). Civil works will be divided into three packages—one to be procured using international competitive bidding and two using national competitive bidding. Supply of goods contracts will be divided into four contracts – three using international competitive bidding and one using national competitive bidding.

Consulting services are provided in two packages. The package for project implementation support will engage international and national consultants for (i) project management; (ii) in-field mentoring of leak detection teams and sub-zone caretakers; (iii) socioeconomic monitoring and evaluation; and (iv) project financial management, reporting, and auditing. The second package will engage international and national consultants to prepare detailed engineering design and documentation, and construction supervision services. The Project will fund a total of 36 person-months of international and 68 person-months of domestic consulting services. Consulting firms will be recruited in accordance with ADB's *Guidelines on the Use of Consultants* (2007, as amended from time to time).

The Project will reduce the cost of water supplies for low-income families who otherwise spend time collecting water from other sources and spend money reducing the contamination of drinking and cooking water. More reliable, safe water supplies will also reduce health costs and improve productivity of beneficiary families. Improved water supplies to businesses will make them more competitive and increase job opportunities for local residents. About 6,000 families (60% being low-income families) and 400 businesses will directly benefit in the six targeted subzones. And all other Dili consumers will benefit from system-wide operating improvements. Project implementation will create about 450 labor-years of employment.

The project design considers potential risks associated with project management, construction quality, and utilization of improved water supplies. A team of international and national consultants will help DNSAS with project management and will help the MOI Corporate Services Directorate with procurement and project financial management. Environmental impact will be monitored through construction supervision and mitigated in accordance with the approved environmental management monitoring plan. Project consultants will work alongside DNSAS contracted and regular staff in the field to ensure DNSAS has adequate leak detection skills and subzone caretaker skills to expand and sustain its water loss reduction program in other zones. The Dili Water Supply Performance Improvement TA will also build DNSAS capacity to sustainably operate and maintain the water supply assets upgraded by the sector Project.

WETAR STRAITS



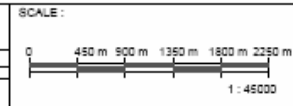
Legend :

- : Road
- : River
- : Zone Boundary
- : Sub Zone Boundary

REVISIONS	
NO.	DATE

**NATIONAL DIRECTORATE OF WATER SUPPLY AND SANITATION
DEVELOPMENT AND PLANNING DIVISION**

ADE TA4646 - TDM - DILI URBAN WATER SUPPLY PROJECT SUPPLEMENTARY APPENDIX D - SUBPROJECT APPRAISAL REPORT PRELIMINARY SUBPROJECT CONSTRUCTION DETAILS DILI WATER SUPPLY ZONES & SELECTED SUB-ZONES					
DESIGNED	DATE	CHECKED	DATE	APPROVED	DATE
	14/09/07				



Drawing File :
SUB ZONE MAPSHEET #2
Drawing No. :
DUWS2-02

Final Report

I. RATIONALE: SECTOR PERFORMANCE, PROBLEMS, AND OPPORTUNITIES

A. Performance Indicators and Analysis

1. Timor-Leste regained its independence in May 2002 after 24 years as a province of Indonesia. Before the Indonesian administration, Timor-Leste was a colony of Portugal for almost 400 years. Infrastructure investment was scant during the Portuguese era. Likewise, water supply and sanitation services were limited, serving only certain parts of a few urban centers, including the capital, Dili. Under Indonesian administration from 1975 to 1999, East Timor benefited from large centrally financed infrastructure investments, including rural and urban water supply and sanitation (WSS). A semi-autonomous local government water enterprise managed the Dili public piped water supply system and was supported by central budget subsidies through to 1999. Nevertheless, by 1998, only 41% of Dili residents had access to piped water of varying quality and reliability, and 44% still used shallow or deep wells.

2. The Dili water enterprise and most district WSS facilities were badly damaged during the Indonesian withdrawal in 1999. By the time the first Asian Development Bank (ADB) Water Supply and Sanitation Rehabilitation Project¹ was approved in July 2000, emergency repairs had enabled parts of the Dili water supply system to be recommissioned. A second phase Water Supply and Sanitation Rehabilitation Project² was approved in July 2001. The total budget of both phases was \$9.0 million, spread across all 13 districts. In addition to physical rehabilitation of water supplies, the WSS Rehabilitation projects rehabilitated, restored, reequipped, and trained staff of the newly constituted United Nations-administered Office of Water and Sanitation, which later became the Government of Timor-Leste's Water and Sanitation Service, and is now the National Directorate for Water Supply and Sanitation (DNSAS). The Australian Agency for International Development, Japan International Cooperation Agency (JICA), other development assistance agencies, and international nongovernment organizations, also invested in WSS rehabilitation in rural and urban areas.

3. Support for WSS rehabilitation in Timor-Leste since 2000, including the two ADB-implemented WSS rehabilitation projects has generally only been partly successful.³ The main shortcoming—as it was during the Indonesian administration—has been lack of sustainability. Community-managed systems in rural areas have not proven sustainable. And inadequate operations and maintenance (O&M) funding and expertise have reduced returns on urban water supply investments. The Millennium Development Goal (MDG) targets for access to safe water in Timor-Leste are to increase access in rural areas from 51% in 2001 to 75% in 2015; and from 72% to 86% in urban areas. But many rural water supply systems have failed and urban water supplies are typically intermittent and of varying quality. DNSAS estimates that in 2007, access to clean water supply is approximately 43% nationally, 45% in urban and peri-urban areas, and 41% in rural areas. Although the statistical disparities partly result from definitional inconsistencies, the MDG baseline estimates are likely too high.

¹ ADB. 2000. *Report on a Project Grant from the Trust Fund for East Timor to the United Nations Transitional Administration in East Timor for the Water Supply and Sanitation Rehabilitation Project*. Manila.

² ADB. 2001. *Report on a Project Grant from the Trust Fund for East Timor (to be administered by the Asian Development Bank) to East Timor (as Administered by the United Nations Transitional Administration in East Timor) for the Water Supply and Sanitation Rehabilitation Project Phase II*. Manila.

³ ADB. 2004. *Project Performance Audit Report. Water Supply and Sanitation Rehabilitation Projects Phase I (Grant 8185-TIM[TF]) and Phase II (Grant 8189-TIM[TF]) in Timor-Leste*. Manila.

4. Since 2000, about \$30 million has been invested in Dili for water production, primary and secondary distribution, and connections; \$5 million has been spent on establishing and strengthening DNSAS. Despite this, less than 30% of Dili households enjoy a 24-hour safe water supply, compared with the Government's National Development Plan (NDP) target of 80% of the urban population with access to a safe piped water supply by 2020.⁴ More than 50% of the Dili water supply system experiences high leakage, low or variable pressure, and intermittent supply with water available for between 3 and 16 hours per day. Complaints of no water and low pressure make up one third of consumer complaints. Water sources, treatment plants, and transmission mains have sufficient capacity to meet Dili city's water needs for several years. The primary and secondary distribution system is now in generally good condition. The poor service is largely caused by (i) lack of tertiary pipes (reticulation), (ii) poor condition of tertiary pipes and service connections, and (iii) inadequate demand management. In August 2007, with no water bills being issued by DNSAS and no payments made by consumers, nonrevenue water (NRW)⁵ was technically 100%. However, an estimated total of 15% of all water supplied to the Dili city water supply was reticulated through consumers' meters, and if this water had been billed and paid for, NRW would stand at 85%. Meanwhile, unaccounted for water⁶ is estimated at 70% in FY2007. By comparison, average NRW for urban water supplies in Southeast Asian countries is 29%. This is discussed in the Dili City Water Supply Study (Supplementary Appendix A).

5. Improving water supplies in Dili is now an urgent priority: (i) Dili's water supply operations are Timor-Leste's biggest drain on WSS sector financial, technical and management resources, and divert resources away from small towns and rural areas; (ii) returns on investments by JICA and others are low but could be greatly increased by relatively modest investments in Dili's tertiary network; (iii) Dili has the most potential in Timor-Leste to be a successful and self-sustaining water supply operation; (iv) rural–urban migration in Timor-Leste is rapid and Dili is growing fast; and (v) donor attention is almost entirely on rural, not urban WSS.

6. The sector Project will complete the vertical integrity of Dili's water supply system in selected zones, and improve system management and customer relations in order to achieve efficient delivery to regularized customers, including low-income households. The design and monitoring framework is attached as Appendix 1.

B. Analysis of Key Problems and Opportunities

7. As a recently independent, post-conflict county, Timor-Leste faces uncommon development challenges. The first constitutional Government after independence adopted the NDP 2002–2020, which incorporates a national poverty reduction strategy. The new Government is preparing a 5-year NDP for 2008–2012. The previous system of annually updated 5-year rolling sector investment plans, and annual action plans is under review. The planning is sound, but the difficulty is translating these plans and programs into tangible benefits for ordinary citizens. For the WSS sector, and specifically for urban water supply, achieving tangible, sustainable development results is constrained by (i) inadequate capital investment; (ii) inadequate O&M funding; (iii) limited human resources to plan, implement and manage water supplies; and (iv) difficult customer relations. Finally, the 2006 political crisis and civil unrest severely damaged the Government's ability to deliver public services, particularly in Dili and specifically water supplies.

⁴ Planning Commission of East Timor. 2002. *East Timor National Development Plan*. Dili.

⁵ Nonrevenue water is measured as the difference between water supplied and water sold (i.e., billed irrespective of whether it is paid for or not) expressed as a percentage of water supplied by the water production facilities.

⁶ Unaccounted-for water is water that is lost to the system through leaks and pilferage.

1. Problems

8. **Inadequate Capital Investment.** Approximately \$55 million was spent on urban water supply investments from 2000 to 2007, mostly funded by donors, notably contributors to the Trust Fund for East Timor, and JICA, German Technical Cooperation, Portugal Cooperation, and other official and nongovernment agencies and organizations. With increasing fiscal strength, the Government has started appropriating budgets for urban water supply capital works, amounting to about \$500,000 annually. The funding has been sufficient only to rehabilitate high priority facilities such as deep wells, water intakes, transmission mains, water treatment plants, and primary distribution mains in Dili and some district centers. Funding has been inadequate to rehabilitate secondary and tertiary distribution. Suboptimal investment strategies have exacerbated the lack of funding. First, capital works focused on upstream facilities before rehabilitating downstream networks, meaning that the additional water produced is mostly lost. Second, investments have been spread too thinly, resulting in only partial rehabilitation of many systems that still cannot operate effectively. These strategies have had a damaging financial impact on DNSAS, as legal water sales decline while water production costs increase.

9. **Inadequate Operations and Maintenance Funding.** Legal water sales cover only 5% of DNSAS operating costs, leaving O&M funding almost completely reliant on Government subsidies. In FY2007, \$1.8 million was budgeted for urban water and sanitation recurrent expenses across Dili, Baucau and 11 other district centers. About 60% is directly allocated for Dili water supply O&M. This equates to about \$0.11 per cubic meter (m^3) of water produced, compared with the Southeast Asian average of \$0.19/ m^3 . The net result is accelerated degradation of plant, equipment, pipes and fittings; and an inexorable decline in system functionality and service quality.

10. **Limited Human Resources.** DNSAS has a staff cap of 174 full-time regular staff; currently 155 positions are filled. It also retains 54 temporary staff. Of these, 77 permanent and 19 temporary staff members are employed at Dili locations. Nevertheless, with a bias in favor of Dili operations, DNSAS has a relatively high number of staff per 1,000 connections ratio of 10.5 for Dili. But the measure excludes possibly thousands of unauthorized water connections, meaning that the actual ratio is significantly lower. The larger problem is that many staff members have limited water supply experience and qualifications, especially in critical areas such as system hydraulic planning and management, and leak detection. DNSAS also has too few field-based caretakers who can intensively monitor water supplies.

11. **Difficult Customer Relations.** DNSAS receives about 180 complaints per month from Dili customers, about lack of water, no meter, broken meter, leaks, low pressure, and dirty water. Accountability to service users is limited: for instance, receipt of customer service requests and complaints is restricted to business hours and only available in one location. Service quality is not routinely monitored, and no standards have been developed for response times. DNSAS does not survey or methodically solicit the view of its customers. Invoicing and payment arrangements were not “consumer-friendly” when consumers were being billed for water for a period of approximately 16 months up to April 2006. DNSAS management is aware of these shortcomings but lacks the resources to address them.

12. **2006 National Crisis.** Following the 2006 political crisis and civil disturbances, some Dili neighborhoods remain openly hostile to officials and outsiders, they are unwilling to cooperate on public goods issues, and have reduced incomes. The disturbances affected DNSAS staff and management personally degraded overall DNSAS capability and destroyed and damaged DNSAS valves, meters, and pipes. For several months after May 2006, DNSAS in Dili operated on an emergency footing as it struggled to keep water production and distribution from collapsing

completely, and meanwhile worked with aid agencies to deliver water and sanitation services to 70,000 internally displaced persons in a dozen camps. DNSAS is recovering and with the presence of international forces Dili is mostly calm, but the situation is not fully normalized.

13. **Implications for Economic Development and Poverty.** Unreliable urban water supply is one of several constraints slowing economic development in Dili and other urban centers. The constraining effects of water supplies cannot be quantified, suffice that it is probably a lesser constraint than the difficulty of doing business, legal risks, high economic costs, low skills, and unreliable electric power. More important is the strong link between urban water supplies and poverty in Timor-Leste. Approximately 75% of Dili residents live in low-income informal areas with the lowest water supply service. Unreliable or nonexistent piped water supply increases their financial costs of obtaining clean water, increases morbidity and health costs, and requires time for water collection and transportation.

2. Opportunities

14. **National Planning Context.** Timor-Leste subscribes to the MDG targets for WSS; has a well-formulated NDP with an embedded national poverty reduction strategy with WSS targets; has an annually updated water supply and sanitation sector program; and has WSS policies covering, for instance, service requirements for different classes of customers and beneficiaries in different geographic contexts. An NDP objective is to provide adequate, safe, and sustainable water supplies for Dili communities and major urban centers in the districts, with the aim of full cost recovery from the users of the water supply (NDP footnotes, p. 275). The NDP 2020 target (recently brought forward to 2015) is for 80% of Timor-Leste's urban population to have access to safe piped water (NDP page 280). The target implies 24-hour continuous service to household connections. Listed NDP projects include (i) capital works, rehabilitation of Dili headworks and distribution; (ii) O&M and service improvements of new connections in Dili; and (iii) resolution, removal of illegal connections in Dili. The draft water supply and sanitation sector investment program 2008–2012 provides for accelerated WSS investments in six priority districts, including Dili and Baucau. Appendix 2 provides an analysis of the WSS sector in Timor-Leste, detailing especially the situation in Dili.

15. **Lessons Learned.** Regional experience⁷ clearly indicates that good governance and adequate operating revenues are crucial prerequisites for sustaining good urban water supplies, especially for the underserved poor. This applies to DNSAS, but the way forward is complicated by the post-crisis social and economic situation in Dili. The ADB project performance audit report for phases I and II of the Water Supply and Sanitation Project (footnote 3) notes that investments were spread too thinly across too many subprojects, which ultimately reduced development results. The report notes the failure to re-impose charges for urban water services. It recommends that ADB support urban WSS investments rather than rural, as well as DNSAS capacity building.

16. **Options and Asian Development Bank Strategy.** Most donor support for WSS in Timor-Leste targets rural areas; soon, no major support for urban WSS will be ongoing or planned. ADB support for urban water supply is needed to help the Government achieve its NDP and MDG targets; this is consistent with the PPAR recommendation.

17. Donor support for urban water supply in Timor-Leste has been spread over too many systems and across too much of each system. Only some components of each system have been

⁷ McIntosh, A. 2003. *Asian Water Supplies: Reaching the Urban Poor*. Manila. Asian Development Bank and International Water Association Publishing.

improved (typically upstream facilities) and these incomplete systems have not been able to sustain improved water supplies to most households. Also, DNSAS lacks the resources to properly operate and maintain the Dili and 12 district urban systems. Learning from this and global experience, the preferred approach is to concentrate efforts in Dili first; and to use a zonal approach to solving Dili's water supply problems. While Dili is presently DNSAS's biggest drain on resources, it could be DNSAS's largest water sales market, able eventually to cross-subsidize sanitation and poorer rural water supply operations. The zonal approach concentrates efforts on just a few hydraulically defined zones at a time, getting them operating properly, and then moving on to the next zone(s) to be upgraded. The process is gradually introduced through a city until the entire system is functioning efficiently. The zonal approach suits ADB's sector grant modality since it takes a geographic slice and a time slice (2008–2010) of the Government's urban water supply development program guided by the draft water supply and sanitation sector investment plan 2008–2012. Once demonstrated as an effective approach, it will be refined and implemented throughout the rest of Dili, in Baucau, and in other district centers funded mostly by the Government under an accelerated NDP.

18. Wastewater collection and disposal is almost entirely a private responsibility in Timor-Leste cities and towns. No sewerage or government-operated communal septic tanks are available. Households and businesses provide for their own on-site treatment and disposal, with varying effectiveness and adequacy; only one government-operated septage⁸ treatment facility serves Dili. DNSAS currently lacks the financial and technical capacity to develop and manage public wastewater management systems. This undesirable situation will have to be addressed as settlement densities increase in Dili. But for now, efforts should focus on improving hydraulic management and reducing water losses in Dili. This involves no increase in water supplied to the urban area and therefore no additional wastewater.

19. Improving water supplies in Dili will need to reflect post-crisis political, technical, financial and social realities. A conventional strategy to mass install meters and bill and collect from all customers will not be immediately practical. While political will to immediately improve DNSAS is strong, improving revenue performance requires a more gradual and selective strategy. Since metering, billing and collecting are important demand management elements, the postcrisis environment in Dili poses special challenges for sustaining water supply improvements. A start can be made with commercial and bulk customers and relatively well-off households in formal neighborhoods.

20. The Government has a long-term aim to build financial and administrative autonomy in DNSAS, possibly as a public corporation utilizing a management contract. A technically and financially successful Dili water supply operation is essential for achieving this. ADB has approved a technical assistance (TA)⁹ to improve the performance of the Dili water supply, complementing the Project. The opportunities and recommendations for DNSAS performance improvement are discussed in Appendix 3 and elaborated in Supplementary Appendix B.

21. **External Assistance.** Since 2003, only the Government of Japan and JICA have financed major water supply investments in Dili; the Government of Portugal through Aguas de Portugal Timor-Leste, and the German Technical Cooperation upgraded components of the water supply system in the second city, Baucau. JICA's program in Dili is now complete, having rehabilitated all the city's smaller water treatment plants and built a new central water treatment plant with a capacity of 6,000 m³ per day. Distribution has been improved to all of Dili's 10 water supply zones, but there was only limited work on tertiary distribution to consumers within zones.

⁸ Septage is the sludge removed from household, commercial, and communal septic tanks.

⁹ ADB. 2006. *Technical Assistance to Timor-Leste for Dili Water Supply Performance Improvement*. Manila.

Australian Agency for International Development, ADB, Aguas de Portugal, and JICA are providing capacity building support for the Ministry of Infrastructure (MOI) and DNSAS (urban), including sector policy development, water catchment management, water supply system management, and water supply technician training. External assistance to the urban water supply sector in Timor-Leste is set out in Appendix 4.

II. THE PROPOSED PROJECT

A. Impact and Outcome

22. The intended impact of the Project is improved water supply services for households, businesses and institutions in Dili city. The intended outcome is improved hydraulic management of the Dili city water supply system and more efficient tertiary distribution. The project area comprises all 10 water supply zones of the Dili city water supply service area. Within the project area, tertiary distribution improvements will be concentrated in six subzones together comprising approximately 12% of the total service area, 31% of the total population of the service area, 30% of total connections, and 21% of the total water supplied. The six target subzones are all supplied by the primary and secondary tertiary distribution system, have a mix of consumer types, comprise about 60% low income households, are less affected by ongoing civil unrest, and are technically suited to improved hydraulic control and tertiary distribution. The sector Project takes a time slice and a geographic slice of the Government's draft 2008–2012 sector investment program to improve water supply services across all of Dili city and Baucau. ADB has approved TA projects¹⁰ which will ensure that the Government has the necessary capacity to implement the sector program.

B. Outputs

23. The Project's outputs in six subzones of three target water supply zones will be replicated progressively across Dili's remaining seven zones, the Baucau city service area, and in other district centers. The Project has three components: (component 1) subzone water supplies—water losses reduced and controlled in subzones of three target water supply zones; (component 2) citywide water supplies—visible leaks reduced and strategic improvements to the pipe network, and commercial and bulk customers metered in all 10 zones; and (component 3) capacity building—skill of DNSAS technical and O&M staff upgraded in leak detection, leak reduction, distribution planning, and distribution management. Key activities include the following:

- (i) **Subzone water supplies.** Plan, design and implement leak detection, reduction, and control program, together with the DNSAS demand management (NRW) task force,¹¹ and help DNSAS recruit and train three leak detection teams. Procure and install pipes, fittings, and other materials, including minor trenching; and inspect, repair or replace faulty distribution valves and bulk meters. Create physical zones and subzones by installing valves and other works. Connect un-served households and businesses. Inspect, replace or install meters on all authorized connections in target zones.
- (ii) **City-wide water supplies.** Identify and repair visible leaks and open pipe discharges. Inspect, replace, or install meters on all authorized commercial and bulk connections. Repair or replace unserviceable chlorination equipment at

¹⁰ Footnote 9 and ADB. 2007. *Technical Assistance to Timor-Leste for Infrastructure Project Management* (TA 4942-TIM, cofinanced by the Government of Australia). Manila.

¹¹ The DNSAS demand management task force will be established with support from the *Dili Water Supply Performance Improvement* TA (footnote 9).

groundwater sources. Relocate existing water service connections to allow the disconnection of old leaking water mains.

- (iii) **Capacity building** (in addition to the ADB TA 4869-TIM: *Dili Water Supply Performance Improvement* TA [footnote 9]). Provide formal training and on-the-job training for leak detection teams, and ongoing support and on-the-job training in distribution planning and management.

C. Asian Development Fund IX Grant Component

24. The entire ADB contribution will be an Asian Development Fund IX grant. As a low-income, post-conflict country, Timor-Leste is eligible for Asian Development Fund IX grants equivalent to 40% of its overall ADF IX entitlement. The Government has no experience and limited capacity to manage external debt. Because of the post-crisis situation in Dili, the Project's financial rate of return will be relatively low. Most direct beneficiaries will be low-income households.

25. The Project justifies Asian Development Fund grant assistance, even for a fiscally strong government. First, financing the Project enables ADB to help apply, refine, and demonstrate an approach to improving urban water supplies, where there currently is no approach. The sector modality will allow lessons learned from the three core subprojects to be designed into the three follow-on candidate subprojects; and for the approach to be replicated using Government resources throughout the urban water supply sector. Second, the Project is a vehicle for delivering on-the-job and classroom capacity building essential for permanently reducing water losses.

D. Special Features

26. **Post Conflict Support.** Preparation of the Project was suspended in mid-2006 because of civil unrest throughout Dili and the emergency pressures on the implementing agency, DNSAS. Eighteen months later, the United Nations retains executive policing powers, particularly in Dili, and armed foreign troops provide a stabilization force. About 40,000 residents of Dili remain displaced, and some neighborhoods are hostile to outsiders and officials. The project design adapts to these challenges. The project scope and approach is simplified by (i) focusing on improving water supplies to consumers in areas already served, albeit poorly; (ii) not attempting to expand the Dili service area; (iii) not introducing new community-based management arrangements or innovations, particularly for informal neighborhoods; and (iv) limiting early billing and collection efforts to commercial, institutional, and large customers. Since no extra water is provided to the service area, no sanitation component is included. Zone selection considers neighborhood stability and security.

27. **Complementing JICA Investments.** JICA and the Government of Japan have funded approximately \$25 million equivalent of rehabilitation and improvements to the Dili water supply system since 2000. These investments ensure that an adequate supply of clean and reliable water can now be distributed to most zones. The Project builds on this by ensuring this water is delivered legally and accountably to customers in three of the zones, and thereafter to customers in all zones.

28. **Zonal Approach, Leak Detection Teams, and Caretakers.** The zonal approach will maximize development results by getting the system functioning correctly in subzones in three target water supply zones. Consumers in other zones will demand the same. The Project will provide demand management specialists and leak detection technicians with water utility operations experience to train and give hands-on support to DNSAS's three leak detection teams.

The Dili Water Supply Performance Improvement TA (footnote 9) will help DNSAS recruit and train six subzone caretakers (approximately one caretaker per 1,000 connections) who will work alongside project staff in the field. Each subzone caretaker will be responsible for managing O&M, NRW control, and customer relations in the concerned subzone.

29. **Sustainability.** The Project and the Dili Water Supply Performance Improvement TA incorporate measures to ensure the project outcome is sustained beyond project completion: (i) the demand management task force that the TA will help establish within DNSAS will be mandated to work to reduce NRW in other zones in Dili, (ii) the Project will plan and prepare work plans and targets for NRW reduction in the next target zones, (iii) leak detection teams will have their contracts extended or will be recruited as DNSAS staff, (iv) MOI and DNSAS will outsource most NRW work, and (v) permanent subzone caretakers will continue NRW monitoring and control in the completed sub-zones. Learning from earlier project experiences, sustainability will be enhanced by appropriate targeting of project resources.

30. **Alignment with Government Procedures and Systems.** The Project will not have a separate project management unit. The project team leader will work within the Dili Water and Sanitation Division, DNSAS; project team technical staff will work in the divisions and units of their direct DNSAS counterparts; and procurement and financial management project staff will work in the Corporate Services Directorate of MOI. This approach will ensure that skills and technology are passed on to DNSAS and MOI staff.

31. **Financing Arrangements.** Use of the sector modality will give DNSAS financing predictability while ensuring sufficient flexibility to sequence tertiary distribution upgrading according to prevailing conditions, which can be less predictable. With project experience for three zones in Dili, DNSAS will be able to accurately define scope and estimate costs for implementing the program through the remaining seven zones in Dili, Baucau, and elsewhere.

E. Project Investment Plan

32. The project investment cost is estimated at \$7.5 million, including contingencies, and taxes and duties of \$0.275 million. The project cost estimates are summarized in Table 1 and detailed in Appendix 5.

F. Financing Plan

33. The Government has requested a grant of \$6,000,000 from ADB's Special Funds resources to finance 80% of the total project cost. The Government will finance the remaining \$1,500,000 (20%). The financing plan is summarized in Table 2 and presented in Appendix 5.

Table 1: Project Investment Plan

(\$ million)

Item	Amount ^a
A. Base Cost^b	
1. Water Loss Reduction in Target Zones	3,414
2. Leak Reduction and Commercial Metering in all Zones	1,567
3. Project Management, Contract Design and Supervision Services, and upgrading of DNSAS Staff Skills	1,759
Subtotal (A)	6.740
B. Contingencies^c	0.760
Total (A+B)	7.500

DNSAS = National Directorate for Water Supply and Sanitation

^aIncludes taxes and duties of \$0.275 million.^bIn mid-2007 prices.^cPhysical contingencies are computed at 7% for civil works, equipment and installation, and 10% for consultancy services. Price contingencies are computed at 0.8% for foreign exchange costs and 4.0% for local currency costs; no provision is made for potential exchange rate movements because the national currency is the \$.

Source: Asian Development Bank and Ministry of Infrastructure estimates.

Table 2: Financing Plan

(\$ million)

Source	Total	%
Asian Development Bank	6.00	80
Government	1.50	20
Total	7.50	100

Sources: Asian Development Bank and Ministry of Infrastructure estimates.

G. Implementation Arrangements**1. Project Management**

34. MOI will be the Executing Agency, responsible for overall project management. DNSAS will be the Implementing Agency, responsible for day-to-day project implementation. To the extent possible, project management will align with existing MOI and DNSAS structures and use their systems and processes. No separate and distinct project management unit will be set up. The project team will be headed by a long-term international project team leader who will be located within the Dili Water and Sanitation Division, DNSAS. The project team will comprise (i) two water supply engineers (including the project team leader) undertaking planning, preparing bid documents, and managing contracts, and who will be located in the Dili Water and Sanitation Division, DNSAS; (ii) two financial management specialists will be located within the MOI Corporate Services Directorate; and (iii) two monitoring and evaluation specialists will be located within the Development and Planning Division of DNSAS. Project-funded procurement will be handled by the Procurement Division, within MOI, with support from the project team. The project team leader will be responsible for coordinating all project inputs and will oversee and contribute to (i) bidding processes, (ii) contract management, (iii) implementation progress monitoring, (iv) preparation of withdrawal applications, (v) preparation of project progress reports and project completion report, (vi) maintenance of project accounts and grant financial records for auditing, and (vii) monitoring of the Project's socioeconomic impacts. The project team leader will report

directly to DNSAS director and to the MOI director of Corporate Services. Outline terms of reference for consulting services are presented in Appendix 6.

35. The ADB Infrastructure Project Management TA (footnote 10) will support project management of the Government-funded infrastructure capital program. This capacity-building TA will place project management engineers, procurement specialists, and other specialists in MOI. A TA-funded procurement specialist will be available to assist the project team and the Procurement Division of the MOI Corporate Services Directorate undertake procurement for the Project. TA-funded safeguard specialists will be available to help DNSAS undertake environmental and social impact assessment and management for the Project.

36. The results of the financial management assessment (FMA), which was conducted in accordance with ADB's *Financial Management and Analysis of Projects* (2005) during project preparation, are summarized in Appendix 3. The sector Project's capacity-building component is designed to address weaknesses identified by assessment. These initiatives will supplement support from the Dili Water Supply Performance Improvement TA to strengthen DNSAS corporate governance and financial management capacity. As a consequence of these initiatives and the separate accounting arrangements recommended, the proposed project financial management arrangements for the Project are considered satisfactory.

2. Subproject Preparation and Selection

37. **Candidate Subproject Preparation.** Three core subprojects have been identified, one in each of the three target water supply zones. Procedures for the selection of target water supply zones and subproject subzones are explained in Supplementary Appendix C. Both the water supply zones within the Dili water supply system and the subproject subzones were selected partly for their hydraulic properties within the pipe network. The work within the subzones is detailed in the subproject appraisal reports (Supplementary Appendix D) and involves a technical and customer-based approach to implementing a total management package for water supply within the subzones. Work will include (i) the installation of bulk meters to measure water supplied to the subzone; (ii) repair, replacement, or installation of tertiary water pipes servicing the subzone; (iii) repair, replacement, or installation of metered water service connections to all consumers with immediate access to tertiary mains; (iv) refurbishment or installation of communal water facilities to serve consumers without immediate access to tertiary water mains; and (v) significant customer and consumer consultation and preparation.

38. Three additional candidate subprojects were identified and will be confirmed during project implementation based on technical, social, and other considerations. Sequencing will not be a significant issue since the entire Project will be completed in 29 months. The project team will help DNSAS prepare a subproject appraisal report for each candidate subproject. Each appraisal report will provide technical analysis and description, rationale, scope and components, cost estimates and financing plan, implementation arrangements, an initial environmental examination, a resettlement plan, if required, and social and poverty impact assessment. The level of analysis and detail will be consistent with the size and characteristics of the subproject and the capacity of DNSAS to manage a similar program in other zones after project completion. DNSAS will submit each appraisal report for review and approval by ADB on a no-objection basis. Implementation may proceed after endorsement by ADB and the MOI minister.

39. A feasibility study (Supplementary Appendix E) was prepared for project activities to operate throughout the Dili water supply system. This work will involve the (i) repair of all obvious leaks; (ii) repair or replacement of existing stop valves and bulk meters, as necessary, and the installation of additional stop valves and bulk meters to enhance system management; (iii)

transfer of service connections from old pipes to parallel new pipes to allow the disconnection of the old pipes; and (iv) metering of all commercial premises and bulk water outlets.

40. **Eligibility Criteria.** DNSAS and MOI, in consultation with the project team, will appraise subprojects in accordance with eligibility criteria and procedures outlined in Appendix 7.

41. **Subproject and Safeguard Plan Approvals.** Subprojects are not expected to require land acquisition or resettlement but a precautionary land acquisition and resettlement framework (LARF) was prepared. The environmental assessment and review procedure (EARP) provides guidance for preparing initial environmental examinations (IEEs) for candidate subprojects, and environmental monitoring and institutional responsibilities for environmental management of the Project. Prior to the signing of supply and civil works contracts and the commencement of works and installation, MOI will submit to ADB for review and no-objection approval, the IEE related to the subprojects. No indigenous peoples reside in Dili city as minority groups and no indigenous peoples will be affected by project activities. Accordingly, no indigenous peoples plan was prepared.

3. Implementation Period

42. Project implementation is scheduled to commence on 1 July 2008 and to operate over a period of twenty-nine months until 30 November 2010. Preconstruction activities for the three core subprojects—detailed design, preparation of bidding documents, tendering, and awarding of contracts for the first batch of subprojects—will start around August 2008. Commencement of civil works is targeted for January 2009, with completion in November 2010. The implementation schedule is attached as Appendix 8.

4. Procurement

43. The equipment, materials, and works financed by the proceeds of the ADB grant will be procured in accordance with ADB's *Procurement Guidelines* (2007, as amended from time to time).

44. ADB's standard bid documents will be used for procuring ADB-financed goods and works. Before commencement of national competitive bidding procurement, ADB and the grant recipient will review the grant recipient's procurement procedures to ensure consistency with ADB requirements. Any necessary modifications or clarifications of the grant recipient's procedure will be documented in the procurement plan. Requirement of any environmental monitoring and management plans (EMMPs) will be reflected in all civil works bidding and contract documents. Project implementation consultants will be recruited as soon as possible after grant effectiveness. The procurement plan outlines (i) particular contracts for goods and works, (ii) proposed method for procurement of goods and works financed by ADB, and (iii) related ADB review procedures. MOI, with ADB approval, will update the procurement plan as needed for the duration of the Project. The procurement plan and contract packages are detailed in Appendix 9.

5. Consulting Services

45. Consulting services are organized in two packages. The package for project implementation support will engage international and national consultants for (i) project management; (ii) in-field mentoring of leak detection teams and subzone caretakers; (iii) socioeconomic monitoring and evaluation; and (iv) project financial management, reporting and auditing. The second package will engage international and national consultants to prepare detailed engineering design and documentation, and undertake construction supervision. Consultants will be selected and engaged in accordance with ADB's *Guidelines on the Use of*

Consultants (2007, as amended from time to time). All consulting services will be provided by firms selected through international competition using quality-and-cost-based selection with a quality to cost weighting of 80:20. A total of 104 person-months of consulting services will be required for project implementation.

6. Anticorruption Policy

46. ADB's *Anticorruption Policy* (1998, as amended to date) was explained to and discussed with MOI and DNSAS. Consistent with its commitment to good governance, accountability, and transparency, ADB reserves the right to investigate, directly or through its agents, any alleged corrupt, fraudulent, collusive, or coercive practices relating to the Project. To support these efforts, relevant provisions of ADB's *Anticorruption Policy* are included in the grant regulations and the bidding documents for the Project. In particular, all contracts financed by ADB in connection with the Project shall include provisions specifying the right of ADB to audit and examine the records and accounts of the Executing Agency and all contractors, suppliers, consultants, and other service providers as they relate to the Project. Building customer awareness and empowerment can reduce the risk of corruption in water supply projects and service delivery. The Dili Water Supply Performance Improvement TA will help build consumer advocacy among DNSAS customers.

7. Disbursement Arrangements

47. The grant proceeds for the sector Project will be disbursed in accordance with ADB's *Loan Disbursement Handbook* (2007, as amended from time to time). To facilitate project implementation and funds flow, a project imprest account will be opened at a domestic commercial bank in Dili, acceptable to ADB. The financial management assessment indicates that DNSAS has limited capacity in internal control in financial management and so MOI will manage the imprest account with assistance from the project implementation consultant firm. The imprest account will be exclusively used to finance, as required, ADB's share of reasonable and eligible expenditures under the (i) leak detection and repair works, (ii) installation of valve covers, marker posts, meter chambers, valves and meters; sundry repair and replacement works; and installation of chlorination equipment, and (iii) project management and capacity development. The direct payment procedures will apply for all other civil works, supplies and consulting contracts under the Project. The initial advance to be deposited in the imprest account will not exceed either 6 months of estimated expenditures to be financed from the imprest account or \$100,000, whichever is lower. If the Government initially funds eligible expenditures from its own resources, reimbursement procedures will be used.

8. Accounting, Auditing, and Reporting

48. MOI, through the project implementation consultant, will maintain a separate account for the Project and prepare separate financial statements, indicating sources and application of funds, and have them audited by the international accountant engaged by the Project. The audited project accounts and the auditor's reports will be provided to ADB within 6 months after the end of each financial year. MOI, through the project implementation consultant, will prepare and submit to ADB quarterly project progress reports and a project completion report within 3 months after the project completion. The ADB's policy on submission of audited accounts, which covers failure to submit accounts and financial statements by due dates has been explained. If submission of an audited financial statement is delayed more than 6 months, ADB may not approve new contract awards. If the delay is more than 12 months, grant disbursements may be suspended or the grant may be canceled. A separate auditor's opinion on use of the imprest account procedure will be included in the audit report.

9. Project Performance Monitoring and Evaluation

49. MOI will establish a project performance monitoring system to facilitate the reporting requirements. The system will assess progress and implementation of the Project, including compliance with subproject EMMPs, and compliance with covenants of the grant agreement. In conjunction with the Dili Water Supply Performance Improvement TA, the project performance monitoring system will help DNSAS monitor its operational efficiency, financial position, and projections to enable performance benchmarking against other utilities.

10. Project Review

50. The Project will be reviewed every 6 months. Each review will cover all institutional, administrative, organizational, technical, environmental and social, economic, financial, and other relevant aspects that may have an impact on the performance of the Project and its continuing viability. MOI and ADB will undertake a mid-term review 14 months after the start of the project implementation.

III. PROJECT BENEFITS, IMPACTS, ASSUMPTIONS, AND RISKS

51. The Project will sustainably improve water supply services for households, businesses, and institutions in Dili city. Sector project investments in valves, meters, distribution pipes and connections will enable DNSAS to improve hydraulic efficiencies, reduce operating costs, and manage demand including reducing water losses. Together with the Dili Water Supply Performance Improvement TA, DNSAS will halt and reverse the decline in water sales revenues, and improve its technical and commercial performance, preparing for an eventual possible management contract. The Project comprises individual subproject investments for defined hydraulic subzones and neighborhoods. The subprojects introduce the Government's medium-term urban WSS program for improving urban water supplies in all of Dili, Baucau, and in all district centers.

A. Economic and Financial Analyses

52. Households without a piped connection (62% of project area) rely on shallow wells, shallow tubewells, springs, neighbors' taps, and public tanks. In Dili, all zones suffer from water stress in the dry season. Consequently, during the dry months obtaining water for basic needs becomes more time consuming as households have to go farther to find a water source. Similarly, connected households with intermittent supply must obtain water from secondary sources once stored water is used. Non-domestic water supply customers will benefit financially due to an improved supply without the need to resort to more costly tanker supplies.

53. Economic benefits arise from increases in improved water supply to both piped and nonpiped domestic users and commercial customers from reduction in time and costs of obtaining water. In addition, a reduction in water losses from an estimated 70%–25% in the subzone subproject areas allows more water to be available in other areas of the city and/or a reduction in pumping, chemical, and O&M costs as less water production is required. Households using clean potable water rather than water from polluted shallow wells and streams will experience health benefits. The Project will reduce the high incidence of malaria and dengue fever in Dili since reducing leaks will reduce pooling and more reliable piped supplies will reduce household water storage.

54. An economic analysis of the three core subprojects based on time and cost savings was completed (Appendix 10). The economic internal rate of return (EIRR) is 20.2% and the economic net present value (ENPV) at 12% is \$1.34 million. An analysis to test the sensitivity of the

economic internal rate of return of the combined subzone subprojects to adverse changes in key variables demonstrates the results are robust to adverse changes. The variables tested are increases (+10%) in capital and O&M costs, reduction in subproject benefits (-10%), and a 2-year delay in project implementation and benefits. In the case of the 2-year delay, with costs spread over an extra 2 years and a further 20% to reflect additional costs incurred, the economic internal rate of return falls to 13.4%.

55. Appendix 10 also presents the financial analysis which considers project-related revenue and chemical and electricity savings costs from water-loss reductions. The financial internal rate of return (FIRR) is calculated at 2.5% for the subprojects and the financial net present value at the weighted average cost of capital (WACC) is computed as \$0.56 million. The FIRR compares favorably with the estimated weighted average cost of capital of 1.0%, substantiating the Project's financial viability. The average incremental financial cost is \$0.25 per m³ compared with the average financial tariff of \$0.29 per m³. The sensitivity analyses demonstrates the results are robust to standard sensitivities, but if the Project is delayed 2 years and costs increase by 20%, then the FIRR falls to 1.2%; if the collection efficiency falls to 70% instead of the assumed 90%, the FIRR falls to 1.1%.

56. Thus the Project is most sensitive to delays and consequent corresponding cost increases. Accordingly, efforts have been made in project design to avoid such delays and cost increases. These are detailed in the subproject appraisal report (Supplementary Appendix D). The economic and financial analyses are detailed in Supplementary Appendix F.

57. DNSAS has limited autonomy in decision-making other than for basic operating matters. All financing, fees and charges, staffing, infrastructure development and procurement decisions require the prior approval of MOI, the Ministry of Finance (MOF), or Ministry of State Administration. The annual budget for all Government departments is set out in the General Budget of the State. MOF regulations cover budget and financial management, and appropriations. A Banking and Payments Authority makes all Government payments. Treasury (a department within MOF) receives all Government revenues, acts as paymaster and performs the accounting function of Government. Accordingly, DNSAS is required to submit all applications for ongoing day-to-day funding to MOF, all revenues collected are banked and passed directly to Treasury.

58. For the 12 months ending 30 June 2007, DNSAS's total budget was \$3.1 million, with \$1.823 million for operations. Dili water supply accounts for \$1.104 million (60.6%) to cover water, wastewater management, and solid waste services. Cost recovery from users through water tariffs has been limited. Since independence, customers have only been billed for a period of 16 months, November 2004–April 2006. In the 12 months ending 30 June 2006, \$58,000 was collected from customers, representing 7% of Dili water supply operating costs.

59. Financial projections prepared for Dili show that cost recovery of operating costs would be achieved by 2017, following full metering of all customers by 2014 and a tariff increase in real terms of 29% in 2014. This would ensure financial sustainability of Dili's operations. The current Dili tariff has a lifeline block up to 14 m³ at a lower tariff to protect the poor and ensure water charges are affordable. Following the tariff increase, the monthly water bill of low-income consumers for 14 m³ would represent 3.2% of household income compared with 3.0% under the current tariff. For an average income household consuming 25 m³ per month, the water bill would represent 3.7% of household income, a similar level to the tariff in FY2008. (The DNSAS financial analysis and tariffs are detailed in Appendix 11 and Supplementary Appendix F).

B. Impacts

60. The due diligence undertaken for the three subprojects appraised does not indicate land acquisition or involuntary resettlement impacts. Due diligence to be undertaken for candidate subprojects should not identify any land acquisition or involuntary resettlement impacts. However, a LARF was prepared (Appendix 12 and Supplementary Appendix G). It provides a mechanism to screen candidate subprojects and—if the need arises—provide guidance on how to prepare and implement subsequent land acquisition and resettlement procedures. Dili city contains no indigenous peoples at present, thus, no indigenous peoples will be impacted by the Project. With support from the Dili Infrastructure Project Management TA, MOI and DNSAS will strengthen their environmental and social impact assessment and management capabilities and TA specialists will be available to support project implementation. In keeping with the Project's alignment principles, environmental and other safeguard considerations will be the responsibility of the DNSAS Development and Planning Division, Division of Administration, Dili Water and Sanitation Division (for planning and implementation), and the MOI Corporate Services Directorate (for oversight). The Project will finance and help build skills and systems in a new Environment and Social Unit, to be located in the DNSAS Development and Planning Division.

1. Social and Gender

61. A summary poverty reduction and social strategy was developed based on the findings of an initial poverty reduction and social assessment, and social surveys. During project preparation, participatory approaches were undertaken, including consultations with representatives of communities, government agencies, and other stakeholders. Focus group consultations were held with women. Women indicated a high willingness to pay for improved water supplies and women are expected to benefit disproportionately from improved water supply services. All reasonable and necessary steps will be taken to encourage women living in the project area to participate in the final design and implementation of subprojects and in the selection and design of candidate subprojects (paragraph 69). A summary poverty reduction and social strategy is presented in Appendix 13 and the findings of the socioeconomic survey and subsequent recommendations are set out in Supplementary Appendix H. Socio economic profiles of each core subproject are also included in subproject appraisal reports (Supplementary Appendix D). In the subzone 1, it is estimated that 23% of households have per capita incomes below the National poverty line of \$0.55 per day and 30% have per capita incomes between \$0.55 and \$1.0 per day. In subzones 2 and 3, the equivalent estimates are 36% and 27%, and 24% and 39% respectively.

2. Environmental

62. The proposed core subprojects are categorized as environmental category B. IEEs and the EMMPs were prepared for the core subprojects in accordance with the ADB's *Environment Policy* (2002) and *Environmental Assessment Guidelines* (2003), and the Government's environmental requirements as set out in the applicable laws and regulations.¹² A summary IEE is attached as Appendix 14 and IEEs are in Supplementary Appendix I. The proposed core subprojects will be located in urban areas and have no sensitive environmental implications. No significant cumulative impacts are identified. Moreover, the proposed core subprojects are limited to rehabilitation of the existing facilities. All potential environmental impacts can be properly mitigated and minimized to acceptable levels.

¹² Timor-Leste is building an environmental legal framework, including an environmental impact assessment law. Until laws are promulgated, environmental matters are governed by applicable regulations of the United Nations Transition Authority for East Timor. Indonesian laws, which were in force up to 1999 and that have broader coverage than the United Nations regulations, lack the political legitimacy for them to be enforced in Timor-Leste.

63. The IEEs and EMMPs, which will be prepared for all candidate subprojects, will be included in the feasibility reports for submission to ADB and to the secretary of state for environment after Timor-Leste's environmental management enabling legislation is promulgated.¹³ An EMMP will be required for subprojects classified as environmental category B. Subproject feasibility reports will identify adequate funding for EMMPs. Subproject EMMPs will be reflected in the bid documents, incorporated into project design, and included in contractors' contracts for subprojects. The project team and contractors will be guided by the EMMPs in managing and monitoring impacts. The EMMP will include requirements for reporting environmental compliance. Civil works and supply contracts may only be signed and works commence after the IEE reports of subprojects are approved by ADB.

64. An EARP prepared in accordance with the ADB guidelines will guide the preparation and approval procedures of environmental assessments of candidate subprojects under DNSAS's urban water supply program, and describe institutional responsibilities for environmental management. The EARP is detailed in Supplementary Appendix J.

C. Assumptions and Risks

65. **Civil Disorder in Dili.** Escalating civil disorder and violence in Dili would disrupt project implementation and make maintaining improved services and improving financial performance difficult for DNSAS. Timor-Leste is now politically stable following successful presidential and parliamentary elections earlier in 2007; the new Government is functioning normally. Internally displaced people are being resettled. Some United Nations policing is likely for several years.

66. **Retention of Leak Detection Teams and Caretakers.** Keeping water losses low and extending the leak detection program to other zones requires DNSAS to retain the three leak detection teams after the Project. Likewise, the six subzone caretakers recruited and trained under the Dili Water Supply Performance Improvement TA must be retained permanently by DNSAS to sustain the Project approach in the three target zones: reliable supply of clean water to the houses or businesses in exchange for on-time payment of a fair tariff. The minister of infrastructure provided an assurance of both these requirements. If the DNSAS staff ceiling is to be exceeded, the additional personnel will be retained on long-term contracts or the work could be outsourced to a local nongovernment organization.

67. **Revenue Performance: Retention of Revenues.** Project sustainability and success depends critically on customers in Dili paying for their improved water supply service. The project design mitigates this risk as follows (Supplementary Appendixes B and D): (i) households, including low income women households, confirmed in discussions and surveys their willingness to pay for water, provided the service is good and reliable—the subzone approach is designed to achieve good reliable water supplies to customers; (ii) subzone caretakers will intensively manage services and customer relations in each subzone, including (a) monitoring service quality, (b) taking and responding to customer needs and complaints, (c) helping with minor repairs, including meters, (d) helping with billing and collections, (e) reporting illegal connections, and (f) delivering outreach messages encouraging good water use practices and the need to pay water bills; (iii) regularize and meter and re-meter all connections in subzones and all commercial connections in Dili; (iv) reinstitute billing and collections in accordance with Ministerial Order 1/2004 on schedule of fees and charges, initially focusing on high usage customers; and (v)

¹³ The environmental impact assessment bill is likely to be promulgated in 2008. Under the bill, the responsible authority for issuing EIAs and approvals will be the secretary of state for environment within the ministry of economic and development. Ahead of the EIA law, there remains no clear responsibility for environmental assessments and approvals within the Government.

strengthen DNSAS's support services section (meter management) and customer services section through the Dili Water Supply Performance Improvement TA. DNSAS management confirmed its willingness to disconnect delinquent accounts, pursuant to Decree Law 4/2004 on Water Supply for Public Consumption. The Government is committed to improving revenue performance and reducing subsidies for water (and electricity) services, but much depends on security conditions in Dili (paragraph 66). As revenues build, DNSAS should be designated a revenue-retaining agency rather than have its revenues go into the state consolidated revenue account. This reform element is included in a draft ministerial order for the "reinstitution" of DNSAS as an independent public entity prepare in 2004. Water tariffs are discussed in Appendix 11 and elaborated, together with a discussion on DNSAS finances, in Supplementary Appendix K.

68. **Commitment to Concentrated Investments, Zonal Approach.** Dili city water supply services should not be extended into new areas prematurely; doing this would compromise the system hydraulically and would reduce the efficacy of the zonal approach. Investments should concentrate on rolling out the subzone process until the entire program is completed.

IV. ASSURANCES

69. In addition to the standard assurances, the Government has given the following assurances, which are incorporated in the legal documents:

- (i) **Counterpart financing.** The Government will make available on a timely basis a total of \$1.5 million from its ordinary budgetary allocations as counterpart financing to ensure timely completion of the Project.
- (ii) **Project management.** The Government, through MOI, will arrange the project team to be located in the Corporate Services Directorate of MOI and in DNSAS, and will provide office accommodation for all members of the project team, and will ensure close cooperation between the project team and MOI and DNSAS staff, including provision of all necessary data and information to the project team in a timely manner.
- (iii) **Environment.** The Government, through DNSAS will ensure that for every subproject: (a) an IEE, environmental impact assessment (as necessary), and EMMP will be prepared in accordance with the project EARP, consistent with (1) applicable national environmental laws, regulations, and guidelines, as and when such laws, regulations and guidelines are adopted and become effective, and (2) ADB's *Environment Policy* (2002); (b) the EMMP in the IEE is part of the bidding documents and civil works contracts; (c) any adverse environmental impacts arising from the Project are minimized by implementing the agreed mitigation measures; and (d) environmental monitoring is done by the construction supervision team. Prior to signing of any works contract under the subproject and the commencement of works, MOI shall submit to ADB for review and approval on a no-objection basis, the IEE related to the subproject.
- (iv) **Subproject approval.** All subprojects will be prepared, selected and submitted for approval by ADB in accordance with the procedures and eligibility criteria agreed between the Government and ADB. The Government will ensure that DNSAS will submit a SPAR for each candidate subproject to ADB for no-objection approval before proceeding with detailed engineering design and construction of the subproject.
- (v) **Project performance monitoring and evaluation.** The Government, through the project team, assisted by the international and national consultants engaged under the Project, will monitor and evaluate project impacts. The Government will discuss

and agree with ADB on the indicators and baseline data prepared by these consultants prior to the commencement of civil works, and will ensure that the consultants monitor and compare the data during project implementation and at project completion. To the extent possible, the indicators and baseline data will make full use of gender-disaggregated data and information.

- (vi) **All works within existing easements.** The Government will ensure that (a) all subproject works are undertaken within existing water supply facility sites, easements, and public rights-of-way, and that (b) all subprojects are screened in view of potential resettlement impacts in accordance with the LARF (Appendix 12 and Supplementary Appendix G) to ensure no land acquisition or resettlement is required. If land acquisition or involuntary resettlement is unavoidable, the Government will (a) prepare a resettlement plan in accordance with ADB's *Involuntary Resettlement Policy* (1995) and the LARF; (b) submit it to ADB for approval prior to civil works contract award; and (c) ensure that payment of compensation or relocation to new sites have been satisfactorily completed prior to land acquisition activities and demolition. The Government will ensure that the resettlement plan will include detailed measurement surveys, compensation unit rates based on replacement cost surveys for all categories of losses and allowances, and a final database of affected persons. The Government will also ensure that timely and adequate budgetary support is fully committed and made available to cover the costs of land acquisition, resettlement, and relocation within the project implementation period.
- (vii) **Retention of project staff.** The Government will cause MOI to retain as regular or contractual staff of DNSAS, or contract through a firm or nongovernment organization, all nine members of the three leak detection teams and all six subzone caretakers (one subzone caretaker for approximately every 1,000 connections throughout the project area) recruited and trained under the Dili Water Supply Performance Improvement TA, provided that those retained will have performed their duties satisfactorily.
- (viii) **Operation and maintenance budget.** The Government will make timely budgetary allocations to DNSAS for costs related to subzone O&M, estimated at around \$17,000 per annum per subzone.
- (ix) **DNSAS institutional development.** The Government will, by 30 November 2009, have approved a ministerial order setting out a roadmap for organizing DNSAS into an independent public entity with appropriate management, technical, and financial autonomy.
- (x) **DNSAS revenue performance.** The Government will ensure that, by 31 December 2009, DNSAS has reinstated its revenue improvement program, with a target to increase during FY2010 the number of billed customers by a minimum 20% and the amount of gross water supply revenue by 30%. The Government will ensure that the demand management task force, established within DNSAS under the Dili Water Supply Performance Improvement TA, is mandated to carry on reducing NRW in other water zones in the project area.
- (xi) **DNSAS performance benchmarking.** The Government will ensure that, by 30 November 2009, DNSAS has instituted a performance benchmarking program, preferably in association with the World Bank-supported IBNet for water and sanitation utilities (Supplementary Appendix B).
- (xii) **Public consultation and participation.** The Government will ensure that: (a) adequate public consultations are conducted with local communities on certain aspects of the Project during implementation, including but not limited to the arrangements for bill paying and provision of water for houses without direct street

access; (b) all reasonable and necessary steps are taken to encourage women living in the project area to participate in the preparation, design and implementation of subprojects; and (c) women are primary targets for any community-based promotion activities, including but not limited to activities designed to promote good water use behavior.

- (xiii) **Labor standards.** The Government will ensure that all installation and civil works contracts under the Project incorporate provisions to ensure that contractors comply with the Government's applicable labor laws and regulations. In particular, all installation and civil works contractors engaged for subprojects will be required to (a) provide equal employment opportunity to male and female employees, (b) provide equal pay to male and female employees for work of equal value, and (c) not employ child labor in the subprojects work.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
<p>Impact Improved water supply services for households, businesses, and institutions in Dili city</p>	<p>Percentage of Dili population receiving 24-hour piped water supply increased from 25% in 2007 to 80% by 2015</p> <p>Customer satisfaction with Dili piped water supply services improved, with less than 180 complaints per 1,000 customers per year by 2015</p> <p>Women perceive significant benefits from improved water supply services to their households</p>	<p>DNSAS customer registration records, consumption records and field surveys</p> <p>DNSAS customer complaints records Structured customer surveys, gender disaggregated</p>	<p>Assumptions</p> <ul style="list-style-type: none"> • Dili is peaceful and stable, and neighborhoods normalize including the resettlement of internally displaced people • Government replicates new water supply infrastructure improvements in all Dili water supply zones • MOI and/or DNSAS retain project leak detection team members and retains/engages one subzone caretaker for every 1,000 connections throughout the Dili service area • MOI and/or DNSAS allocate sufficient budget and technical resources to properly operate and maintain Dili water supply systems • Government implements reforms to strengthen the financial, technical, and managerial autonomy of DNSAS, including retention of earned revenues
<p>Outcome Improved hydraulic management of the Dili water supply system and more efficient tertiary distribution</p>	<p>NRW ratio for Dili city water supply reduced from 95% to 40–50% by month 29</p> <p>NRM ratio for the three target zones reduced from 95% to 25–30% by month 29</p> <p>Percentage of the population in the three target zones receiving 24-hour piped water supply increased from 40% in 2006 to 80% by 2009</p> <p>Procurement contracts let, NRW targets set and work plans in place for ongoing leak detection and NRW reduction work in future target zones by month 29</p>	<p>DNSAS customer, billing, production, and consumption records</p> <p>Procurement contracts and monthly demand management task force report</p>	<p>Assumptions</p> <ul style="list-style-type: none"> • Water production and main distribution infrastructure and facilities recently upgraded continue to function properly and deliver water to the service area as designed. • Residents in neighborhoods cooperate with project teams. • DNSAS provides efficient and effective management and administration procedures for customer registration, metering and billing. • Procurement agencies provide efficient and effective procurement support.
<p>Outputs 1. Water losses reduced and controlled in three target zones</p>	<p>Water loss reduction and control program completed in three target zones by month 29, including (i) six subzones in the three target zones metered and controlled by valves; (ii) 51 km of tertiary pipes</p>	<ul style="list-style-type: none"> • Demand management task force progress reports and leak detection teams field reports • DNSAS customer registration records, customer database, and 	<p>Assumptions</p> <ul style="list-style-type: none"> • Outputs from the Dili Water Supply Performance Improvement TA are on time and as expected • MOI and/or DNSAS give adequate authority to the demand management task force over DNSAS operating

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
<p>2. Visible leaks reduced; practical improvements made; stop valves refurbished, replaced, or installed to allow the better management of the system; and commercial customers metered in all Dili water zones</p>	<p>and service connections surveyed for leaks, repaired, or replaced; (iii) 2,950 meters of registered connections replaced or installed; (iv) 5,100 unauthorized connections regularized or disconnected; and (v) metering of all registered customers in target zones increased from 30% (September 2007) to 70–80% by month 29</p> <p>Visible leaks and open pipe discharges identified in water supply zones by month 12</p> <p>Installation of 240 commercial and bulk meters and metering (operating meters) of registered commercial, institutional, and other large customers in all zones increased from 25% (September 2007) to 80–90% by month 29</p> <p>Improvements made to allow the disconnection of 7 km of old leaking mains; and repair, replace, or install 88 stop valves to allow the better management of water by month 29</p> <p>Nine chlorine-dosing units refurbished or replaced by month 29</p>	<p>meter database.</p> <ul style="list-style-type: none"> • DNSAS record drawings <p>Demand management task force progress reports and leak detection teams field reports</p> <p>DNSAS customer registration records, customer database, and meter database</p> <p>Baseline and follow-up socioeconomic surveys during project implementation</p>	<p>sections to ensure timely execution of their assigned NRW work plans and targets.</p> <ul style="list-style-type: none"> • Government approves and enacts changes to water supply tariffs and connection charges that may be recommended by the project team in view of prevailing economic and social conditions and consumers' willingness to pay. • MOI/DNSAS implement water supply connection and disconnection policies, on a graduated basis (focusing on commercial, institutional, wealthier, and larger customers first). • Residents do not obstruct project teams from inspecting and repairing leaks. • Targeted customers are willing to pay DNSAS water supply tariffs and connection charges. • Availability of suitable leak detection teams members for recruiting • Availability of suitable subzone caretakers for recruiting
<p>3. Skills of DNSAS technical and O&M staff upgraded in leak detection, leak reduction, and subzone management (the Dili Water Supply Performance Improvement TA will provide formal and on-the-job training for (i) NRW, (ii) network modeling and drawing office management, (iii) meter management, (iv) customer service,</p>	<p>Three leak detection teams established by month 2, operating effectively by month 8, and team members retained by DNSAS as permanent staff by month 29</p> <p>Planning of leak detection work in target zones completed by month 4 and planning of future target zones completed by month 29</p> <p>Subzone caretakers</p>	<p>DNSAS staff records, leak detection teams and subzone caretakers employment contracts and duty statements</p> <p>DNSAS training records</p> <p>Leak detection teams field reports</p> <p>Demand management task force progress reports</p> <p>Project monitoring and evaluation report</p>	

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
(v) customer relations, and (vi) distribution planning and management. On-the-job training will be included under the Project.	<p>recruited, trained, and operating effectively in target zones at maximum ratio of one caretaker per 1,000 customers by month 29</p> <p>80 trainees successfully completed 470 days of classroom instruction (supplemented by on-the-job training) by month 29</p>		
<p>Activities with Milestones</p> <p>1. Water Loss Reduction and Control Program in Three Target Water Supply Zones</p> <p>1.1 Establish project team and recruit project consultants by month 0.</p> <p>1.2 Provide training to project team and establish project management, accounting, reporting, and records system in months 1–3.</p> <p>1.3 Plan and design leak detection, reduction, and control program in consultation with demand management task force by month 3.</p> <p>1.4 Help DNSAS to recruit and establish three leak detection teams by month 3.</p> <p>1.5 Prepare tender documents, call, evaluate, and award tenders for supply of pipes, valves, meters; meter and valve chamber construction; and pipe repair and replacement by month 6.</p> <p>1.6 Inspect, repair, or replace faulty distribution valves and bulk meters by month 12.</p> <p>1.7 Create physical zones and subzones by installing valves in months 4–24.</p> <p>1.8 Construct valve and meter chambers for target subzones in months 4–24.</p> <p>1.9 Create three pilot subzones, undertake leak detection and repairs in the subzones and provide training to leak detection teams from months 4–8.</p> <p>1.10 Expand leak detection, and pipe repair and replacement to other parts of target zones and subzones from months 9–29.</p> <p>1.11 Inspect, replace, or install meters on all authorized connections in subzones in target zones; and regularize or disconnect unauthorized connections from months 3–29.</p> <p>1.12 Provide ongoing support to demand management task force over months 1–29.</p> <p>2. Basic Leak Reduction and Commercial Customer Metering in 10 Water Supply Zones</p> <p>2.1 Identify and repair visible leaks and open pipe discharges in all 10 water supply zones in months 3–6.</p> <p>2.2 Inspect, replace, or install meters on authorized commercial, institutional, and other large customer connections from months 3–29.</p> <p>3. Skills Upgrading in Leak Detection and Subzone Management</p> <p>3.1 Provide formal training and on-the-job training to leak detection teams and subzone caretakers in pilot subzones from months 4–8.</p> <p>3.2 Provide ongoing support and on-the-job training to leak detection teams and subzone caretakers in months 9–29.</p> <p>Note: The project team will assist the TA consultants in assessing skills, reviewing practices, and designing skills upgrading programs in distribution and management by month 1. The project team will help the TA consultants conduct formal (in-house) and on-the-job skills training programs covering distribution planning, zone management, valve and bulk meter management, and technical standards by the end of month 3, reaching at least 60% of staff in planning and design and Dili O&M sections. The project team will provide ongoing support and on-the-job training in distribution planning and management during months 4–29.</p>			<p>Inputs</p> <p>ADB (\$6.000 million)</p> <ul style="list-style-type: none"> • Consulting services 104 person-months (\$1.036 million) • Design and supervision package (\$0.723 million) • Equipment and installation (\$3.680 million) • Contingencies (\$0.561 million) <p>Government (\$1.500 million)</p> <ul style="list-style-type: none"> • Equipment and installation (\$1.026 million) • Taxes and duties (\$0.275 million) • Contingencies (\$0.199 million)

ADB= Asian Development Bank; DNSAS = National Directorate of Water Supply and Sanitation; MOI = Ministry of Infrastructure; NRW = nonrevenue water; O&M = operation and maintenance; TA = technical assistance.

URBAN WATER SUPPLY SECTOR ANALYSIS

A. Water Supply and Sanitation Overview

1. Background

1. **Sector Management.** Under the fourth constitutional Government sworn into office in August 2007, the new Ministry of Infrastructure (MOI) has primary responsibility for managing water supply and sanitation (WSS) in Timor-Leste. The secretary of state for electricity, water, and urbanization reports to the minister. An MOI organic law is being prepared to clarify precise arrangements, roles, and responsibilities for the various offices that will directly and indirectly influence WSS sector development, for instance the previous Corporate Services Directorate of the previous responsible ministry. The National Directorate of Water and Sanitation (DNSAS) is responsible for developing, managing, operating, and maintaining urban and rural WSS systems throughout Timor-Leste. It manages 13 urban water supply systems, the largest being Dili city. DNSAS is a directorate within MOI, with no financial and little managerial autonomy. Other important stakeholder agencies include (i) Office of the Prime Minister and Council of Ministers (COM), for policy, planning, and regulation; (ii) Ministry of Economy and Development for environmental protection and Ministry of Agriculture, Forests, and Fisheries for water resources management; (iii) Ministry of Health for public health and community education and awareness; and (iv) other MOI directorates for urban drainage and other local environmental aspects.

2. **Legislative Framework.** In February 2004, COM adopted the Water Services Decree, which provides for the management of water services delivery, including provisions for the identification of areas to be supplied and application of service user charges. Two subsidiary ministerial diplomas concurrently set water supply tariffs for Dili and main towns in districts, and formalized management arrangements for multivillage piped water systems in rural areas. The Water Services Decree allows for the corporatization of DNSAS. Other relevant legislation includes (i) sanitation management decree (drafted but not yet considered by COM); (ii) Public Sanitation Decree (2005); (iii) national water policy and legislative framework (drafted and considered, but not yet passed by COM); (iv) law on environmental impact assessment and guidelines (drafted but not yet considered by COM); (v) law on pollution control (drafted but not yet considered by COM); and (vi) law on protected areas (under discussion).

3. **Access to Water Supply.** National estimates of access to water supply in Timor-Leste are not reliable because of definitional inconsistencies and data gaps.¹ But two things are clear: access nationally is low by regional standards, and access overall has improved little since restoration of independence in 2002, and in many areas has worsened. In 2001, access to water varied across Timor-Leste. About 42% of the population of the western districts had access to safe water, 48% in central districts, and 50% in eastern districts. The 2003 figures in Table A2.1 are derived from interviews with DNSAS staff, adjusted for ongoing projects. But rehabilitated and new rural (piped) water supply systems in Timor-Leste have been difficult to sustain and the figures are not adjusted for probable system failures. Access to safe water in urban centers has probably declined since 2001, again because systems have been inadequately maintained and have lost service efficiency. Earlier estimates for access to safe water could have been too optimistic. An informal survey in December 2004 indicated that about 41% of the urban population and 30% of the rural population had access to safe water.

¹ A thorough discussion of definitional issues and data gaps is available in the draft Water Supply and Sanitation: Priorities and Proposed Sector Investment Program, September 2007 (Update 2007).

Of households with access to safe water supply, the United Nations Development Programme² estimated in 2004 that only 13% had piped house connections and 16% used community taps. The remainder mostly used protected wells and spring sources.

4. **Access to Sanitation.** In 2001, only 42% of the overall population had access to adequate sanitation.³ In 2001, almost 45% (and 49% in 2002) indicated they did not use any form of toilet facility, instead using ponds, fields, etc., for their sanitary needs. In rural areas, anecdotal reports from health and other professionals indicate rural access may still be below 10%, especially in western districts. In urban areas, the 2002 survey suggests that a significant 22% of the total urban population did not have access to any toilet facility, with another 21% using open pits without septic tanks. In Dili, 31% did not have a septic tank connected to their toilet facility. The Timor-Leste Millennium Development Goal (MDG) Report 2004 cited access to sanitation as 19% total, 44% urban, and 10% rural in 2001.

2. Dili Water Supply

5. **Water Supply Infrastructure.** Dili city's water supply system comprises four river intakes, nine functioning deep bores, 31 kilometers (km) of raw water transmission mains, four water treatment plants, seven service reservoirs, and 200 km of distribution mains. The distribution network is divided into 10 water supply zones. While some are separate zones controlled by boundary valves, others are theoretical zones only. Over the past 5 years, the Government of Timor-Leste, Japan International Cooperation Agency, Asian Development Bank (ADB), and other donors have made substantial investments⁴ in raw water transmission capacity, water treatment plant capacity, and the distribution network in 8 of the service area's 10 water supply zones. These elements of Dili's water supply system are in reasonable condition and have adequate capacity, although raw water intakes and transmission mains are occasionally damaged by floods and landslides. But tertiary pipes and service connections are in poor condition and contribute substantially to the high leakage rates. The distribution network reaches about 80% of the entire Dili water service area (the 10 water supply zones).

6. **Service.** DNSAS estimates (March 2006) that only about 43% of Dili's households have authorized piped water supply connections, while a further 10% use public taps or tanks (Table A2.1). An estimated 22% of households have unauthorized connections. In total, around 87% of households take water directly from the piped water supply system. In zone 3 and elsewhere, smallholder farmers use DNSAS treated piped water for crop irrigation. Only about 25%–30% of DNSAS authorized customers, mainly in zones 1 and 10, have 24-hour supply with good pressure. The other zones experience high leakage, low or variable pressure, and intermittent supply with water available for only about 10–16 hours per day. Many urban neighborhoods, particularly in low-income areas, rely on contaminated water from shallow wells or boreholes and streams. The poor service and low coverage are largely caused by

² United Nations Development Programme. 2004. *Timor-Leste Human Development Report: Paths Out of Poverty*. Dili.

³ The definition of adequate sanitation is an adequate excreta disposal facility, such as a connection to a sewer or septic tank system, a pour-flush toilet, or a simple pit or "VIP" latrine. An excreta disposal system is considered adequate if it is private or shared (but not public) and it can effectively prevent human, animal, and insect contact with excreta.

⁴ Recent and ongoing construction works in April 2006: Japan International Cooperation Agency -funded project has completed distribution system upgrading in zone 4, and continues to upgrade distribution in zones 1, 3, 5, 6, 7, and 8, which is scheduled for completion by September 2006. ADB had previously upgraded the distribution network in zone 10. DNSAS is replacing some tertiary pipes in zones 2 and 4, and is reinstalling meters in zones 1, 2, 3, and 4. DNSAS also plans to relocate a package water treatment plant from Benamau to treat raw water from Maloa intake, which currently supplies raw water to a 60 cubic meter service reservoir servicing a small part of the system.

(i) lack of tertiary pipes; (ii) poor condition of tertiary pipes and service connections, and; (iii) poor demand management. Complaints of no water and low pressure make up almost one third of consumer complaints.

Table A2.1: Conditions in Dili City's 10 Water Supply Zones

Category	Area (hectares)	% of Total Area
Good Pressure	1,411	50
Mix of Good and Low Pressure	336	12
Low Pressure	452	16
Own Supply (Airport)	65	2
No Connection	42	1
Public Taps	21	1
Maloa Raw Water System	28	1
No Supply	485	17
Total	2,841	100

Source: National Directorate for Water Supply and Sanitation and Asian Development Bank estimates.

7. Average daily water demand is about 29,000 cubic meters per day, while water treatment plant capacity has reached 11,200 cubic meters per day through the Government of Japan-funded project to upgrade three water treatment plants plus the program to upgrade the central water treatment plant. The shortfall in supply comes from nine functioning deep boreholes that supply adequate quality water without treatment other than chlorination. Generally, Dili's piped water supply is not safe to drink directly from the tap. Many urban households use alternative more reliable supplies. Water quality is acceptable at treatment plant outlets, but quickly deteriorates within the distribution system due to low or negative pressure and lack of adequate watermain maintenance. More than half of Dili households rely on shallow wells for water supply—solely reliant or to supplement the piped water supply—and most premises have some form of storage to collect water when flowing from the piped system (Table A2.2). About 3% of households rely on tanker trucks. A few small-scale entrepreneurs provide water.

Table A2.2: Registered and Unregistered Connections in Dili City

Description	Number of Connections	Persons per Connection ^a	Population Served	% of Total Population
Registered Household Connections	9,174	7	64,220	41
Unregistered Household Connections	8,300	7	58,100	37
Public Taps or Tanks	91	140	12,740	8
Total			135,060	87
Total Population			160,000	100

^a The 2004 census reported 5.5 persons per household, 6.0 persons per dwelling, and 6.9 persons per occupied dwelling in Dili. The Dili Slum Upgrading Project, 2005, reported 5.9 persons per household and 7.9 persons per dwelling in Dili city's informal settlement areas.

Sources: National Directorate for Water Supply and Sanitation customer records for registered connections in March 2006; and 2002 estimates for unregistered connections.

8. **Water Access and Demand in Informal Areas.** Household surveys⁵ by the Dili Slum Upgrading Project in 2004 found that informal settlement areas account for about 15,500 (78%) of Dili's estimated 20,000 households, and are characterized by low population density, large

⁵ A total of 2,769 dwelling units were surveyed representing nearly 20% of the housing stock of the city. The surveys included housing inventory; assessment; socioeconomic attributes; areas of high, medium, and low priority; key issues and neighborhood priorities; infrastructure condition; basic service delivery; and upgrading needs. A further 220 dwelling units were interviewed in greater detail to clarify key issues and conditions.

household size (average 7.9 persons per dwelling unit), poor quality housing, and poor drainage. Improved water supply was consistently the highest development priority of respondents. The project estimated that some 98 underserved areas with about 46,000 residents (i.e., 28% of the total urban population) across the city would require upgrading in the short to medium term, and recommended a 4-year upgrading program at an estimated cost of \$3.59 million,⁶ including about \$0.40 million for water supply and \$0.48 million for sanitation.

9. **Water Meters.** Only 22% (2,350) of 9,972 authorized customers have operating metered connections. Many existing meters are broken or faulty; some have been deliberately damaged, removed, or tampered with to produce faulty readings. To meter all currently nonmetered Dili connections in the medium term would require around 1,800 meters to be installed each year over the next 4 years. DNSAS currently has a stock of 9,500 uninstalled meters, sufficient to complete metering of all current authorized customers in Dili (Table 2.3).

Table A2.3: Reported Connections and Consumption in March 2006

Classification	Connections		Customers		Consumption		Water Sold
	Authorized	Metered	Billed	Paying	Authorized	Billed	
	(number)				(m ³ /month)		
Households	9,174	2,132	2,132	169	247,698	57,564	4,563
Offices	150	56	56	0	450	168	0
Business (large)	249	78	78	9	7,470	2,340	270
Business (small)	218	50	50	6	3,270	750	90
Industrial (large)	22	22	22	11	990	990	495
Industrial (small)	0	0	0	0	0	0	0
Public Taps	91	0	0	0	10,920	0	0
Social ^a	68	12	12	0	204	36	0
Water Tankers					894	894	894
Total	9,972	2,350	2,350	195	271,896	62,742	6,312
% Production					36%	8%	1%

m³ = cubic meter.

^a Social includes schools, hospitals, churches, and government offices.

Note: Reported monthly water production in March 2006 was 757,575 m³.

Source: National Directorate for Water Supply and Sanitation records.

10. **Water Balance.** Dili's water supply system is losing massive amounts of water and money, and relies almost entirely on government subsidies. In September 2007, nonrevenue water⁷ was 100%, as no consumers were being billed for water used and no payments were received (Table A2.4). Nevertheless 15% of the water distributed from headworks was reticulated through water meters and if this water was billed and paid for, a theoretical nonrevenue water of 85% is calculated and used for this exercise. Other water losses are around 70%. DNSAS commenced billing and collecting revenue from its Dili water supply customers in 2005, in line with the Water Services Decree 2004. By then, only 2,350 (24%) of

⁶ Direct costs exclude administration, consultants, and contingencies. The project estimated unit upgrading costs of \$450 per dwelling unit for 5,950 dwelling units (7,970 households) in 98 target communities. The unit costs for water supply were \$50 per dwelling unit and for sanitation \$60.

⁷ Nonrevenue water is the difference between water supplied and water sold (i.e., billed irrespective of whether it is paid for or not) expressed as a percentage of water supplied by the water production facilities.

authorized customers were metered, and in March 2006 only 9% of metered customers (about 2% of all authorized customers) paid for piped water. The number of paying customers decreased inexplicably from about 900 to 195 between January and March 2006. From the onset of the national crisis in April 2006 until now, billing and collections ceased.

Figure A24: Water Balance for Dili City in September 2007

System Input Volume 100% 919,494 m ³ /month	Authorized Consumption 30% 275,848 m ³ /month	Billed Authorized Consumption 15% 137,924 m ³ /month	Billed Metered Consumption (paid)	0% 0 m ³ /month	Revenue Water 15% 137,924 m ³ /month
			Billed Metered Consumption (not paid)	15% 137,924 m ³ /month	
			Billed Nonmetered Consumption	0% 0 m ³ /month	
		Unbilled Authorized Consumption 15% 137,924	Unbilled Metered Consumption	0% 0 m ³ /month	Non- revenue Water 15 plus 70% unknowns = 85% 781,570 m ³ /month
			Unbilled Nonmetered Consumption	15% 137,924 m ³ /month	
	Water Losses 70% 643,646 m ³ /month	Apparent Losses Not Known	Unauthorized Consumption	Not Known	
			Metering Inaccuracies	Not Known	
		Physical Losses Not Known	Leakage on Transmission and Distribution Mains	Not Known	
			Leakage and Overflows at Storage Tanks	Not Known	
			Leakage on Service Connections up to the Customers' Meters	Not Known	

m³ = cubic meters.

Source: National Directorate for Water Supply and Sanitation; and Asian Development Bank. 2005. *Technical Assistance to Timor-Leste for Preparing the Urban Water Supply and Sanitation*. Manila. TA 4646-TIM.

11. **Performance Indicators and Benchmarks.** The Dili water supply and DNSAS performance indicators and comparisons with Southeast Asian averages are discussed in Appendix 3, and in some detail in Supplementary Appendix B.

B. Sector Policy and Programming

1. Sector Investment Plan Update 2007

12. The draft WSS sector investment program 2008–2012 was completed in September 2007 and by project fact-finding was being considered by the new Government. The 17 sector investment programs/update reports produced each year have been the Government's key program budgeting tool since 2004; they underpin the formulation of annual national budgets and include a 5-year rolling investment plan. The draft 2008–2012 plan comprises a comprehensive and technically sound national WSS strategy and the Government's WSS sector planning and budgeting.

13. Since before the 2006 national crisis—and especially since—the Government and development partners have recognized the urgent need for the Government to execute an accelerated program of public works in order to create jobs and improve service delivery. The FY2007 national budget quadrupled the national capital development program. The new Government is likely to continue with this policy and the WSS sector investment program 2008–2012 assumes some kind of a program for accelerated national development. It includes Dili city among several target districts for accelerated WSS investments. It explicitly programs

for the replication of the zonal approach being tested and demonstrated by the ADB-supported Dili Urban Water Supply Sector Project. The Project will cover only six subzones spread around three of Dili's 10 water supply zones—covering about 26% of Dili customers (in addition to the approximately 10% of customers already adequately served). The sector investment program provides for the zonal approach to be replicated in the remaining Dili city water supply zones until the entire network is technically sound and properly managed. The approach would then be replicated in Baucau and other urban centers in the remaining four priority districts.

2. Context for the ADB Sector Grant

14. The draft WSS sector investment program 2008–2012 provides a proper context for an ADB sector grant. The purpose of a sector loan or grant is to assist in developing a specific sector or subsector by financing a part of the investment planned by the Government. This type of ADB support takes a time slice or geographic slice of the wider investment program. The sector Project's water supply subzone approach fits with the usual subproject modality that underpins a sectorwide investment program and ADB sector loan or grant.

PERFORMANCE OF NATIONAL DIRECTORATE FOR WATER SUPPLY AND SANITATION

A. Agencies within the Urban Water Supply Sector

1. Ministerial Arrangements

1. Responsibilities of ministries and their line agencies in the water and related sectors were restructured on 8 August 2007. Until then, the National Directorate for Water Supply and Sanitation (DNSAS) was a line agency of the Ministry of Natural Resources, Minerals and Energy Policy. In a major government reshuffle, the Ministry of Infrastructure (MOI) was created covering the responsibilities of the Ministry of Public Works, Ministry of Transport and Communications, and the water supply, sanitation and electricity generation and distribution responsibilities of the Ministry of Natural Resources, Minerals and Energy Policy. Secretaries for state were created within MOI with the head of each secretary for state reporting to the minister. DNSAS reports to the secretary of state responsible for water supply and sanitation, electricity, and urban planning.

2. Until September 2007, financial management, including procurement, was controlled by the Ministry of Finance (MOF). This responsibility will be devolved to line ministries that have not yet been identified. Within MOI, financial, budgeting, and procurement responsibility will probably be retained at the ministerial level, but it may be devolved to the respective secretaries of state. The Ministry of State Administration controls staffing but is still developing its public service staffing procedures for recruitment, motivation, appraisal, training, and discipline. A consolidated fund of Timor-Leste has been established. In accordance with government annual budget papers, a banking and payments authority makes all government payments. Treasury receives all government revenues, acts as paymaster, and performs the accounting function of government.

2. National Directorate of Water Supply and Sanitation

3. DNSAS manages urban water supply systems in the 13 district capital towns—the largest being Dili City with a population of approximately 165,000—and a small but expanding number of systems in smaller district centers. Due to resource constraints, its rural water supply activities have relied heavily on the support of development partners and nongovernment organizations. The Project will rely on DNSAS as the project Implementing Agency, for day-to-day project implementation. Project management will fit within existing DNSAS structures and will use existing systems and processes.

4. DNSAS organizational development is discussed in greater detail in Supplementary Appendix B. Although established with a strategic plan and organization structure suited to expected early corporatization, DNSAS continues to operate as a government department. As expected of a government directorate, DNSAS has limited autonomy in decision making other than for basic operations and exhibits little accountability to service users. All financing, fees and charges, staffing, infrastructure development, and procurement decisions require the prior approval of higher level agencies.

5. DNSAS has 209 allocated staff positions, compared with 174 in 2005, and an urban water supply infrastructure asset base estimated at almost \$50 million. Its 2005–2006 total operating budget—covering urban water, urban sanitation, rural water, and sanitation—was just under \$2 million (up \$0.6 million from 2004/05) with another \$1.8 million for capital works (up \$0.7 million). The Government heavily subsidizes its operations and fully funds its development expenditures (in addition to external support). The 2006/07 staffing allocation for the various functions of DNSAS is shown in Table A3.

Table A3: National Directorate for Water Supply and Sanitation Staffing, 2006/07

Division	Permanent Staff	Temporary Staff	Total Staff
Administration and Human Resources ^a	8	4	12
Development and Planning	23	10	33
Dili Water and Sanitation Division ^b	47	21	68
Districts Water and Sanitation Divisions	77	19	96
Total	155	54	209

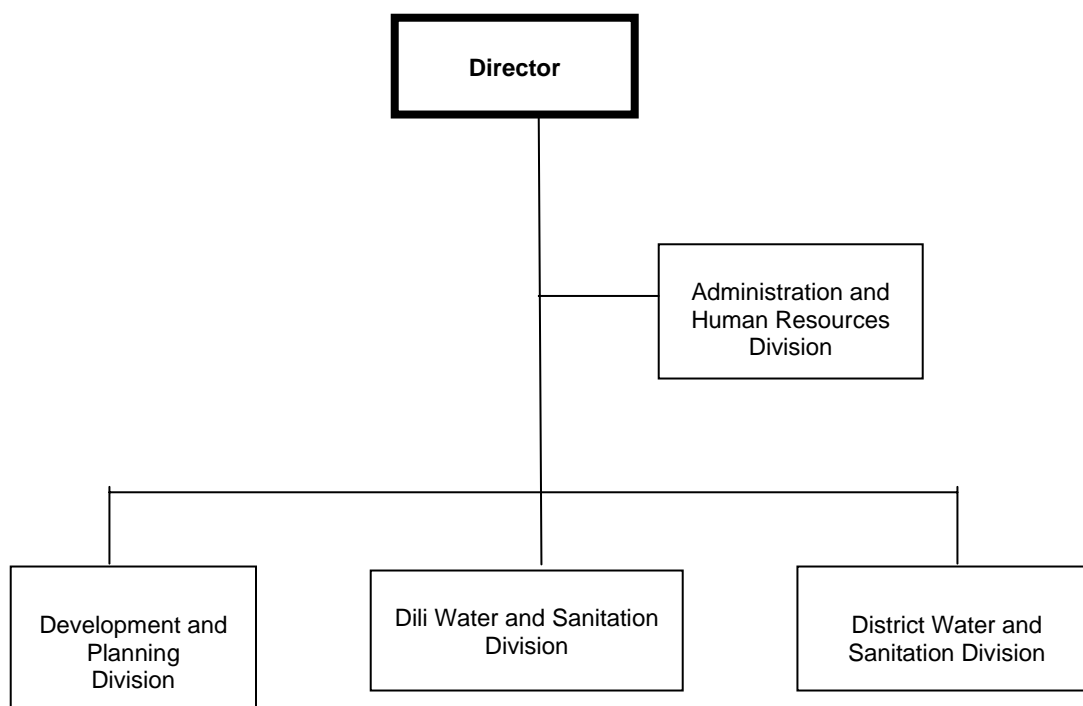
^a Includes customer services; staff administration, and finance.

^b Temporary staff includes garbage collectors.

Source: National Directorate for Water Supply and Sanitation.

6. The simplified DNSAS organization structure (Figure A3) generally follows the Government-owned corporation model established in early 2000.

Figure A3: National Directorate for Water Supply and Sanitation Organization



DNSAS = National Directorate for Water Supply and Sanitation.

Source: National Directorate for Water Supply and Sanitation.

3. National Directorate for Water and Electricity Policy

7. The recent establishment of the National Directorate for Water and Electricity Policy provides an opportunity for the presently fragmented water supply sector policy and service delivery directions to be reviewed, clarified, and comprehensively documented. The directorate's role is to make policy and legislative recommendations to the Government, and coordinate and monitor water service delivery.

B. Analysis of Organizational Strengths and Weaknesses

1. Strengths

8. DNSAS senior staff members exhibit a strong sense of organizational loyalty and pride. Senior managers meet weekly and organizational challenges are usually openly discussed and

decisions reached by consensus; although some autocratic and ad-hoc decisions occur at other times, often as a result of urgent ministerial direction. Senior staff members have a strong belief that ongoing procedural changes will allow both MOI and DNSAS increased autonomy in human resource management and more rapid ministerial-level procurement arrangements, thus improving organization performance.

9. Much reliance is placed on the well-documented organization structure and chains of command are well understood. Of particular significance is that the organizational structure currently in place, was developed by DNSAS itself. While this structure is not completely in line with recommendations,¹ the structure is operational and workable. The sense of ownership of the structure in place is strong. Job descriptions are available for most positions, but are not routinely referred to or well-linked to operating procedures. No established system of formal performance appraisal is in place.

10. DNSAS staff members have demonstrated great acceptance of most new systems and procedures imposed provided they have understood the need for change and the processes to be followed. DNSAS is highly regarded as more capable in budget preparation and quarterly reporting than most other agencies.

11. With the assistance of the two ADB-managed trust funds for water supply and sanitation rehabilitation projects in 2001/02, DNSAS established a system of guidelines, procedures, standard specifications, and drawings for community water supply and sanitation and for urban water supply. The community water supply guidelines have been well utilized and were recently updated by DNSAS. These guidelines have been well promoted and accepted by development partners. They are viewed as good practice for similar activities in other countries. Urban technical guidelines and standards are discussed in Supplementary Appendix D.

2. Weaknesses

12. Organizational weaknesses perceived by staff all relate to lack of autonomy to perform procurement, human resource management, and other functions that would allow them to do a “better” job. Examples given include slow procurement, financially constrained emergency responses, and inability to recruit budgeted staff. This is reinforced by the very poor DNSAS budget execution,² and underspending of staffing budgets. However ongoing changes concerning the devolution of responsibility from MOF to MOI, and within MOI, may help, in part, to overcome these weaknesses.

13. Many existing organizational deficiencies are not recognized by DNSAS staff as weaknesses that need to be addressed. These include

- (i) limited strategic planning;
- (ii) limited monitoring and reporting of performance;
- (iii) few embedded systems and operating procedures;
- (iv) limited means to identify future infrastructure development, rehabilitation, operation and maintenance costs; and
- (v) lack of accountability to service users.

¹ ADB. 2002. *Technical Assistance to Timor-Leste for Integrated Water Resource Management Project*. Manila (TA 3986-TIM).

² The DNSAS 2004–2005 annual reports show an operating budget execution of 86%; however, when end of year carryover commitments are removed the figure is 47%. Capital budget execution was similarly shown as 51%; however, actual capital expenditure at the end of the year was 0%.

14. DNSAS has experienced enormous organizational change over the past 6 years. Many staff members have been rapidly promoted to positions with responsibilities far in excess of their previous experience. Analytical thinking, planning, and problem-solving abilities have improved, but the room for further improvement is significant.

3. Project Reaction to Strengths and Weaknesses

15. The Project will build on the identified DNSAS strengths and provide support in areas identified as weaknesses. The Project will be implemented by DNSAS through its three existing divisions. No special project management unit will be established and all technology transfer resulting from project implementation will benefit these three divisions.

16. The Government prefers DNSAS to eventually become an independent public entity exercising management, technical, and financial economy. To this end, ADB sought the assurance of the Government and MOI, that by 31 December 2009, a draft ministerial order will be submitted to the Council of Ministers setting out a road map for graduating DNSAS to that status.

17. Capacity building is integrated with project activities with all members of the team of implementation consultants working collaboratively with their DNSAS counterpart(s). Further, a package of technical assistance³ specifically aimed at enhancing DNSAS capacity has already been approved and will be in the field concurrent with the Project.

18. Existing comprehensive technical standards, drawings, specifications, and guidelines, with some minor modifications, have been developed in consultation with DNSAS staff members. These will be adopted as DNSAS documents and be followed by the Project.

C. Financial Management Assessment

19. A financial management assessment questionnaire and interviews were used to review the present standing of financial management of DNSAS. The completed questionnaire and interview findings are set out in Supplementary Appendix K.

1. Financial Management

20. Supplementary Appendix K, discusses in detail DNSAS financial management issues under these headings: accounting, budgeting, and auditing.

21. During project implementation, the Project will need to develop accounting and reporting systems⁴ to enable generation of suitable financial reports including total project expenditure incurred, amount eligible for ADB financing, amount already claimed from ADB, amount reimbursed by ADB, and amount disallowed and/or pending for reimbursement.

22. Detailed budgets are prepared by each unit and division of DNSAS and compiled by the finance division. These are forwarded to MOI for approval and then finally to MOF. The overall budget is approved by the Council of Ministers and finally by Parliament. Any changes to the budget must be approved by Treasury, which can only authorize changes of plus or minus 15%.

23. DNSAS has no internal audit function. Special audits of DNSAS projects may be undertaken by MOI or MOF, but this is not common. DNSAS is not required to have its own

³ ADB. 2006. *Technical Assistance to Timor-Leste for Dili Water Supply Performance Improvement*. Manila (TA 4869-TIM, financed by the Japan Special Fund).

⁴ This project accounting function may be based in DNSAS or MOI.

financial records audited as all records are maintained within the government accounting system in Treasury. However, an international independent auditor audits the government accounts. The Project will need to arrange for an independent audit of project finances and transactions.

2. Conclusion

24. The financial sustainability of the Dili urban water sector is dependent on (i) developing subzone projects with improved water supply services; (ii) metering and billing households and nondomestic customers in the subzone project areas, and payment for improved water services; (iii) reducing water losses over the whole Dili water supply system; and (iv) billing all commercial customers. The physical intervention under the sector Project plus ongoing capacity development will result in improved cost recovery and financial sustainability of the Dili urban water supply system.

25. In terms of financial management, DNSAS financial, accounting, and reporting systems are part of the overall government accounting system. DNSAS has limited financial autonomy. The government accounting system provides adequate safeguards over the control and reporting of government expenditure against annual budget heads.

26. However, in terms of project accounting and reporting, the Project will need to maintain separate accounts and prepare separate financial statements. These will then need to be audited by an international accountant engaged by the Project.

EXTERNAL ASSISTANCE TO THE WATER SUPPLY SECTOR

1. International donors active in the water supply sector and water resources in Timor-Leste include the Asian Development Bank (ADB), Australian Agency for International Development (AusAID), European Commission, French Cooperation, Japan International Cooperation Agency (JICA), New Zealand International Aid & Development Agency, Norwegian Water Resources and Energy Directorate, Portugal Cooperation, United States Agency for International Development, World Bank, various United Nations agencies, and World Health Organization. Most of these partners are only active in the rural areas of Timor-Leste and unless they have implications for the activities of the Dili Urban Water Supply Sector Project are not discussed in this appendix. The Government of Portugal, through Aguas de Portugal Timor-Leste (Portugal Water Timor-Leste), and the German Technical Cooperation upgraded components of the water supply system in the second city, Baucau.

A. External Assistance with Implications for the Project

1. United Nations

2. The United Nations Transitional Administration in East Timor (UNTAET) established an Office of Water Supply and Sanitation (WSS) in 2001 as the government agency responsible for developing, managing, operating, and maintaining urban and rural water supply systems throughout Timor-Leste. The office also played a key coordination role with the activities of the multidonor Trust Fund for East Timor. UNTAET formulated sector policies and a legal framework (Appendix 2). Phases I and II of the Water Supply and Rehabilitation Project were funded by the trust fund and administered by ADB (paras. 4–5).

2. Australian Agency for International Development

3. AusAid recently completed its Community Water Supply and Sanitation Project after 5 years of implementation in Cova Lima, Bobonaro, and Viqueque districts. This project focused on installing small village and multivillage gravity-flow systems, and establishing community-based ongoing management arrangements. A successor project, the Rural Water Supply and Sanitation Project commenced in September 2007, with AusAID committing \$45 million equivalent over 10 years. AusAID support includes capacity building for the National Directorate for Water Supply and Sanitation (DNSAS) and the Ministry of Health. The project implementation consultants, as well as consultants engaged under the ADB Dili Water Supply Performance Improvement technical assistance (TA),¹ should coordinate closely with the Community Water Supply and Sanitation Project.

3. Asian Development Bank

4. The Water Supply and Sanitation Rehabilitation Project, phase I operated from August 2000 until December 2001.² With a budget of \$4.5 million, the project objective was to provide sustainable water supply and sanitation using appropriate technology. The scope was to restore damaged water supply and sanitation infrastructure, and build institutional capacity to manage and operate the system. Among its outputs, the project produced many standards and standard drawings, which DNSAS has adopted. These standards will be adopted and followed by the sector Project with some minor improvements to reduce the impact of intentional damage.

¹ ADB. 2006. *Technical Assistance to Timor-Leste for Dili Water Supply Performance Improvement*. Manila (TA 4869-TIM, financed by the Japan Special Fund).

² ADB. 2000. *Report on a Project Grant from the Trust Fund for East Timor to the United Nations Transitional Administration in East Timor for Water Supply and Sanitation Rehabilitation Project*. Manila (Grant 8185-TIM).

5. The Water Supply and Sanitation Rehabilitation Project, phase II operated from July 2001 until 30 April 2003.³ This project also had a budget of \$4.5 million with objectives to improve the capacity of water supply and sanitation services; and help implement priority projects in Dili, districts, subdistricts, and villages.

6. The Integrated Water Resources Management TA operated from March 2004 until February 2006.⁴ It was to create a national water policy to lead to the adoption and progressive implementation of an integrated approach to water resource management in Timor-Leste. A draft national water resources policy was prepared and endorsed by the project steering committee and the Prime Minister; however, the policy has yet to be formally adopted.

7. The ongoing Infrastructure Sectors Capacity Development TA aims to improve the delivery of infrastructure services, including water supply, by providing training and logistical support to relevant ministries.⁵ The Infrastructure Project Management TA supports project management of the Government's own-funded infrastructure capital program.⁶ A TA-funded procurement specialist will be available to assist the Ministry of Infrastructure (MOI) in undertaking procurement for the Project. TA-funded safeguard specialists will be available to help DNSAS undertake environmental and social impact assessment and management for the Project. The Dili Water Supply Performance Improvement TA (footnote 1) is intended to directly support the Project. The TA will provide formal and informal training for (i) reduction of nonrevenue water, (ii) network modeling and drawing office management, (iii) water meter management, (iv) customer service, and (v) distribution planning and management.

4. Japan International Cooperation Agency

8. JICA has invested heavily in urban water supply infrastructure and has a program continuing in district towns. Total JICA investment in Dili is approximately \$25 million equivalent. Recent JICA support has rehabilitated or replaced headworks, water treatment plants, and reservoirs. A comprehensive network of primary and secondary water mains has been constructed throughout all 10 zones of the Dili water supply system. In many cases, these new galvanized steel mains have yet to be connected to the existing network of mains, and tertiary mains serving neighborhoods do not exist. This JICA program in Dili has concluded.

9. JICA also proposes a study on community-based integrated watershed management. The objectives of this study are to develop a community-based watershed management plan for Lacio and Comoro river basins, both of which are in the Dili urban water supply catchment; and prepare community-based watershed management guidelines for use in other areas.

10. JICA intends to conduct capacity development work within DNSAS aimed at improving the management, operation, and maintenance of new water supply infrastructure. The assistance is likely to target the operations of water treatment plants.

³ ADB. 2001. *Report on a Project Grant from the Trust Fund for East Timor (to be administered by the Asian Development Bank) to East Timor (as administered by the United Nations Transitional Administration in East Timor) for Water Supply and Sanitation Rehabilitation Project*. Manila (Grant 8189-TIM).

⁴ ADB. 2002. *Technical Assistance to Timor-Leste for Integrated Water Resources Management*. Manila (TA 3986-TIM).

⁵ ADB. 2005. *Technical Assistance to Timor-Leste for Infrastructure Sectors Capacity Development Project*. Manila (TA 4609-TIM).

⁶ ADB. 2007. *Technical Assistance to Timor-Leste for Infrastructure Project Management*. Manila (TA 4942-TIM, cofinanced by the Government of Australia).

B. Lessons from Externally Supported Projects

11. Lesson from the ADB grant-funded Water Supply and Sanitation Project (phases I and II) as set out in the project completion report include

- (i) significant external support to the sector is still needed; restoration of services to pre-independence standards does little to meet goals of public health, human dignity, and environmental protection;
- (ii) external assistance should fit within strategies of UNTAET WSS; the emergency phase is over (December 2001) and long-term planning should be based on assessment of needs;
- (iii) sector assistance projects should be designed with sufficient flexibility to respond appropriately to evolving needs;
- (iv) the need for capacity development at all levels is ongoing; however, this must be undertaken at an appropriate pace and timing—some previous capacity development effort may need to be repeated for the benefit of new staff and for reinforcement of existing staff;
- (v) service can be improved rapidly and cost-effectively by reducing water supply distribution system leakage and customer wastage; the introduction of cost recovery based on a tariff structure will rapidly reduce consumer wastage; and
- (vi) concentrating effort over a smaller area is more effective than spreading operations too thinly on the ground over a much wider area—in this case, Dili and all district towns.

12. The project performance audit report, produced by ADB in December 2004, identifies the following lessons from the Water Supply and Sanitation Project (phases I and II):

- (i) The community-managed model has not proved sustainable because it did not take account of actual social relations, which are household and kin-based, rather than community based.
- (ii) The emphasis on delivering results to address an emergency situation meant that action took precedence over building local capacity, although the achievements in terms of capacity development within the Office of WSS (now DNSAS) were significant.
- (iii) The failure to reimpose charges for water at the time of rehabilitation of urban services meant that doing so later became politically difficult given that the service delivery standards had slipped in many instances.

13. The major lessons from the Integrated Water Resources Management Project (footnote 4) was that the capability of a nascent government can easily be overestimated. Project design should ensure stakeholders fully understand the distinction between policy formulation and policy implementation, and implementation support should be fully resourced. Awareness raising should be continuous and appropriately resourced. Project design should capture synergy opportunities among complementary externally supported programs. Legislation and formal national policy should be drafted first in the Portuguese language.

COST ESTIMATES AND FINANCING PLAN

Table A5.1: Detailed Cost Estimates by Expenditure Category
(\$'000)

Item	Foreign Exchange	Local Currency	Total Cost	% of Total Base Cost
A. Investment Costs^a				
1 Mechanical and Equipment (plus installation)	2,952	2,029	4,981	73.1
a. Land Acquisition and Resettlement	—	—	—	—
b. Equipment	1,925	275	2,200	47.9
c. Installation	1,003	1,754	2,757	22.0
d. Environmental Management Plans	24	—	24	0.0
2 Consultants	1,407	352	1,759	26.1
a. Project Management and Capacity Development	812	224	1036	15.4
b. Contract Design and Supervision Services	595	128	723	10.7
Base Costs^b, Subtotal (A)	4,359	2,380	6,740	100.0
B. Contingencies				
1 Physical ^c	347	177	525	7.8
2 Price ^d	48	188	236	3.5
Subtotal (B)	395	365	760	11.3
C. Financing Charges during Implementation				
Subtotal (C)	0	0	0	0.0
Total Project Cost (A+B+C)	4,755	2,745	7,500	111.3

— = No cost

^a In mid-2007 prices.

^b Taxes and duties of \$0.275 million or 4.1% of base costs.

^c Computed at 7% for civil works and 10% for consultancy services.

^d Computed at 0.8% of foreign costs and 4.0% for domestic costs.

Source: Asian Development Bank estimates.

Table A5.2: Detailed Cost Estimates by Financier
(\$'000)

Item	Total Project Cost	ADB		Government	
		Amount	% of Cost Category	Amount	% of Cost Category
A. Investment Costs					
1 Mechanical and Equipment (plus installation)	4,981	3,680	74	1,301	26
	—	—			
a. Land Acquisition and Resettlement				—	
b. Equipment	2,200	1,925	88	275	12
c. Installation	2,757	1,731	63	1,026	37
d. Environmental Management Plans	24	24	100	—	—
2 Consultants	1,759	1,759	100	—	—
a. Project Management and Capacity Development	1036	1036	100	—	—
b. Contract Project Design and Supervision	723	723	100	—	—
Base Costs, Subtotal (A)	6,740	5,439	81	1,301	19
C. Contingencies	760	561	74	199	26
D. Financing Charges during Implementation	0	0	0	0	0
Total Project Cost	7,500	6,000		1,500	
% Total Project Cost			80		20

— = no cost, ADB = Asian Development Bank.
Source: Asian Development Bank estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTING SERVICES

1. The Terms of Reference for consulting services has been prepared by ADB.
2. Survey and design for the Project will be outsourced with consultants to be procured by the Government, following Government procurement procedures and ADB Procedures for the procurement of consultants. ADB has estimated that this package would include one international Resident Engineer and one local Water Supply Engineer, each for the duration of the project, as well as local Survey and Design Technician for 15 months and a local Construction Supervisor for 26 months. Together with necessary logistical support, the estimated cost of the outsourced survey and design package is \$723,350.
3. ADB TA 4869-TIM Dili Water Supply Performance Improvement (the TA) has been approved by ADB and will operate concurrent with the Project. The TA will provide formal and informal training for (i) the reduction of Non Revenue Water (NRW); (ii) network modeling and drawing office management; (iii) water meter management; (iv) customer service; (v) customer relations; and (vi) distribution planning and management.
4. ADB has proposed that four international consultants and six local consultants be engaged, over the 29 month period of the Project, for a total of 36 staff months for international and 68 staff months for domestic consultants. It is understood that the international consultants will include: (i) a Project Management Specialist who will take the role of Team Leader – 27 months provided throughout the life of the Project with two, one month breaks during the wet season of 2009 and 2010; (ii) a Financial Management Specialist who will provide inputs totalling 6 months, one of three months early in the Project, and two each of one and a half months during 2009 and 2010; and (iii) a Monitoring and Evaluation Specialist who will provide one input of three months during the first year of the Project. It is understood that the Domestic Consultants will include (i) a Water Supply Engineer who will also assume the responsibility of Deputy Team Leader for the 29 month life of Project; (ii) a Financial Management Specialist who will be engaged for the 29 month life of the Project; and (iii) a Monitoring Evaluation Specialist who will be engaged intermittently for the life of the Project for a total input of 10 months.
5. ADB estimates cost of consulting services for the Project to be \$ 1,036,300

ELIGIBILITY CRITERIA AND PROCEDURES FOR SUBPROJECT SELECTION

1. The Dili Urban Water Supply and Sanitation Sector Project is consistent with the draft 2008-2012 Water Supply and Sanitation Sector Investment Program, which proposes a comprehensive program to turn-around the decline of urban water supply services in Timor-Leste. Starting with three zones within the Dili water supply service area, the program will demonstrate a zonal approach to progressively upgrading an entire city's water supply secondary and tertiary distribution (reticulation) operation to sustainably decrease water losses, manage water demand, boost customer satisfaction, and improve water supply business performance. Dili city was selected because it has the largest water and financial losses. If Dili remains such a drain on resources, the National Directorate for Water Supply and Sanitation (DNSAS) will be unable to commit sufficient resources to improve water supplies in other urban centers and rural areas.

2. Dili city is divided into 10 geographic water supply zones. Three zones (2, 4, and 5) are selected for candidate subprojects. Subprojects have been selected in subzones within each of these three water supply zones. Subzone boundaries will be determined by the technical location of the existing water supply pipe network, as well as the location of control valves. Subzones consist of a discreet section within the water supply network where water flow can be controlled and managed. Each subzone, or subproject, will include approximately 1,000 water services.

3. While the technical reasons for the selection of subzones took precedence, consideration was also given to the social and political implications of subzone sites and boundaries. Hydraulic boundaries cannot always be contiguous with *suco* (neighborhood administration) boundaries; the management of water supply in a subzone will increase in difficulty as the number of *sucos* increases. Similarly, if cost recovery, either in total or in part, is to be an output of the subproject, then the socioeconomic status of the households within the subzone will be a key consideration. The upgrading of subzones throughout the Dili water supply area is the ultimate aim of the sector Project. Issues of local political boundaries and socioeconomics affecting affordability and security must be addressed.

A. Procedures for Subproject Selection

4. The Development and Planning Division of DNSAS will identify candidate subprojects that meet the established criteria (paras. 6–8). The division will obtain DNSAS approval to assess the feasibility of the candidate subprojects. DNSAS will then prepare a subproject appraisal report (SPAR) or feasibility study for each candidate subproject. SPAR will provide

- (i) technical analysis and description,
- (ii) subproject rationale,
- (iii) scope and components,
- (iv) cost estimates and financing plan,
- (v) implementation arrangements,
- (vi) an initial environmental examination, and
- (vii) a resettlement plan, as required.

5. DNSAS will submit each SPAR to the Asian Development Bank (ADB) for review and approval on a no-objection basis. The SPAR will contain sufficient evidence of the candidate subproject's eligibility under the agreed criteria and be prepared in accordance with the detail and quality required to enable ADB to assess the viability and suitability of the subproject. After ADB endorsement of the SPAR, DNSAS will submit the SPAR to the secretary of state of the Ministry of Infrastructure for review and approval. Implementation of the candidate subproject may only

proceed following the endorsement of the SPAR by ADB, DNSAS, and Ministry of Infrastructure. The subproject selection process is set out in Figure A7.

B. Eligibility Criteria

6. To be eligible for financing through the Project, subprojects must be selected in accordance with the following criteria:

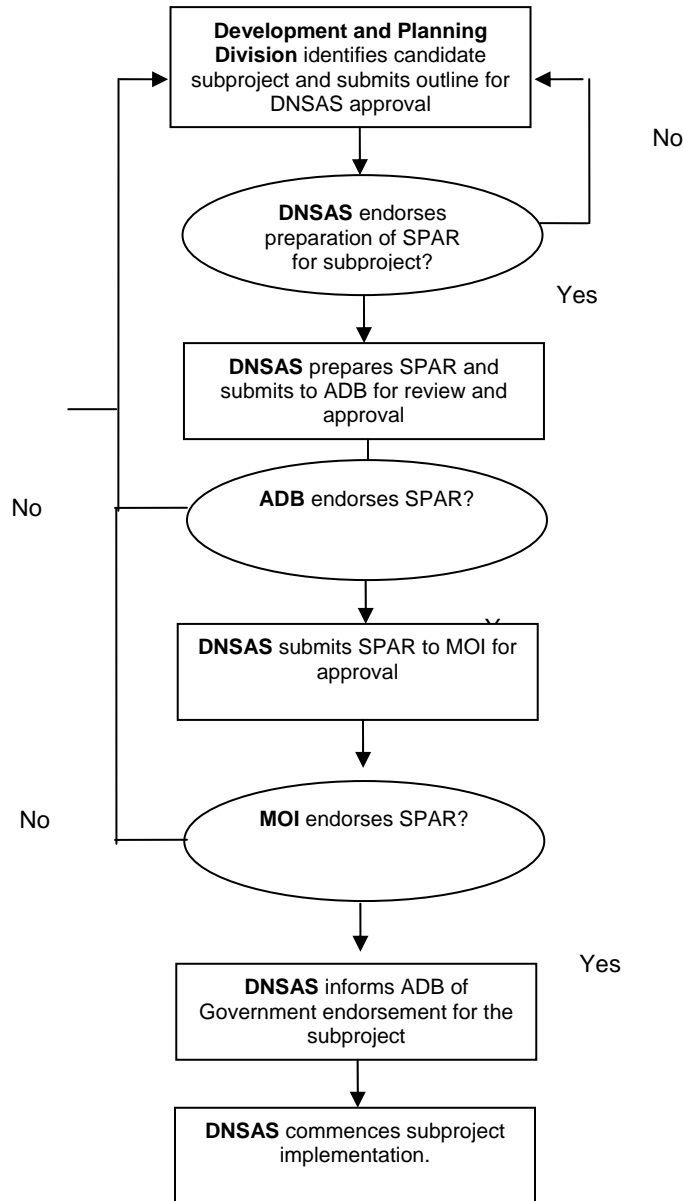
- (i) The subproject is consistent with the draft 2008-2012 Water Supply and Sanitation Sector Investment Program and is identified by DNSAS as a high priority.
- (ii) The subproject is technically feasible and meets the Government's technical standards and requirements.
- (iii) The subproject is justified as the most feasible subproject to achieve the stated objectives and is shown to be designed to minimize costs.
- (iv) The subproject has no land acquisition or involuntary resettlement impacts. In the event land acquisition or resettlement is unavoidable, DNSAS will prepare a resettlement plan in accordance with ADB's *Involuntary Resettlement Policy* (1995) and the LARF.¹
- (v) ADB determines that DNSAS has the necessary staff, and implementation and financial management capacity to implement the subproject, or that DNSAS can provide specific assurances that assessed shortcomings can be rectified by adding qualified staff or by providing timely in-service training for existing staff.
- (vi) The subproject's implementation time frame is reasonable, surveys and design can be prepared and reviewed, and safeguard procedures and other procedures followed with implementation to be completed within the project period.
- (vii) The financing plan clearly identifies confirmed sources of financing, including counterpart financing, and the provision of budgetary resources to meet counterpart funding requirements for capital expenditure during implementation, environmental management costs, and routine operating costs.
- (viii) The subproject will not adversely impact on DNSAS ability to meet financial covenants required by ADB.
- (ix) All required government approvals have been obtained.

7. In addition, for ADB approval the subproject must meet the following environmental criteria:

- (i) Subproject is not located in nature reserves.
- (ii) Subproject does not involve any significant loss of primary forest, mangroves, or sensitive wetland.
- (iii) Subproject does not involve any permanent negative effect on known rare or endangered species.
- (iv) Subproject does not involve any significant impacts on air quality and water quality.
- (v) Subproject does not involve any permanent damage to irreplaceable cultural relics and archaeological sites.
- (vi) Subproject does not require a preparation of the full environmental impact assessment.

¹ Note, however, that the project land acquisition and resettlement framework provides a mechanism to screen candidate subprojects and—if the need arises—provide guidance on how to prepare and implement subsequent land acquisition and resettlement procedures.

Figure A7: Flow Chart for Subproject Selection Procedures



ADB = Asian Development Bank, DNSAS = National Directorate for Water Supply and Sanitation, MOI = Ministry of Infrastructure, SPAR = several subproject appraisal report
 Source: ADB. 2005. *Technical Assistance to Timor-Leste for Preparing the Urban Water Supply and Sanitation*. Manila. (TA 4646-TIM).

PROJECT IMPLEMENTATION SCHEDULE

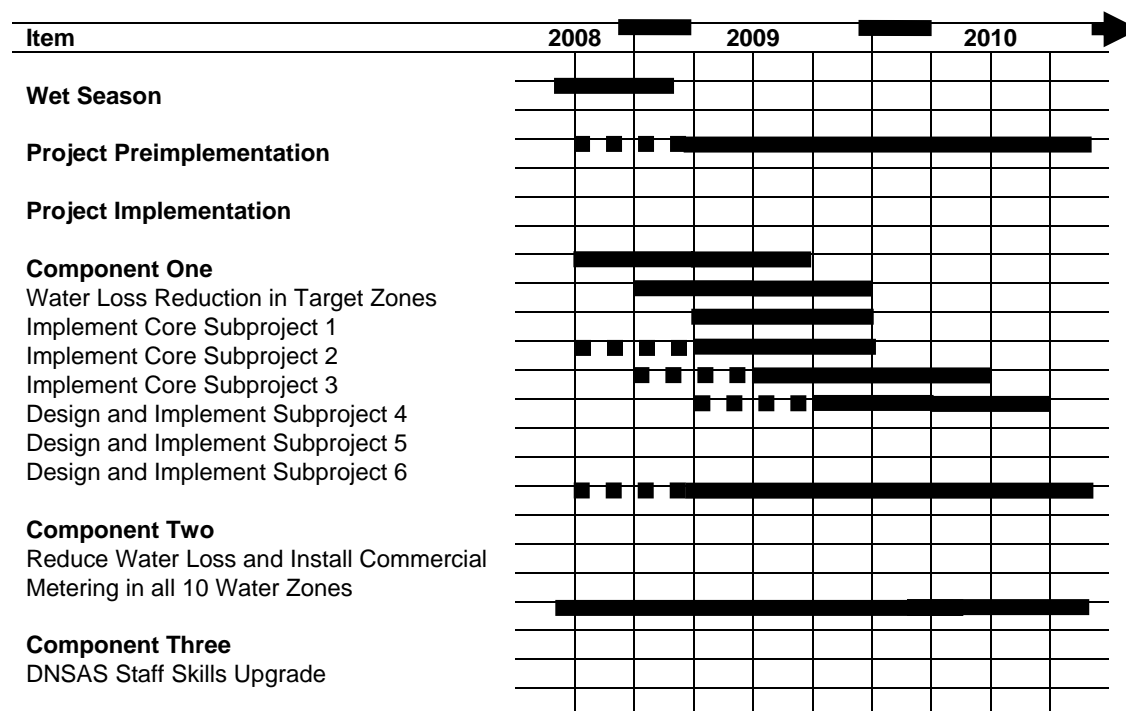
A. Introduction

1. The Dili Urban Water Supply Sector Project (the Project) takes a time slice and a geographic slice of the Government's draft Water Supply and Sanitation Sector Investment Program (Urban) for 2008–2012. Its outputs in six water supply subzones will be replicated progressively throughout Dili, the second city, Bacau, and in other district centers. The Project's intended outputs are (i) water losses reduced and controlled in six subzones within Dili; (ii) visible leaks reduced and commercial and bulk customers metered in all 10 zones in Dili; and (iii) skills of National Directorate of Water Supply and Sanitation (DNSAS) technical and operations and maintenance staff upgraded in leak detection, leak reduction, distribution planning, and distribution management. Subproject Appraisal Reports (SPARS) have been prepared for the first three subprojects (Supplementary Appendix D). The remaining three SPARs will be prepared during Project implementation.

B. Project Implementation Schedule

2. Project implementation is scheduled to commence on 1 July 2008 and to operate over a period of 29 months until 30 November 2010. The rainy season months of December to March, inclusive, are characterized by monsoonal rains. This and the large number of religious and national holidays in the last few weeks of the year have been taken into account in preparing the project implementation schedule, as well as schedule of inputs by the project implementation consultants. The schedules for project implementation consultants can be found in Appendix 6, and the project implementation schedule is set out in Figure A8.

Figure A8: Project Implementation Schedule



DNSAS = National Directorate for Water Supply and Sanitation.

Source: Asian Development Bank estimates.

PROCUREMENT PLAN AND CONTRACT PACKAGES

Project Information

Country	Timor-Leste
Name of Recipient	Democratic Republic of Timor-Leste
Project Name	Dili Urban Water Supply Sector Project
Grant Reference	Project No. 38212
Date of Effectiveness	tbd
Amount US\$ (total from all financiers):	\$7,500,000
Of which Committed, US\$	tbd
Executing Agency	Ministry of Infrastructure
Approval Date of Original Procurement Plan	tbd
Approval of Most Recent Procurement Plan	tbd
Publication for Local Advertisement	tbd
Period Covered by this Plan	18 months from signing of the Grant Agreement

tbd = to be determined.

Procurement Thresholds, Goods and Related Services, Works, and Supply and Install

Procurement Methods	To be used above/below (\$)
ICB works	At least \$1,000,000
ICB goods	At least \$500,000
NCB works	Less than \$1,000,000
NCB goods	Less than \$500,000

ICB = international competitive bidding, NCB = national competitive bidding

Procurement Thresholds, Consultants Services

Procurement Methods	To be used above/below (\$)
Quality- and Cost-Based Selection (QCBS)	At least \$200,000

List of Contract Packages in Excess of \$100,000, Goods, Works, and Consulting Services

Ref	Contract Description	Estimated Cost (\$)	Procurement Method	Expected Date of Advertisement	Prior Review	Comments
1	Installation of water supply infrastructure	2,385,000 (three contracts)	ICB and NCB	3 rd quarter 2008 4 th quarter 2008 1 st quarter 2009	Yes	
2	Procurement of pipes, fittings, etc.	1,850,000 (two to three contracts)	ICB	3 rd quarter 2008 (3 rd quarter 2008) 1 st quarter 2009	Yes	Financed by ADB
3	Procurement of equipment and implement program	125,000 (one contract)	NCB	3 rd quarter 2008	Yes	Financed by ADB
4	Consulting services	1,759,650 (two or three contracts)	QCBS	1 st quarter 2008 3 rd quarter 2008	Yes	Financed by ADB

ADB = Asian Development Bank, ICB = international competitive bidding, NCB = national competitive bidding, QCBS = quality and cost-based selection.

Proposed Detailed Contract Packages

Description	Number of Contracts	Cost Estimate per Contract (\$)	Aggregate Total Cost Estimate (\$)	Mode of Procurement	Responsible Agency
A. Civil Works					
1. Network improvements in subzones: installation of pipes, valves, service connections, reinstatement of roads, etc.	2	1,150,000	2,100,000	ICB and NCB	DNSAS,MOI
2. Installation of valve covers, marker posts, concrete meter chambers, valves, and meters; sundry repair and replacement work; procurement and installation of chlorination equipment	1	950,000	285,000	NCB	DNSAS, MOI
B. Goods and Services, Equipment					
1. Procurement of goods: pipes, fittings, and valves for six subprojects	2	285,000	1,200,000	ICB	DNSAS, MOI
2. Procurement of water meters (domestic, Commercial, and bulk), valves, cocks, valve covers, meter boxes, tapping bands, repair clamps, etc.	1	650,000	650,000	ICB	DNSAS, MOI
3. Leak detection and repair work, including the procurement of water loss detection equipment and water quality monitoring equipment	1	550,000	125,000	NCB	DNSAS, MOI
C. Consulting Services					
1. Procurement of project implementation consulting services.	1	650,000	1,036,300	QCBS	MOI,ADB
2. Procurement of detailed engineering design and documentation, and construction supervision services.	tbd	125,000	723,350	QCBS	DNSAS,MOI
Total Contract Packages		1,036,300	6,119,650		

DNSAS = National Directorate for Water and Sanitation, ICB = international competitive bidding, MOI = Ministry of Infrastructure , NCB = national competitive bidding, QCBS = quality- and cost-based selection, tbd = to be determined.
 Source: Asian Development Bank estimates.

ECONOMIC AND FINANCIAL ANALYSES

1. The economic and financial analyses of the proposed Dili Urban Water Supply Sector Project was carried out in accordance with the *Guidelines for the Economic Analysis of Projects* (1997) and *Financial Management and Analysis of Projects* (2005) of the Asian Development Bank (ADB).

A. Economic Analysis

1. Project Rationale

2. Many households with no piped connection rely entirely on water from dug wells or shallow tubewells and streams, which are often contaminated and pose serious health risks. Connected households receive an intermittent supply and often need to supplement their supplies with water from neighbors or from local sources such as wells and streams. Overall technical and nontechnical water losses are now estimated at 70% of water production.

3. The Project will complete the vertical integrity of the Dili water supply system in targeted zones, where subzone subproject areas have been selected. In these subzone areas, all leaks will be repaired; tertiary reticulation refurbished, replaced, or installed; all households and businesses metered; and 24-hour water supply with good pressure provided. Thus physical improvements together with improved system management and customer relations will achieve efficient delivery to regularized poor and nonpoor customers.

4. Economic and health benefits will result from improved services. For this improved service, customers are expected to be willing to pay a tariff¹ and will be billed accordingly. In addition for all zones, the Project will repair identified leaks, install valves and master meters, implement logical improvements to the pipe network, and meter all commercial customers who will be expected to pay the water tariff.

2. Economic Assumptions

5. For the present study, the following assumptions are adopted (i) all costs are expressed in mid-2007 prices; (ii) tertiary pipes and fittings are assumed to have a useful economic life of 30 years after construction; (iii) the Project is analyzed over 22 years from 2008 to 2029, or 20 years after construction with residual values assumed in year 20 for project assets of 10 years; (iv) meters are assumed to be replaced every 5 years at a cost of \$30 every 5 years; (v) the real opportunity cost of capital employed in the economic analysis is 12%; (vi) capital costs include physical contingencies, but exclude price contingencies (no financing charges are applicable as the funds are provided as a grant); (vii) a standard conversion factor of 1.0 and a shadow wage rate of 0.50 are assumed; (viii) taxes and duties on imported pipes and fittings are 6.0% and sales tax 6.0%, a total of 12.0% on materials; (ix) water losses in the subzone subproject areas are assumed at 25% compared with 70% in the without-Project situation; (x) operation and maintenance costs for the subzone subprojects are assumed at 2.5% of project capital costs, plus additional maintenance and clerical staff.

3. Least-Cost Analysis

6. The subzone subproject areas were selected using the given criteria with the main feature being to select areas where water supply was available and the system could be improved in

¹ In 2005, \$32,000 revenue was collected for piped water sales from those billed and paying (2% of uses), and represented 2.6% of operating costs; in 2006, \$58,000 collected represented 7.5%.

order to demonstrate that customers would be willing to pay for an improved water supply. This model is to be progressively replicated in the Dili area and in district towns in the future. Considerable investment has been made in water sources, water treatment, and bulk transmission mains in Dili. However, unless investment in the tertiary network, customer connections, and metering is undertaken, the benefits of this additional investment and water supply cannot be realized. Accordingly, investments in leak reduction, upgrading tertiary connections, and metering are necessary throughout the Dili urban area and in the subzone subproject areas selected.

2. Water Demand Projections

7. Demand projections for 2008–2020 in three subproject areas were prepared in line with ADB guidelines, which relate demand to expected future increases in income and changes in water price. Water demand forecasts are based on the estimated number of potential connections in 2007 multiplied by the estimated consumption, which is 70 liters per capita per day (lpcd) for domestic connections and 1,000 lpd/connection for commercial connections. No additional customers are assumed over the forecast period.² The inclusion of both price and income effects results in consumption increases in excess of the lifeline block of 70 lpcd. The conservative assumption adopted is that households take advantage of the lifeline block up to 70 lpcd or 14 cubic meters (m³) per month, while consumption above this may be met by existing nonpiped sources rather than an increase in piped water consumption.

3. Economic Costs

8. Capital costs are based on estimates of costs of rehabilitating the tertiary piped network and household connections, plus providing connections and meters under the Project to all unconnected households in the subproject areas. In addition, project management and detailed design are allocated to each subzone subproject. Adequate water supply is available in the without-project situation. Accordingly incremental operating costs for the subzone subprojects are assumed to be (i) operation and maintenance costs for maintaining pipes and connections at 2.5% of project capital costs, (ii) replacement of meters every 5 years at a cost of \$30 per meter, (iii) chlorination of all water at a cost of \$0.0069/m³, and (iv) provision of additional caretaker or maintenance staff and clerical staff.

4. Project Benefits

9. Benefits are associated with (i) providing household connections (62.4% of households in project zones) using nonpiped sources, (ii) improving water supply treatment and distribution by providing 24-hour service in areas currently experiencing interrupted service, (iii) increasing security of supply, (iv) improving drinking water quality, (v) improving system pressure, and (vi) reducing risk of exposure to waterborne pathogens. Decreased water losses will reduce pumping costs, and chemical and operation and maintenance costs as less water production is required to meet water sales. Nondomestic water supply customers will benefit financially due to an improved supply without the need to resort to more costly tanker supplies.

10. The valuation of benefits is based on the water supply characteristics of each zone and include the following:

² Housing in Dili is relatively low density, but in the subproject areas chosen new or additional house construction on existing sites is not anticipated. Regarding daily water consumption, surveys indicated that many households may continue to use wells for clothes washing and the like, so that overall consumption may not increase above levels proposed. However, there was a clear indication that such sources were not satisfactory and in case of hand pumps, physically demanding, so that households preferred a piped connection. But some use of non-piped sources may continue.

- (i) **Time savings to collect water.** Time taken in collecting a household's daily water requirements was obtained as part of the socioeconomic survey, with an average daily time of 90 minutes to collect an estimated 200 liters per household per day.
- (ii) **Cost and maintenance of existing nonpiped facilities.** Where households obtain water from wells, both dug wells and tubewells (either with electric pumps or hand pumps), the cost of providing the well,³ maintenance, and electricity are included as part of the without-project costs.
- (iii) **Costs of storage.** The cost of buckets and storage facilities in houses is included in the without-project water supply costs at \$20 per household.
- (iv) **Boiling water.** Most households boil water for drinking purposes (assumed at 5 lpcd) with these costs included in the without-project water supply costs.
- (v) **Bottled water.** Use of bottled water is widespread (representing 0.5% of consumption) with the average at 0.95 liters per household per day. This is valued conservatively at \$53 per m³.

11. The cost of water consumption in the without-Project situation that is displaced by piped water supply results in resource cost savings. The convenience of a piped water source results in greater use of piped water than that in the without-Project situation. Also improved sanitation practices will lead to increased water use. This additional water consumption is incremental consumption induced by piped water supplies as a result of lower costs and other positive externalities (such as improved hygiene practices and greater convenience) and is valued in terms of willingness to pay. The resource costs of water in the without-Project situation is an indication of the willingness to pay for the quantity of water consumed.

12. The survey indicates the unskilled labor rate for casual labor at around \$2.00 per day, with a shadow wage rate factor of 0.50 assumed). Time savings combined with the cost of alternative water sources results in a cost per m³ ranging from \$2.2 to \$2.8 per m³ to meet around 20 lpcd or \$13.14–\$16.74 per month for 6 m³. In the project situation, households are assumed to take advantage of the 70 lpcd available within the lifeline block and consume up to 14.0 m³/month; at a tariff of \$0.20 per m³, this represents a cost of \$2.8 per month.

13. The present situation with and without the Project provides a basis for deriving a household demand curve and estimating economic benefits of incremental consumption. Using the semi-log function,⁴ the economic benefit to households is estimated as \$1.06 to \$1.31 per m³. In the case of commercial customers, the cost of tankering water of around \$1.00 per m³ is used as basis of benefit valuation. This level of benefit is used to value all household consumption without a piped connection, which represents approximately 60% of all domestic consumers in the subzone. In the case of households with a piped connection, their hours of supply from the survey and whether the service was adequate were examined and a proportion of the economic benefit allocated to this consumption. Overall, this represents a further 6.9–10.3% of consumption valued at the willingness to pay (WTP) value.

14. Economic benefits also arise from a reduction in water production requirements with the reduction in water losses in the subzone subproject areas from 70% to 25%. The reduction in water production will result in savings in direct electricity pumping costs for both groundwater

³ The capital cost of each water supply option is expressed as an annuity at 12% based on the expected life of the asset.

⁴ For derivation of the curve and benefit area under the curve, see Choynowski, Peter. 2002. *Measuring Willingness to Pay for Electricity*. Manila: ADB (ERD Technical Note 3).

sources (bore holes) and water treatment plant operations, plus savings in chemical costs, chlorine, and alum.

7. Calculation of the Economic Internal Rate of Return

15. The economic internal rate of return (EIRR) for the three subzone subprojects is 20.2% (Table A10.1). The EIRR of the Project exceeds 12%. The economic net present value at 12% is \$1.336 million. The average incremental economic cost is \$0.86 per m³. An analysis to test the sensitivity of the EIRR of the combined subzone subprojects to adverse changes in key variables was undertaken. The variables tested were increases (+10%) in capital and operation and maintenance costs, reduction in subproject benefits (–10%), and a 2-year delay.

16. The three pilot subprojects are most sensitive to a reduction in benefits, with the EIRR falling to 18.8% (Table A10.1). However, where delays also result in real capital cost increases (20%) and a 2-year delay in benefits if the improvements are commissioned later, the EIRR declines to 13.4%. Accordingly, efforts must be made in subproject design to avoid such delays and cost increases. Where water losses in the subproject areas are only reduced to 40%, rather than 25%, then the EIRR falls to 19.8%.

17. The calculation of benefits was also examined, and where the value of time savings were halved from \$2.00 per day to \$1.00 per day (or alternatively the shadow wage rate factor SWRF of 0.50 halved to 0.25), then the EIRR fell to 18.5%. Where the value of time was reduced to zero so that the domestic WTP was based on the cost of nonpiped water sources, wells, pumps, cost of boiling water, etc., the EIRR falls to 16.8% suggesting the results are not sensitive to the value of time adopted in the analysis. In the case of commercial customers, if their WTP based on tanker deliveries at \$1.00 per m³ was reduced to the current commercial tariff of \$0.60 per m³, the EIRR falls to 19.1%. If the last two sensitivities are combined, namely zero value of time used in cost of collecting water in the case of domestic customers and commercial customers WTP based on current tariff, then the EIRR falls to 15.7%. This indicates that the analysis is robust to the basis of benefit calculation.

Table A 10.1: Economic and Sensitivity Analyses for Three Subzone Sector Projects

Sensitivity Analyses		ENPV	EIRR	SI	SV
		\$'000	%	%	%
Base Case		1,336	20.2		
(i) Capital	+10%	1,135	18.	8.7	46.5
(ii) Operating	+10%	1,293	19.9	1.2	343.0
(iii) Benefits	–10%	958	18.0	10.8	(37.4)
(iv) All the above		715	16.1		
(v) Two-year delay		310	13.4		
(vi) Water losses 40%		1,269	19.8		
(vii) Reduce value of time by half		1,051	18.5		
(viii) Reduce value of time to zero		765	16.8		
(ix) Commercial WTP at tariff		1,144	19.1		
EOCC			12.0		

() = negative, EIRR = economic internal rate of return, ENPV = economic net present value, EOCC = economic opportunity cost of capital, SI = sensitivity indicator, SV = switching value, WTP = willingness to pay.

Source: Asian Development Bank estimates.

B. Financial Analysis

18. Financial analysis was undertaken of the three subzone pilot subprojects of the sector Project. Financial benefits result from the billing and payment of water bills in the subzone subproject areas at the existing tariff (Appendix 11, Table A11.3) for domestic, social, and commercial customers. Following the conflicts in 2006, all metering and billing of water customers was suspended in April 2006 due to little incentive on the part of DNSAS to enforce payment from a small proportion of the population.

19. An optimistic revenue estimate, with the current declining water service, is for DNSAS to maintain revenue at \$50,000 per annum, with \$20,000 more likely. Therefore, in the case of the subzone subprojects an allowance has been made to reflect the fact that some revenues might continue to be paid. The initial three subzone subprojects represent about 13% of the population, but possibly 25% of revenue potential as zones 2 and 5 have some commercial customers. Therefore, 25% of \$50,000 or \$12,500 is assumed over the three zones.

20. An allowance is made for collection efficiency, that is, the amount of billed water charges actually collected, assuming 50% in the first year (2010) increasing to 90% by year 4 (2013). In addition, DNSAS would benefit from reduced water losses from 70% to 25%, and from savings in electricity and chemical costs as a result of a reduction in both technical and nontechnical losses.

1. Calculation of Weighted Average Cost of Capital

21. The weighted average cost of capital (WACC) is estimated based on the opportunity cost to the Government of providing equity to the Project and adopting the same value for the ADB grant funding. In the absence of any Government domestic bond market, the return on the Government's investments in the Petroleum Fund of Timor-Leste was taken as a proxy for the opportunity cost of capital. The Petroleum Fund will, in the future, be one of the main sources of Government development financing. The average return on investments in 2006 in the fund of US treasury bonds is estimated at around 5%. After adjusting for domestic inflation (4%), the WACC is 1.0% (Table A10.2).

Table A10.2: Calculation of Weighted Average Cost of Capital

Item	ADB Grant	Government Equity	Total
Amount (\$ million)	6.00	1.50	7.50
Weighting	80.00	20.00	100.00
Nominal Cost	5.00	5.00	
Inflation Rate	4.00	4.00	
Real Cost	0.96	0.96	
Weighted Component of WACC	0.77	0.19	1.00

ADB = Asian Development Bank, WACC = weighted average cost of capital.

Source: Asian Development Bank estimates.

3. Results of Financial Analysis

22. The financial internal rate of return (FIRR) for the three subprojects is 2.5% for the pilot subprojects, with benefits derived from revenues (at current tariffs) from water sales and savings in chemical and electricity costs as a result of reduced water losses. This rate compares favourably with the estimated WACC at 1.0%, substantiating the financial viability of the Project. The average incremental financial cost is \$0.27 per m³ compared with average financial tariff of \$0.25 per m³. The financial net present value at the WACC is \$ 0.588 million.

23. Separate analyses were carried out to examine the sensitivity of the FIRR and financial net present value to adverse changes in key variables. The variables considered for the sensitivity analyses are a 10% increase in capital costs, 10% increase in O&M costs, 10% decrease in benefits, and 2-year implementation delay with a 20% increase in costs. The results are robust with the standard sensitivities exceeding the WACC (Table A10.3). However, a project-specific sensitivity that reflects cost increases (20%) and a 2-year delay results in the FIRR declining to 1.2%. Thus the Project is most sensitive to delays associated with corresponding cost increases. Accordingly, efforts must be made in project design to avoid delays and cost increases. A key objective of the subzone projects is to reduce water losses. However, where water losses in the subproject areas are only reduced to 40%, rather than 25%, then the EIRR falls to 1.9%.

24. Another project-specific sensitivity relates to collection efficiency. The analysis assumes that a collection efficiency of 90% is achieved by year 4 of each subproject. This is considered achievable with the institutional and technical support provided under the Project and associated projects, plus expected household willingness to pay for the 24-hour provision of good pressure and clean water. The sensitivity indicates that where collection efficiency falls to an average of 80%, then the FIRR is 1.8%; however at 70% collection efficiency the FIRR falls to 1.1%. Consequently, at collection efficiencies less than 70%, the FIRR will be lower than the WACC. The results are very sensitive to collection efficiency; every effort is needed, including adherence to disconnection policies, to ensure that more than 70% and preferably a collection efficiency of 90% is achieved.

Table A10.3: Financial Analysis and Sensitivity for Subzone Core Subprojects

Sensitivity Analyses		FNPV	FIRR	SI	SV
		\$'000	%	%	%
Base Case		558	2.5		
(i) Capital	+10%	370	1.9	23.7	25.7
(ii) Operating	+10%	437	2.1	12.9	47.1
(iii) Benefits	-10%	193	1.5	39.4	(15.5)
(iv) All the above		(116)	0.7		
(v) Two-year delay		125	1.2		
(vi) Water losses 40%		333	1.9		
(vii) Collection efficiency 80%		319	1.8		
(viii) Collection efficiency 70%		64	1.1		
WACC			1.0		

() = negative value, FIRR = financial internal rate of return, FNPV = financial net present value, SI = sensitivity indicator, SV = switching value, WACC = weighted average cost of capital.

Source: ADB. 2005. *Technical Assistance to Timor-Leste for Preparing the Urban Water Supply and Sanitation*. Manila (TA 4646-TIM).

FINANCIAL ANALYSIS OF NATIONAL DIRECTORATE FOR WATER SUPPLY AND SANITATION

A. Budget Appropriations and Expenditure

1. As a government department, the National Directorate for Water Supply and Sanitation (DNSAS) has limited autonomy in decision making other than for basic operating matters. All financing, fees and charges, staffing, infrastructure development, and procurement decisions require the prior approval of the Ministry of Infrastructure, Ministry of Finance (MOF), or Ministry of State Administration.

2. The annual budgets for DNSAS activities for the 3 years, FY2005–FY2007, and actual expenditure are summarized in Table A11.1, with actual annual expenditure and percentage of the budget spent. DNSAS has underspent its budget, especially capital expenditure, where activities have been constrained by unrest during recent years. Thus in FY2007 only 75% of the budget was spent, an improvement over the previous year's 64%. In FY2006, additional capital expenditure was provided—Emergency Response Facility of \$0.769 million and capital development of \$1.00 million, with 43% and 77% of these amounts spent, respectively.

Table A11.1: Budget and Actual Expenditure (\$'000)

Item	Budgeted			Actual Expenditure			Percentage Spent (%)		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Salary and Wages	258.0	263.0	324.4	180.0	222.4	274.7	70	85	85
Operating Expenses	934.0	1531.0	1674.4	834.1	1122.4	1409.9	89	73	84
Minor Capital ^a	152.0	200.0	347.3	145.5	178.4	140.9	96	89	41
Capital Development	—	560.0	1790.0	—	103.0	1264.8	—	18	71
Total Budget	1344.0	2554.0	4136.0	1159.5	1626.3	3090.3	86	64	75

— = not available.

^a Includes minor equipment and treated as material maintenance expense.

Source: National Directorate of Water and Sanitation.

B. Dili Water Supply Operating Costs

3. Estimates of annual operating costs for Dili water supply operations for the 3 years, 2005, 2006, and 2007, averaged \$1.055 million (Table A11.2). In FY2007, Dili accounted for about 81% of the DNSAS operating budget. If sanitation services are added to the total, then Dili represents about 74% of DNSAS's overall operating budget. Operation and maintenance materials and equipment make up the largest item of expenditure at \$0.516 million (47%) and include materials required for leak repairs, maintenance of water treatment plants, contractor payments, etc.; followed by electricity and fuel (22%); other operating expenses (including internally displaced persons camps) 15%; and staff costs of 10%.

C. Water Tariffs and Revenue Generation

4. In February 2004, the Council of Ministers approved the current tariff structure, with charges levied for each cubic meter consumed on a monthly basis, for Dili urban area and district towns (Table A11.3). The initial block in the domestic tariff allows for a lifeline of around 70 liters per capita per day, assuming about 6.9 persons per occupied dwelling.

Table A11.2: Estimate of Costs of Dili Water Supply Operations
(Year ended 30 June, \$'000)

Item	2005	2006	2007	(%) 2007
Staff costs	114	112	105	10
O&M materials and equipment	573	362	516	47
Electricity and fuel	298	208	241	22
Vehicle operating and fuel	38	51	59	5
Other operating expenses	190	99	177	16
Office expenses	8	7	7	1
Subtotal	1,221	838	1,104	100
Sanitation (solid waste)	308	250	254	
Total	1,529	1,088	1,358	

O&M = operation and maintenance.

Source: National Directorate of Water and Sanitation and Asian Development Bank estimates.

Table A11.3: Current Urban Water Supply Tariffs

Monthly Water Tariff Category	Consumption Band / m ³ per month	Dili \$/m ³	District \$/m ³
Domestic (piped)	0–14.0	0.20	0.20
	>14.0	0.40	0.40
Public taps	All	0.10	0.10
Social (school, hospital, mosque, church)	All	0.15	0.15
Commercial/Industrial	All	0.60	0.60

m³ = cubic meters.

Notes: Domestic = premises principally used for long-term residential accommodation (Hotels and boarding houses where a fee is paid for use of the accommodation on a commercial basis are categorized as commercial). Public tap users will be charged through a community leader among the users at a rate of \$0.10 per m³. The public tap will be metered and the charges will be equally shared by the users. This system has never been in operation. Social = school, hospital, mosque, church, and government departments. Commercial/industrial = all other premises including businesses, foreign missions, humanitarian organizations, hotels, restaurants, boarding houses, public utilities, and services.

Source: National Directorate of Water and Sanitation and Asian Development Bank estimates.

5. Charging for water through tariffs commenced in November 2004, but by March 2006 only 24% of DNSAS registered customers in Dili were metered and billed for water, and only 2% of customers actually paid their water bills. With the disturbances in April 2006, all billing of Dili customers ceased. DNSAS revenue generation is set out in Table A11.4 and shows that in FY2005 water billing revenues accounted for \$32,400 (39% of revenues) and in FY2006 water billing revenues increased to \$58,000 (55% of total revenues). In 2006, revenues of \$105,300 represented about 12.6% of the Dili water supply operating costs, with water tariffs representing 7.0%.

6. The 2004 decree also provided charges for water connections for Dili and districts, with those for the districts lower in recognition of lower incomes and the need to encourage connections. Domestic customers may pay 50% upfront and the balance in installments over the following 12 months. All other customer classes, including social, are required to pay the connection fee upfront. The project estimate is \$192.2 for a 15 mm diameter connection, while the DNSAS cost would be \$153.30 (where households undertake their own excavation and backfilling) compared with \$55 per domestic connection charge. This indicates a considerable subsidy in the cost when providing a water connection at these charges.

Table A11.4: Revenue Generation (12 months ended 30 June, \$'000)

Item	2005 ^a	2006 ^a	2007
Water Billing (Dili)	32.4	58.0	—
Water Tankers DNSAS	9.0	5.9	
Water Tankers Private	22.8	10.7	
Connections (Dili)	18.8	30.6	
Total	83.0	105.3	45.9

DNSAS = National Directorate for Water Supply and Sanitation.

^a Billing commenced in November 2004 and was discontinued in April 2006.

Source: National Directorate for Water Supply and Sanitation.

D. Timor-Leste Tariff Policy and International Best Practice

7. The key water supply policy directives for urban water supply prepared between 2000 and 2003¹ included in the main legislation² are (i) the Government will provide a “universal water distribution service;” (ii) DNSAS will provide “appropriate, secure and sustainable” urban water supplies in the “capital city and chief towns of each district and subdistrict;” (iii) in the long term, the “totality” of water service costs incurred will be recovered from service users; and (iv) an urban water services fees policy will be established to promote sustainable water use and will consider the overall economic situation, the needs of the poor, and the coverage of operation and maintenance (O&M) costs.

8. In particular, Water Services Tariff Policy (Section 17) of Decree Law 2004/4 requires tariff policy to be developed that takes into account the following factors: (i) sustainable use of the water resources of East Timor, (ii) economic circumstances of East Timor, (iii) need to provide a minimum of water to the poor people of East Timor; and (iv) paying for the costs of operating and maintaining the water supply system. The Water Law also provides for disconnection and reconnection policies (Section 15) for nonpayment of water tariffs, connection fees, or interfering with and/or damaging a connection. However, to date such regulations have not been enforced and enforcement capacity has generally been lacking.

9. These may be compared with tariff policies and objectives developed related to international best practice. These objectives³ are of particular importance in developing water tariff structures and levels for Dili, namely (i) financial sustainability and cost recovery, (ii) economic efficiency, (iii) price equity, (iv) administrative efficiency and good governance, and (v) affordability and universal access. The Water Services Decree Law 4/2004 overall tariff policy objectives are in accord with international best practice (Supplementary Appendix K).

10. An estimate of the capital and operating costs for Dili was used to assess tariffs to meet O&M⁴ costs, O&M plus depreciation,⁵ and a 5% return on net fixed assets. Assuming the postproject reduction in water losses at 25% (compared with 70% now) and a collection efficiency of 90% (compared with less than 10% when billing ceased in April 2006), a tariff of \$0.19 per m³ would be required to cover O&M costs, \$0.40 per m³ to cover O&M plus depreciation; and \$0.56 per m³ to achieve a 5% rate of return.

¹ The water supply legislation framework was developed with external assistance in 2001.

² Decree-Law 2004/4 was approved in 2004

³ ADB. 2006. *Setting User Charges for Public Services: Policies and Practice at the Asian Development Bank*. Manila (Economics and Research Department Technical Note Series Number 9), ADB. 2004. *Beyond Cost Recovery: Setting User Charges for Financial, Economic, and Social Goals*. Manila (Economics and Research Department Technical Note Series Number 10).

⁴ Where material O&M expenses are based on 1.5% of capital costs.

⁵ Government and DNSAS accounting procedures are on a cash basis and exclude depreciation.

11. This analysis of operating costs suggests that the present tariff structure covers cash O&M costs in the initial domestic block (\$0.20 per m³) while the commercial and industrial tariff at \$0.60 per m³ would recover O&M costs, plus depreciation and a 5% return on assets. In the case of the social category of customers, the current tariff of \$0.15 per m³ would not cover cash O&M costs, however, social customers are expected to represent 1.25% of customers. The average tariff in the subzone areas is \$0.25 per m³ meaning that overall O&M costs are recovered with cross subsidy from commercial and industrial to the domestic and social customer categories.

12. In view of the current economic situation in Dili, the current tariff structure is recommended to be adopted in the subzone subprojects. With a reduction in water losses to 25% (and a collection efficiency of 90%), this tariff structure would recover operating costs, which is the financial objective of current water tariff policy of the Public Water Supply Decree. In addition, water connections are to be free for households participating in the subprojects as an incentive to participate. This is seen as equitable where exiting customers with damaged connections and meters would have these replaced under the Project. The project capital costs provide for new connections as well as replacement items. The objective is to instill a payment for service philosophy in customers in the subzone areas. Tariffs can be adjusted in the future as economic circumstances improve and household incomes in Dili increase.

E. Financial Impact of the Project on DNSAS Dili Operations

13. The objective is to have Dili water supply providing a 24-hour service by 2014 with good pressure treated water, with all customers metered and charged a tariff. This would allow water production to be measured in terms of metered sales. Prior to this, where only those domestic and social customers within the subzone subprojects were metered, and commercial customers in all zones, domestic water use could not be limited so that there would be wastage, with production assumed at maximum for the system, rather than that required to meet metered sales (and losses). Consequently by 2014, when all customers are metered and billed, production would be related to sales and average water losses of 35%.

14. As limited information is available on DNSAS district operations, projections of DNSAS operations were prepared for Dili only. As Treasury operates on a cash accounting basis, depreciation was excluded. No balance sheet information is available with all DNSAS accounting undertaken by Treasury with DNSAS allocated all operating and capital requirements through the state budget. Projections of revenues and expenditures were prepared (in constant 2007 prices) for 2008–2020 with the objective of achieving coverage of operating costs through the tariff by 2017. Forecasts of water demand are based on population projections for Dili assuming a 5% per annum population growth rate, with revenue projections based on metering and billing all customers in subzone subprojects and all commercial customers throughout Dili. A collection efficiency of 50% in the first year rising to 90% after 4 years is assumed for DNSAS revenue generation.

1. Capital Expenditure

15. Table A11.5 summarizes capital expenditure under the Project and ongoing expenditure over the forecast period. Projected capital expenditure totals \$17.1 million during 2008–2020 (in 2007 prices). The Project will provide \$7.5 million during 2008–2010 with an estimated \$9.60 million required for the remainder of the period.

16. In the future, DNSAS is to receive \$2.0 million per annum for capital expenditure from the state budget, which would cover some of the balance.⁶ A second subzone improvement project is assumed to commence in 2010, while upgrading the whole network would also continue. This may involve an overall project cost of \$5.0 million, which may require external funding assistance where DNSAS has available from the state budget about \$1.0 million for Dili per annum. Thereafter, during 2013–2020, DNSAS should be able to fund capital expenditure out of its state budget allocation, as it would be less than \$1.0 million per annum, and new connections have an element of cost recovery (20%).

Table A11.5: Estimated Capital Expenditure Dili Water Supply
(FY ended 30 June, \$'000)

Item	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Subzone sector projects													
ADB Year 1 (3 zones)	1,477.1	369.3											
ADB Year 1 (3 zones)		1,284.0	321.0										
New Year 3 (3 zones)			1,284.0	321.0									
New Year 4 (3 zones)				1,284.0	321.0								
Metering domestic	55.7	55.7			609.9	602.9	174.5	184.5	456.7	494.1	534.1	576.8	
All zones improvements	1,266.9	316.7	500.0	500.0									
Detailed design	540.5	540.5	270.2	100.0	50.0	50.0							
Equipment and miscellaneous	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Water production											150.0	100.0	
Total Capital Grants	3,440.1	2,666.1	2,475.2	2,305.0	1,573.9	1,252.9	274.5	284.5	586.7	594.1	784.1	776.8	100.0

Note: All figures are calculated in 2007 prices.

Source: Asian Development Bank estimates.

2. Results of Financial Projections

17. Over the whole Dili water supply service area (compared with subzones) with increased operating costs to provide improved services, the existing tariff revenues would only meet 80% of operating costs in 2017 and 90% by 2020. Real tariff⁷ increases of 29% in 2014 to cover operating shortfalls by 2017 are set out in Table A11.6. The largest increase (65%) is proposed in the social category to bring the tariff into line with the lifeline domestic category, followed by commercial (50%), with the domestic lifeline increased by 25% to \$0.25 per m³, and then above 14 m³ per month by 25% to \$0.50 per m³.⁸ The tariff for public taps would remain at the present tariff. The provision of lifeline block and public taps should be adequate protection for the poor.

⁶ Although this amount is to cover all other DNSAS projects in Timor-Leste district towns etc., if 50% were allocated to Dili from 2010 to 2020, this would amount to \$11.0 million, which would be adequate.

⁷ Any actual tariff adjustments would need to take into account any inflationary increases in costs during 2008–2014.

⁸ Were the tariff structure is also to be revised, then the lifeline block should be reduced from 14 m³ to 10 m³ per month, a second block of 10 m³ to 20 m³ per month at \$0.50 per m³ included, with all consumption above 20.0 m³ per month charged at the commercial rate of \$0.90 per m³. In addition, churches and mosques and other social nonrevenue generating activities should be included in a tariff category with the same structure as domestic. On the other hand, all government departments and agencies should be treated as commercial and pay a flat tariff with the amount provided in their state budget funding. Supplementary Appendix K provides additional discussion.

Table A11.6: Dili Proposed Real Tariff Increases in 2014 (2007 prices, \$/m³)

Item	Current	% Increase	Proposed
Domestic Lifeline	0.20	25	0.25
Domestic Balance	0.40	25	0.50
Commercial/Industrial	0.60	50	0.90
Social	0.15	65	0.25
Public taps	0.10	-	0.10
Average	0.23	29	0.30

Source: Asian Development Bank estimates.

18. Table A11.7 demonstrates that where tariffs are increased in 2014 by an average 29% (in real terms) then by 2017 DNSAS would be able to cover its operating shortfall and make a small surplus of \$12,900, which would increase to \$269,000 by 2020.⁹ This would mean that the Government would, by 2017, be able to divert \$1.6 million to other programs, with the amount of state budget allocated to meet O&M costs of Dili water supply in 2008 of \$1.34 million steadily declining to 2017 (rather than increasing).

Table A11.7: Projections for Dili Operations Revenue and Expenses 2010–2020 (2007 prices, \$'000)

Item	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Revenue											
Water Sales	122.0	227.1	355.6	495.0	875.6	1,024.3	1,317.6	1,530.8	1,700.6	1,883.4	2,089.9
Tanker water sales	23.2	24.3	25.5	26.8	28.1	29.5	31.0	32.6	34.2	35.9	37.7
Other Income/ Connections			108.3	108.3	31.4	33.2	82.1	88.8	96.0	103.6	0.0
Total Revenues	145.1	251.5	489.4	630.1	935.1	1,087.7	1,430.7	1,652.1	1,830.8	2,023.0	2,127.6
Operating Costs											
Salaries	139.8	153.7	169.1	186.0	195.3	205.1	215.3	226.1	237.4	249.3	261.7
Electricities	305.7	305.7	305.7	305.7	214.0	226.5	244.0	270.0	298.0	328.1	365.7
Chemicals	169.5	169.5	169.7	169.5	118.7	125.6	135.3	149.7	165.2	181.9	202.8
Maintenance	772.0	792.9	808.9	812.2	815.6	821.8	828.4	837.7	846.6	848.1	848.1
Vehicles expenses	78.5	86.4	95.0	104.5	109.7	115.2	121.0	127.0	133.4	140.1	147.1
Administration/ Miscellaneous	20.4	21.4	22.5	23.6	24.8	26.0	27.3	28.7	30.1	31.6	33.2
Total	1,485.8	1,529.6	1,570.6	1,601.5	1,478.1	1,520.2	1,571.3	1,639.2	1,710.8	1,779.1	1,858.6
Net Revenues/(Loss)	-1,340.7	-1,278.1	-1,081.2	-971.4	-543.0	-433.2	-140.6	12.9	120.0	243.9	269.0
% Cost Recovery	10%	16%	31%	39%	63%	72%	91%	101%	107%	114%	114%

Source: Asian Development Bank estimates.

F. Household Affordability of Water Tariffs

19. An affordability analysis reviewed the impact of the proposed tariff changes discussed. This analysis assumes that in 2015, an average household (with an income of \$192 per month as per the socioeconomic survey) consumes 120 liters per capita per day or 25 m³ per month and a low-income household (with an average income for the lowest quartile of \$92 per month) consumes 68 liters per capita per day or 14 m³ per month. The revised water tariff results in a monthly charge for 25 m³ of \$8.9 per month in 2015 compared with \$7.1 per month with the current tariff, representing 3.7% of average household income, which is similar to the current tariff, where incomes grow at 3.75% per annum.¹⁰ In the case of a low-income household, the monthly charge is now \$3.5 per month compared with \$2.8 per month, which represents 3.2% of income for a low (bottom quartile) income household compared with 3.0% under the current tariff, where incomes grow at 2.5% per annum. At these levels, current water tariffs are regarded as affordable, and below the 4–5% affordability threshold.

⁹ This assumes any impact on consumption due to real price increases. However, income elasticity of demand effects over the period would probably mean that increases in consumption would offset any price elasticity of demand effects related to the tariff increase.

¹⁰ Assuming real increase in gross domestic product of 5.0% per annum over the forecast period.

SUMMARY OF LAND ACQUISITION AND RESETTLEMENT FRAMEWORK

1. The due diligence undertaken for the three core subprojects appraised show no land acquisition or involuntary resettlement impacts. Due diligence to be undertaken for candidate subprojects should show there to be no land acquisition or involuntary resettlement impacts, and the Project's agreed subproject selection criteria preclude any candidate subproject that would require land acquisition or involuntary resettlement. However, since the Project uses a sector modality, a Land Acquisition and Resettlement Framework (LARF) has been prepared in accordance with the ADB *Involuntary Resettlement Policy* (1995) and *Operations Manual Section F2/IBP on involuntary resettlement* (2006). The LARF will be available to guide later Government-funded urban water supply improvements in Dili and other centers. The LARF provides a mechanism to screen candidate subprojects and—if the need arises—provide guidance on how to prepare and implement subsequent land acquisition and resettlement procedures (LARP). This Appendix summarizes the full LARF contained in Supplementary Appendix G.
2. Land ownership issues in Timor-Leste are clouded by inadequate legal and regulation framework resulting in insecure land and property rights.¹ The principles and policies on land acquisition and compensation under this LARF are therefore based on the ADB policy.
3. Notwithstanding the ineligibility under the Project of candidate subprojects with possible land acquisition or resettlement requirements, subproject implementation will comply with the agreed policy principles contained in paragraph 9 of Supplementary Appendix G, and with due consideration of the customs and traditions of the people in the subproject site. For any subproject with possible resettlement impacts, DNSAS will carry out (or commission consultants to carry out) a social impact assessment, based on preliminary technical designs. The LARP will also include measures to ensure that socioeconomic conditions, needs, and priorities of vulnerable groups are identified, and ensure that land acquisition and resettlement does not disadvantage them.
4. Subproject screening is used to identify the types and nature of potential impacts related to the activities proposed under the Project, and to provide adequate measures to address these impacts which ensure that potential affected persons are (i) informed of their options and rights; (ii) included in the consultation and participation in the selection of alternatives; and (iii) provided with prompt and effective compensation at full replacement cost for losses of land, assets and access to assets and livelihoods attributable to the subproject(s). The screening process will be completed by the project implementation team and be reviewed and cleared by ADB.
5. The detailed measurement survey will be used to identify eligible households and individuals, and the cut-off date associated with it (the end of the survey), is used to discourage any party to take advantage of the compensation measures as people moving into the area or starting to use resources after the cut-off date are not eligible for compensation and livelihood restoration. The entitlements of eligible households and individuals are summarized in the entitlement matrix below.

¹ World Bank. FY2006–08. *Country Assistance Strategy for Timor-Leste*. Dili.

Table A12.1: Entitlement Matrix

Affected Asset	Type of Loss	Affected People	Entitlement	Expected Results
Customary Land	Permanent	Households represented by the Chief of <i>Suco</i> (neighborhood head)	Cash compensation based on the market value of the affected land and provision of all legal and other expenses associated with it; and If the remaining portion of the affected land is not viable for continuous use: Cash compensation for the entire piece of land, assistance to find a similar lands and all transaction costs associated with the transfer	Livelihood restoration
	Temporary	Households represented by the Chief of <i>Suco</i>	Lease agreement. After the use, the land will be restored to its original condition or improved quality and returned to the <i>suco</i> .	Livelihood restoration
Government Land	Permanent	Leaseholder & other users	Assistance to find a similar piece of land and provision of the transaction costs.	Livelihood restoration
	Temporary	Leaseholder & other users	A negotiate lease. After the use, he land will be restored to its original condition or improved quality and returned to the landowner.	Livelihood restoration
Annual crops	All kind	Users (whether or not they have legal and/or customary titles)	A cash compensation equivalent to the market values of each crops at the time of anticipated harvest.	Income restoration
Other crops, trees	All kind	Users (whether or not they have legal and/or customary titles)	Cash compensation, equivalent to the market values. For woodlands and uncultivated trees on customary land, the Chief of the <i>Suco</i> will be considered as owner and the compensation paid to the <i>Suco</i> .	Income restoration
Nonagricultural livelihoods	Permanent	Affected people	Livelihoods are improved or at least restored. Details to be determined during the elaboration of LARPs.	Livelihood restoration
	Temporary	Affected people	A cash compensation equal to the average monthly income of AP for the entire period during which the livelihood is affected.	Livelihood restoration
Nonland based common property	All kind	<i>Suco</i> represented by the Chief of <i>Suco</i>	Funds for all ceremonies etc., which are associated with the resettlement of items.	Pay respect to customs
Access to common property	Permanent	Affected persons	An alternative access and an easement fee. All impacts associated with this alternative access will be addressed accordingly.	Pay respect to customs
	Temporary	Affected persons	Alternative access (bypasses etc.) or if this is found to be impossible an easement fee & the access will be restored up to a condition, which is equal or better then before the project.	Livelihood restoration
Structures (residential or commercial)	Partial or total removal of structure	Owner of the structure (whether having legal title to land or not) (could also be a community)	<ul style="list-style-type: none"> Cash compensation amounting to the full replacement cost; Relocation assistance in cash and in kind; Moving allowance equal to two month income (as determined in the DMS); All materials salvaged from demolished structures remain the property of owner of the structure. 	Livelihood restoration
		Tenant	Assistance to find a similar structure of equal or higher quality at a similar price.	Livelihood restoration
All kind of losses		Vulnerable households	Additional cash grant to head of affected households Employment in the project construction work, if available.	Improved living conditions
Any unforeseen or unintended impacts emerging after the finalization of this LARF			Compensation at full replacement costs as per the spirit of this land acquisition and resettlement framework.	No impact is left unmitigated

LARF = land acquisition and resettlement framework.

Source: Asian Development Bank and Ministry of Infrastructure.

6. An environment and social unit will be formed within the DNSAS development and planning division to plan, implement, and coordinate land acquisition, resettlement, and environmental activities prior to loan effectiveness. The Ministry of Infrastructure (MOI) will provide overall guidance on Government requirements and legal issues relating to land acquisition. The operations of the environmental and social unit will be financed by the Project for the duration of project implementation.

7. In the event that land acquisition and resettlement is required, an international resettlement specialist will be recruited as a member of the project implementation consultancy team and will design procedures for the identification of resettlement impacts, design of social surveys, preparation of LARPs, and resettlement monitoring procedures. Table A12.2 summarizes the roles of relevant institutions during the implementation of the LARP.

Table A12.2: Institutions Involved in Resettlement Implementation

Activities	Responsible Agency
A. Preparation and Implementation of LARP	
- Subproject disclosure and public consultation	ESU/ <i>Sucos</i>
- Survey and marking of subproject sites and ROW	ESU
- Loss assessment	ESU, DNSAS
- Survey and establishment of market unit prices	ESU
- Consultation and agreement of compensation	ESU and MOI Sec of State
- Review and approval of Draft LARP	ADB
- Update of the LARP	ESU
- Endorsement of updated LARP	MOI
- Disclosure to the affected people and the public	ESU & ADB
B. LARP Implementation	
- Approval and release of funds for compensation	Ministry of Finance
- Verification of AP and affected communities	ESU
- Monitoring	ESU
- Grievance and redress	MOI Secretary of State
- Preparation of Deeds of Sale	MOI Secretary of State
- Payment of compensation	Ministry of Finance
- Acquisition of affected lands	MOI
- Submit compliance documents to ADB	DNSAS
- Validate compliance of LARP implementation	ADB
C. Construction Stage	
- Confirm "no-objection" for the award of civil works	ADB
- Tendering and award of civil works	DNSAS/MOI
- Hiring of AP and mobilization of labor force	Civil works contractor
- Core subproject construction	Civil works contractor
D. Post Construction	
- Restoration and return of temporarily affected lands	ESU/Civil Works Contractor

ADB = Asian Development Bank, DNSAS = National Directorate for Water Supply and Sanitation, ESU = environmental and social unit, LARF = land acquisition and resettlement framework, MOI = Ministry of Infrastructure.

Source: Asian Development Bank and Ministry of Infrastructure.

8. DNSAS, through the environmental and social unit, will disclose the LARF to the public through the ADB webpage and refer to it in its general publications and meetings. In the unlikely event that a subproject with potential resettlement impacts has been earmarked for funding, the environmental and social unit will undertake public consultations with the affected communities and individuals. ADB will ensure that subproject designs allow for stakeholder feedback during implementation and that relevant information about any major changes to subproject scope is also shared with affected persons and the stakeholders.

9. For subprojects subject to land acquisition and/or resettlement, all activities in the implementation of LARPs will be monitored by the environmental and social unit with land acquisition and resettlement activity reports compiled on monthly basis for circulation within DNSAS and MOI. The information from these monthly reports will be aggregated on a quarterly basis for distribution to the Government and ADB.

SUMMARY POVERTY REDUCTION AND SOCIAL STRATEGY

Country/Project Title: Timor-Leste: Dili Urban Water Supply Sector Project

ADF Grant:	Sector: Water supply, sanitation, and waste management	Department/ Division:	PARD/SOTL
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I. POVERTY ANALYSIS AND STRATEGY

A. Linkages to the National Poverty Reduction Strategy and Country Partnership Strategy

Timor-Leste is one of the poorest nations in the world. The Government has a clearly defined strategy for poverty reduction, which includes improvement of basic social services to poor households and enhancement of national and local institutional capacities. The Dili Urban Water Supply Sector Project will result in leak reduction and improved pipe networks across the whole of Dili city, and intensive water supply improvement in six subzone subprojects. At the same time, capacity of staff of the National Directorate of Water Supply and Sanitation (DNSAS) to manage and sustain the water system will be enhanced, so that gains made during the Project can be sustained and extended in the future. Thus the Project focus reflects two of the key areas of the Government's national poverty reduction strategy.

The combination of technical improvements and enhancement of staff capacity will enable DNSAS to provide Dili with an economically more efficient water system and thus release some of the resources that DNSAS is currently forced to commit to the provision of urban water services, enabling these resources to be used to improve services in rural areas, where more than 40% of people are estimated to live in poverty. The reduction in water-related illnesses anticipated to result from an improved water system in Dili should also result in savings to the national health situation, which currently supplies free medical treatment to Dili residents.

B. Poverty Analysis	Targeting Classification: Intervention
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1. Key Issues

Urban water supply can be linked to poverty in Timor-Leste in a number of ways: (i) poor infrastructure is a barrier to local economic development and hence can limit job creation in a situation where unemployment is very high and growing annually; (ii) high urban water costs detract from the provision of water to rural areas, further limiting development; (iii) excessive leakages can lead to stagnant water that can attract malarial and dengue mosquitoes, thus increasing the risk of mosquito-borne illnesses, the occurrence of which can impact on both household productivity and national health costs; (iv) the time taken to access water for domestic use can be an added burden on households, especially for women; and (v) limited access to safe water can increase the risk of waterborne diseases and reduce hygiene, potentially reducing household productivity.

The Project will directly or indirectly impact on each of these links to poverty. The entire population of Dili city will receive an improved water supply with a major reduction in leakages. This should, in turn, result in a significant reduction in the risk of mosquito-transmitted diseases. The consequences of this reduction of leakages will directly affect some 160,000 people in Dili, of whom in 2004 more than 14% are estimated to have been living below the national poverty line of \$0.55 per day. As a result of the lower incidence of disease, income earners will have fewer days lost from work due to illness, a consequence of illness that usually disproportionately affects poorer households.

The Project's subprojects will result in additional improvements in the water supply in the six subproject areas. The subprojects are not located in the poorest water zones in Dili; in the September 2007 socioeconomic survey 27% of households interviewed had a per capita income below the national poverty line (\$15.44 per month). About 4,000 residents live in each of the subproject areas. For many of these residents, these additional improvements in water supply will bring benefits in terms of added convenience and reduced costs. A total of 64% of those interviewed did not have a DNSAS water connection and had primary sources of water ranging from private bore wells with electric or hand pumps, to shallow wells with buckets, all of which to a varying extent are subject to contamination. For the 64% of households surveyed that did not have a piped water service at their home, the median time that members as a whole spent on collecting water from their primary source was 90 minutes per day. In addition, approximately 25% of the households interviewed, including 31% of those with a DNSAS household connection, had to supplement their primary source of water with a secondary source. In some cases this could take up to 2 hours per day. Apart from the opportunity costs, the direct costs incurred in obtaining water from sources other than a DNSAS connection can include (i) cost of drilling a shallow well (\$100 or more), (ii) cost of either an electric pump (around \$250 and lasting 10 years) or hand pump (\$45 and lasting 6 years), (iii) cost of repairs and maintenance to the pump and well, and (iv) cost of purchasing bottled water (purchased by 42% of households) at a median cost of between \$0.50 and \$1.00 per day depending on the location.

The combined effect of improved quality of water in the pipe network, increased number of DNSAS household connections, and elimination of the need to supplement piped water with water from potentially contaminated sources will result in reduced risks of both water-washed and waterborne diseases, as well as mosquito-borne diseases, in the subproject areas. This is likely to disproportionately benefit the lower per capita income households. The survey results indicate that members of households with per capita incomes below the national poverty line were more likely to have experienced one or more days of illnesses that they

attributed to water-related causes than those whose incomes were \$1.00 per day or more (78% compared to 53%). In addition, civil works required to improve the network and to connect households to the system and install meters will provide an estimated 300 local residents with income-generating opportunities.

Because of the close link between Timor-Leste's National Development Plan and its Millennium Development Goals (MDGs), the Project will directly or indirectly assist Timor-Leste meet a number of its MDGs, including the goals of (i) ensuring that 86% of the urban population have access to safe drinking water by 2015; (ii) reducing the percentage of people earning less than \$1 per day from 21% in 2001 to 14% by 2015, and (iii) reducing the mortality rate among children under 5 by two thirds between 1990 and 2015 (not only does a poor water supply directly contribute to the risk of a number of illnesses, but in situations where it results in recurrent bouts of diarrhoea it can lead to malnutrition in children, making them more vulnerable to other illnesses.)

2. Design Features.

The Project does not have any features directly targeting poverty reduction. However, to maximize its potential benefits to poor households, the Project will collaborate with other agencies to promote responsible community water-use behavior. Such behavior will contribute to cost savings and the prevention of waterborne and mosquito-carried diseases. These factors will motivate behavioral change.

Contractors carrying out construction work will be required to employ people from the *suco* (neighborhood) in which they are working for unskilled laboring jobs. This will include a disproportionately large number of people from the lowest income households.

The existing tariff structure has a lifeline component to ensure that households with per capita incomes below the national poverty line will be able to continue to afford sufficient DNSAS piped water for consumption and personal hygiene when households are required to pay water tariffs.

C. Poverty Impact Analysis for Policy-Based Lending

The Project is funded by an Asian Development Fund Grant and poverty impact analysis for policy-based lending is not required.

II. SOCIAL ANALYSIS AND STRATEGY

A. Findings of Social Analysis

A major concern for the Project will be overcoming the current community attitudes to basic social services; attitudes that evolved in Dili during conflict and civil unrest. Dili residents have not been regularly paying for water for some years and have not been invoiced since April 2006. When meters were still being read, meter tampering occurred, and now breaking pipes for water or making illegal connections, especially to the connections of houses that have been destroyed by fire, is common. Theft of, and damage to, network system components is the norm and rarely are direct penalties imposed for such behavior. This situation is in part a consequence of household problems with the supply of DNSAS water and the consequent difficulties that residents face in accessing water for household use. Connections to a reliable and safe supply of water will facilitate behavioral change, especially if project implementation activities are carefully sequenced to ensure that no one currently obtaining water illegally is ever left without a source of safe water while improvements are being made to the network. However, the Project will also have a detailed strategy for promoting behavioral change concurrent with improvements being made to the local network system (Section E). This strategy will involve collaboration with other agencies such as the United Nations Development Fund for Women; the Alola Foundation (a nongovernment organization); PLAN International; and the women's organization, the Organizacao Popular Mulher Timor, which is linked to the *suco* councils. These linkages will mainstream the promotion of responsible water use behavior in the ongoing activities of these agencies and in schools. Such activities will need to involve sustained advocacy of appropriate behavior over an extended period.

B. Consultation and Participation

The consultation process in project preparation included a household socioeconomic survey of 300 households in water supply zones in which the subprojects will be implemented, formal and informal meetings with *suco* chiefs and with women and youth members of the *suco* councils, and relevant government departments and nongovernment organizations working with communities in Dili. A program of focus group meetings on specific issues of relevance to involving communities in the long-term sustainability of the Dili city water system was also carried out. This is discussed in detail in Supplementary Appendix H. During this consultation process, some issues essential to project design were discussed, such as (i) role of subzone caretakers; (ii) approaches to promote responsible water use behavior; and (iii) strategies to reduce the incidence of illegal behavior affecting the piped water system. Other issues such as the type of facilities (communal taps, tanks, etc.) to be provided for households with no direct access to streets, did not produce a response, despite probing; specifically affected households will need to be given the opportunity to comment during project implementation, once proposals have been developed. The issues on which consultation has taken place and requiring community consultation in the course of project implementation are indicated in Supplementary Appendix H.

2. What level of consultation and participation (C&P) is envisaged during project implementation and monitoring?

- Information sharing Consultation Collaborative decision making Empowerment

Three types of community consultation and participation will be required during project implementation:

- (i) A complaints system and process for regularly assessing consumer satisfaction and accurately monitoring complaints will need to be established. Although critical to the success of project implementation, these processes will need to be established as permanent ongoing elements in DNSAS management of the water system. Accordingly these processes will be developed under the community and customer relations program of the associated Dili Water Supply Performance Improvement technical assistance project, which will support DNSAS improvements in community and customer relations including feedback mechanisms.
- (ii) Community consultation will be required in relation to certain aspects of the project design as implementation proceeds, such as the arrangements for bill paying and provision of water for houses without direct street access. For the most part, community involvement in such decisions will require information sharing and consultation. These issues, and the appropriate consultation and community participation when addressing them, are discussed in Supplementary Appendix H.
- (iii) Project success will depend on the commitment of local communities to the conservation of treated water and the water infrastructure, and the ultimate willingness of households to pay for the water they consume. Given the existing context, achieving this commitment will require sustained community-based advocacy of the behavior necessary for effective functioning of the system. This will require the active collaboration of the Project with *suco* (small suburb) and *aldeia* (neighborhood) council members and other groups in the community. To achieve this community involvement, the Project will also collaborate with other agencies in Dili (e.g., United Nations, the Aloia Foundation, etc) who are doing community mobilization work in Dili *aldeias*, with a view to these agencies adopting supportive strategies. Preliminary discussions with relevant agencies and with the national women's organization (OPMT) at the *aldeia* level have led to interest in such collaboration. Similarly women in some *aldeia* have expressed interest in participating in such activities. Peer education opportunity, as one option, is discussed in Supplementary Appendix H.

Opportunity for the Project providing schools with extracurricular classroom resource material in the form of a booklet of games and other activities relating to the effective use of water as well as the need for conservation is also discussed in Supplementary Appendix H.

3. Was a consultation and participation plan prepared? No

Community consultation and participation is an important aspect of project design and implementation. The C&P process for project design is elaborated above and C&P arrangements during Project implementation will be detailed in the subproject appraisal reports and become an important component of successful subproject implementation.

C. Gender and Development

1. Key Issues.

Data from the socioeconomic survey is gender disaggregated and has been analyzed accordingly. Information on the gender division of labor with respect to relevant household activities such as decisions about utility connections and payment of utility bills, collection of water, pumping, and filtering and boiling water, shows that most water-related tasks are shared by both men and women. However, because of their disproportionate responsibilities for housekeeping and child-care, women are most affected by the convenience of the water source available to them,

Virtually no difference was noted in the willingness of male and female respondents to pay at least \$2.00 a month for piped water (73% and 71% respectively) when willingness to pay was considered in terms of whether or not the respondent was the household member solely or equally responsible for managing money for the payment for utilities. In households headed by men, a slightly lower percentage of those responsible for managing money were willing to pay (68%), compared with those not responsible (77%). Women respondents who were responsible solely or partly for managing money for utilities were somewhat less willing to pay (65%) than were men in this position (70%). (The number of households headed by women was too small to do a similar comparison for that group). Nonetheless, a clear majority of both men and women are willing to pay.

2. Key Actions. Measures included in the design to promote gender equality and women's empowerment—access to and use of relevant services, resources, assets, or opportunities and participation in decision-making processes:

- Gender plan Other actions/measures No action/measure

No gender action plan will be required for the Project.

However because of the significance of their role as water users, women should be primarily responsible for any program designed to promote good water use behavior; particular attention should be paid to women's groups in the community facilitating such promotion. Women will be the primary target for any such community-based promotion activities. Among households using public facilities, girls will also be a target group for such promotion, as they are observed to often be responsible for clothes washing, etc. at the public water facilities.

III. SOCIAL SAFEGUARD ISSUES AND OTHER SOCIAL RISKS			
Issue	Significant/Limited/ No Impact	Strategy to Address Issue	Plan or Other Measures Included in Design
Involuntary Resettlement	No impact	Not required for ADB sector project, however a land acquisition and resettlement framework was prepared to guide other agencies	<input type="checkbox"/> Full Plan <input type="checkbox"/> Short Plan <input checked="" type="checkbox"/> Resettlement Framework <input checked="" type="checkbox"/> No Action
Indigenous Peoples	Dili city has no indigenous people residents. With none present, no indigenous peoples will be impacted by the Project.	Not applicable	<input type="checkbox"/> Plan <input type="checkbox"/> Other Action <input type="checkbox"/> Indigenous Peoples Framework <input checked="" type="checkbox"/> No Action
Labor <input checked="" type="checkbox"/> Employment opportunities <input type="checkbox"/> Labor retrenchment <input checked="" type="checkbox"/> Core labor standards	Implementation will be undertaken by contract and employment opportunities for local laborers will be significant.	Labor concerns are discussed with recommendations in the subproject appraisal reports. (Supplementary Appendix D)	<input type="checkbox"/> Plan <input type="checkbox"/> Other Action <input checked="" type="checkbox"/> No Action
Affordability	Supplementary Appendix K discusses water tariffs, affordability, and willingness to pay. Early indications are that water tariffs are affordable and that consumers are willing to pay for water provided the service is adequate. The incidence of households in Dili that perceive themselves as headed by women headed is low. The small number identified in the socioeconomic survey (7%) had a similar per capita economic status as households headed by men and showed little difference in their willingness to pay.	Pro-poor water tariff policies have been discussed that would provide a three-block tariff structure to replace the two-block structure presently in use (Supplementary Appendix K).	<input checked="" type="checkbox"/> Action <input type="checkbox"/> No Action
Other Risks and/or Vulnerabilities <input type="checkbox"/> HIV/AIDS <input type="checkbox"/> Human trafficking <input checked="" type="checkbox"/> Others (conflict, political instability, etc.), please specify	<p>Many households have a component of unstable or temporary contract income in their per capita household income. These households can be considered vulnerable. This issue is addressed in relation to affordability.</p> <p>Peace and order remains a problem in many parts of Dili.</p> <p>Although construction work will be carried out in the sucos, this will be done mainly with local aldeia labor and thus not require any construction camps. No migrant labor will be employed and the Project will not increase the risk of HIV/AIDS.</p>	Project design considered concerns for peace and order breakdown by including higher than normal consultation and cooperation with community organizations and individuals within the community.	<input type="checkbox"/> Plan <input type="checkbox"/> Other Action <input checked="" type="checkbox"/> No Action
IV. MONITORING AND EVALUATION			
Are social indicators included in the design and monitoring framework to facilitate monitoring of social development activities and/or social impacts during project implementation? Yes			

SUMMARY INITIAL ENVIRONMENTAL EXAMINATION

1. This summary initial environmental examination outlines the findings of the initial environmental examinations (IEEs) of the three core subprojects of the Dili Urban Water Supply Sector Project. The IEEs are presented as Supplementary Appendix I. The IEEs of core subprojects are closely linked to the requirements and procedures of the Government's draft law on environmental impact assessment. Government responsibility for urban environmental issues lies with the secretary of state for environment (SSE) within the Ministry of Economy and Development. The environmental assessment process followed the draft law and is in accordance with the Asian Development Bank (ADB) *Environment Policy* (2002) and the *Environmental Assessment Guidelines* (2003). Under the ADB assessment guidelines, the Project is categorized as an environment category B. IEEs were prepared for core subprojects in accordance with the ADB *Environmental Assessment Guidelines* and comply with ADB *Environment Policy*.

A. Description of the Project

2. Starting with three zones within the Dili water supply service area, the Project will demonstrate a zonal approach to progressively upgrading an entire city's water supply secondary and tertiary distribution (reticulation) operation to sustainably decrease water losses, manage water demand, boost customer satisfaction, and improve water supply business performance. Dili city is divided into 10 geographic water supply zones. Subprojects were selected in subzones within each of the three target water supply zones in the Dili water supply service area. Subzone boundaries were determined by the technical location of the existing water supply pipe network, as well as the location of control valves. Each subzone includes approximately 1,000 water services.

B. Description of the Environment

3. Timor-Leste occupies the eastern half of the island of Timor, the most easterly island of the Lesser Sunda Group. It is approximately 300 kilometers (km) long and 50 km wide with a total land area of 15,000 square kilometers. It is mountainous with peaks up to 2,920 meters (m) and is bordered by coral reefs. The urban area of Dili is located on a flat strip of land between the coast line and the foot of the mountains. The Project and subprojects are all located entirely on this coastal strip of flat land. The climate is monsoonal with distinct rainy and dry periods. Rainfall is relatively high (over 1,750 millimeters) on 65% of the island; much of this rain falls in heavy storms during the months from December to March. Average temperature at sea level is 27°C and sea level relative humidity is around 80%. Timor-Leste has a combination of Australian and Asian flora and fauna, with about 224 species of birds, 23 of which are endemic to the Timor island group. Timor-Leste also has rich marine life. Threatened or endangered species include several turtle species and estuarine crocodiles.

4. Timor-Leste is one of the least developed countries in the world. Per capita gross domestic product (non-oil) was estimated at \$370 in 2006, and has fallen in most years since 2001. Around 40% of the total population is reported to live under the official income poverty line of \$0.55 per capita per day. Each year, about 14,000 young people enter the labor force. Youth unemployment increased nationally from 15% in 2001 to 23% in 2004; and underemployment may be three times as high. Timor-Leste's human development index remains the lowest among Southeast Asian countries and Timor-Leste ranks 140th (value of 0.426 in 2004) of 177 countries ranked worldwide. The Project is wholly within the urban area of Dili city and provides water services to industrial, commercial, and residential premises. Dili had a 2006 population of

160,000. Each subproject includes approximately 1,000 water connections and has a population of about 4,000 permanent residents.

C. Forecasting Environmental Impacts and Mitigation Measures

5. Each subproject will systematically repair, refurbish, or replace tertiary distribution pipe networks; and replace or install water meters in an effort to reduce the incidence of both nonrevenue water and unaccounted-for-water. All work will be undertaken on the same alignment of existing water pipes and services. The potential environmental impacts associated with the work in the subproject will occur during implementation, and will typically involve excavation and exposure of existing water pipes accompanied by local stockpiling of excavated material prior to backfilling the excavation. Expected negative environmental impacts will be limited to (i) possible noise and dust pollution while work is in progress; (ii) possible broken water pipes; and (iii) presence of open excavations while work is in progress. Positive environmental impacts will include the repair of leaks in water pipes resulting in an expected substantial reduction of pooling water within the urban area. Since the natural terrestrial environment of the subproject area has already been significantly altered and disturbed by urban development with roads, drains, homes, and industrial and commercial buildings, the subproject will not cause any significant impact to the existing environment, nor will it affect any environmentally significant area. Implementation work of the subproject will not affect any streams or watercourses within the Dili urban area. No major sites of archaeological, cultural, or historic significance will be affected by subproject implementation. All excavations will be undertaken in ground that has been subject to previous recent excavation. All asbestos cement pipes to be disconnected by the Project will be left in-ground and covered. As all subproject activities will be undertaken on the footprint of existing water supply infrastructure, no land acquisition or land for resettlement will be required. The environmental impacts identified for preimplementation, implementation, and operations phases for the subproject are detailed in this appendix. They are also shown in the environmental management and monitoring plan (EMMP) matrix set out in Supplementary Appendix I. The EMMP addresses the impacts and mitigation measures identified, and outlines the requirements of various people or agencies that need to be addressed during the phases of the subproject.

D. Institutional Requirements and Environmental Monitoring Program

6. The Government's draft law on environmental impact assessment has yet to be promulgated by the Council of Ministers. While the requirements of the draft law are clear, they are not well enforced. These provide for the preparation of an IEE, and all urban development projects will require SSE approval. SSE may require a full environmental impact assessment for subprojects with significant negative environmental impacts. The National Directorate for Water Supply and Sanitation (DNSAS) will need to submit an application for approval to SSE for each subproject. A subproject appraisal report (SPAR) will be prepared for each subproject and will include an IEE prepared following ADB requirements. Approval applications for subprojects will be supported by a SPAR.

7. An environmental and social unit (ESU) will be established within the Administration and Human Resources Division of DNSAS. The ESU will comprise two staff who will be responsible for environmental management; and public and customer relations. DNSAS will be responsible for the preparation of subproject IEEs including an EMMP. The IEE will be reviewed and approved by SSE and ADB. SSE will determine if an environmental impact assessment is required according to the requirements of the draft law (although subproject screening criteria will exclude subprojects that may have significant negative environmental impact, according to ADB criteria). Prior to the commencement of implementation activities, and once detailed design information is available, the EMMP developed for the subproject will be refined by the ESU. The

ESU will assist other sections DNSAS in supervising EMMP implementation through regular observation and spot-checks of implementation activities. The ESU will help DNSAS ensure that EMMPs are adequately prepared and will ensure that adequate and timely remedial actions are taken when issues arise during implementation.

8. During all phases of subproject implementation, management of the EMMP will be the responsibility of DNSAS with overall site monitoring of the subproject the responsibility of the ESU. Monitoring will include regular community meetings to monitor community concerns, thus identifying and mitigating these concerns as early as possible in the process to ensure community actions do not prevent access or incur damage to the subproject site. DNSAS will prepare quarterly mitigation progress and monitoring reports. At the end of subproject implementation, the ESU will prepare a summary report and verification that mitigation actions were completed and forwarded it to SSE with a copy to ADB.

E. Public Consultation and Disclosure

9. DNSAS will provide public notification of the subproject in a widely circulated local newspaper in both *Tetum* and Portuguese languages. Notifications will invite submissions from members of the public, or organizations within the community within 2 weeks following public notification. Notification will advise that further information may be obtained at the office of SSE or DNSAS. Public consultation and information disclosure requirements are detailed in the IEE (Supplementary Appendix I).

F. Findings and Recommendations

10. The Project through the implementation of subprojects will improve technical and commercial water losses in three of the city's water supply zones. Lessons can then be applied to similar programs in adjacent zones and progressively replicated until all 10 of the city's water supply zones are covered and overall service delivery is improved. The Project, through the implementation of subprojects, will assist the Government to achieve its Millennium Development Goal and National Development Plan targets for urban water supply. The Project will have few negative impacts and all can be satisfactorily managed. The EMMP establishes compliance conditions. DNSAS will ensure that mitigation measures are included in subproject design while during implementation the ESU will have monitoring responsibilities. The Project will include strengthening of DNSAS by establishing and supporting the ESU.

G. Environmental Assessment Review Procedure

1. Environmental Selection Criteria for Subprojects

11. In selecting subprojects, the following criteria will be used for the first level of screening. If any of these criteria are found applicable to the particular subproject and/or other conditions that may lead to a full environmental impact assessment, the subproject will not be accepted as part of the sector Project:

- (i) subprojects located in nature reserves;
- (ii) any significant loss of primary forest, mangroves, or sensitive wetland;
- (iii) any permanent negative effect on known rare or endangered species; and significant impacts on air quality and water quality; and
- (iv) any permanent damage to irreplaceable cultural relics and archaeological sites.

12. The IEE process to be applied will confirm this or recommend necessary work. All subprojects will be subject to an IEE to be prepared by the ESU. The IEE of subprojects will

initially be prepared under the supervision and guidance of the project implementation consultants.

2. Review Procedure for Environmental Assessment of Subprojects and Responsibilities of DNSAS and ADB

13. To ensure that all subprojects are prepared in accordance with the ADB *Environmental Assessment Guidelines* and the Government's draft law, DNSAS and ADB will divide responsibilities.

a. DNSAS Responsibilities

14. DNSAS through the ESU will be responsible for the following:
- (i) prepare an IEE for each subproject for approval by the SSE;
 - (ii) undertake adequate consultation with affected people and public disclosure;
 - (iii) undertake the necessary actions to ensure environmental compliance with the requirements of the Government and ADB;
 - (iv) obtain the necessary IEE clearance (development consent approval) from SSE;
 - (v) submit to ADB, IEEs and their summaries, incorporating EMMPs;
 - (vi) submit to ADB the development consent approval from the SSE, and its conditions, for ADB consideration in approving the subprojects;
 - (vii) ensure that the EMMP required mitigation measures to be incorporated during preconstruction activities are addressed by the design section within DNSAS;
 - (viii) ensure that the EMMP implementation stage mitigation measures are included in regulatory clearances (particularly the development consent approvals) will be obtained before commencing any civil work for the subproject;
 - (ix) ensure that the completed EMMP is submitted to SSE for approval;
 - (x) ensure that all DNSAS sections understand their responsibilities to mitigate environmental problems associated with implementation activities;
 - (xi) monitor the EMMP and ensure it is properly implemented; and
 - (xii) submit quarterly progress reports of on the implementation of EMMPs to the SSE and ADB.

b. ADB Responsibilities

15. ADB will be responsible for the following:
- (i) review IEE and summary initial environmental examination reports and disclose the reports through the ADB website;
 - (ii) review all statutory environmental clearance granted by the SSE, particularly the development consent approval, and note all conditions in approving the subprojects;
 - (iii) review the quarterly report of EMMP implementation and take necessary actions in close consultation with DNSAS; and
 - (iv) undertake monitoring of EMMP implementation and due diligence as part of the overall project review mission.

3. Environmental Due Diligence to Ensure Compliance with the ADB Environment Policy

16. DNSAS should ensure that ADB is given access to undertake environmental due diligence for all subprojects, if necessary. However, DNSAS has primary responsibility for undertaking environmental due diligence for monitoring implementation of environmental

mitigation for subprojects. The due diligence report and monitoring report of the implementation of the EMMP need to be systematically documented.

4. Public Disclosure

17. For any subproject subject to the environmental assessment and review procedure and where an IEE is required, formal and documented public consultation and information disclosure will be required. This will be done once during IEE preparation, i.e., to inform stakeholders of project components and to encourage input to identify overlooked environmental issues. The information disclosed and feedback provided at the consultation sessions will be summarized, attendance recorded, and the document attached as an annex to the IEE. Invited attendees at IEE consultations will include Government agencies and local authorities, community representatives, as well as nongovernment organizations. At least 2 weeks notice of consultative meetings will be given. DNSAS is responsible for ensuring that all documentation including the environmental due diligence and monitoring reports are properly and systematically kept as part of the DNSAS project record. Environmental documents such as IEEs are subject to public disclosure and therefore should be made available to the public on request.

H. Conclusions

18. The Project is classified as category B. All impacts can be satisfactorily mitigated and an EMMP was prepared that contains practical and realizable mitigation measures. The IEE concludes that the subproject will not have a significant impact on the environment. The IEE concludes that adverse environmental impacts arising from the location, design, implementation, and operation and maintenance of the proposed water supply and delivery infrastructure can be minimized to insignificant levels. Therefore a full environmental impact assessment is not considered to be warranted. An EMMP is provided in Supplementary Appendix I and will be strictly adhered to.