



Completion Report

Project Number: 38189-022
Grant Number: 0100
September 2018

Timor-Leste: Dili Urban Water Supply Sector Project

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Asian Development Bank

CURRENCY EQUIVALENTS

Currency unit – US dollar (\$)

The United States dollar is the currency of Timor-Leste.

ABBREVIATIONS

ADB	-	Asian Development Bank
DMF	-	design and monitoring framework
DNSA	-	National Directorate for Water Services
DNSAS	-	National Directorate for Water Supply and Sanitation
EIRR	-	economic internal rate of return
EMMP	-	environmental management and monitoring plan
ENPV	-	economic net present value
FIRR	-	financial internal rate of return
FNPV	-	financial net present value
ICB	-	international competitive bidding
IEE	-	initial environmental examination
JICA	-	Japan International Cooperation Agency
km	-	kilometer
m ³	-	cubic meter
MOI	-	Ministry of Infrastructure
MPW	-	Ministry of Public Works
NCB	-	national competitive bidding
O&M	-	operation and maintenance
PIC	-	project implementation consultants
PMU	-	project monitoring unit
PPMS	-	project performance monitoring system
PPP	-	public-private partnership
QCBS	-	quality and cost-based selection
SPS	-	Safeguard Policy Statement
WSS	-	water supply and sanitation

NOTE

The fiscal year (FY) of the Government of Timor-Leste and its agencies ends on 31 December. FY before a calendar year denotes the year in which the fiscal year ends, e.g., FY2018 ends on 31 December 2018.

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BASIC DATA

A. Grant Identification

1.	Country	Democratic Republic of Timor-Leste
2.	Grant number and financing source	G0100-TIM, with ADB Development Fund IX Grant and government financing
3.	Project title	Dili Urban Water Supply Sector Project
4.	Recipient	Democratic Republic of Timor-Leste
5.	Executing agency	Ministry of Infrastructure
6.	Amount of grant	\$6,000,000
7.	Project completion report number	xxxx
8.	Financing modality	Sector Project

B. Grant Data

1.	Appraisal	
	– Date started	8 October 2007
	– Date completed	15 October 2007
2.	Grant negotiations	
	– Date started	22 November 2007
	– Date completed	23 November 2007
3.	Date of Board approval	18 December 2007
4.	Date of grant agreement	5 March 2008
5.	Date of grant effectiveness	
	– In grant agreement	3 June 2008
	– Actual	25 April 2008
	– Number of extensions	0
6.	Project completion date	
	– Appraisal	31 May 2011
	– Actual	30 September 2015
7.	Grant closing date	
	– In grant agreement	31 May 2011
	– Actual	30 September 2015
	– Number of extensions	6
8.	Financial closing date	
	– Actual	25 August 2016
9.	Terms of grant	
	– Interest rate	Not Applicable – Grant Funding
	– Maturity (number of years)	
	– Grace period (number of years)	
10.	Terms of relending (if any)	Not Applicable – Grant Funding
	– Interest rate	
	– Maturity (number of years)	
	– Grace period (number of years)	
	– Second-step borrower	

11. Disbursements

a. Dates

Initial Disbursement 3 November 2009	Final Disbursement 22 January 2016	Time Interval 74 months
Effective Date 25 April 2008	Actual Closing Date 30 September 2015	Time Interval 89 months

b. Amount (\$ million)

Category	Original Allocation (1)	Increased during Implementation (2)	Canceled during Implementation (3)	Last Revised Allocation (4=1+2-3)	Amount Disbursed (5)	Undisbursed Balance (6 = 4-5)
Works	1.731		0.830	0.901	0.894	0.007
Civil Works		0.923		0.923	0.874	0.049
Equipment	1.925		0.887	1.038	1.036	0.002
Environmental Management & Monitoring Plans	0.024		0.024			
Consulting Services	1.709	1.230		2.939	2.932	0.006
Vehicles		0.081		0.081	0.081	
Project Management		0.011		0.011	0.009	0.002
Training	0.050		0.016	0.034	0.034	
Financial Audit		0.040		0.040	0.031	0.009
Works Leak Detection		0.032		0.032	0.029	0.003
Unallocated	0.561		0.559	0.002		0.002
Total	6.000	2.317	2.316	6.000	5.920	0.080

Notes:

- Numbers may not sum due to rounding.
- The fourth reallocation was undertaken on 20 August 2015.
- New financing cost categories were also approved during the project linked to minor changes in project scope and reallocation in grant proceeds, including combining works and equipment (which had different ADB cost share percentages) into a single civil works category (November 2013).

C. Project Data

1. Project cost (\$ million)

Cost	Appraisal Estimate	Actual
Foreign exchange cost	Not Applicable	Not Applicable
Local currency cost	Not Applicable	Not Applicable
Total	7.500	7.415

2. Financing plan (\$ million)

Cost	Appraisal Estimate	Actual
Implementation cost		
Borrower financed	1.50	1.495
ADB financed	6.00	5.920
Other external financing		
Total implementation cost	7.50	7.415
Interest during construction costs		
Borrower financed	Not Applicable – Grant Funding	
ADB financed		
Other external financing		
Total interest during construction cost		

3. Cost breakdown by project component (\$ million)

Component	Appraisal Estimate	Actual
1. Water loss reduction in target zones	3.414	3.022
2. Leak reduction & commercial metering in all zones	1.567	1.387
3. Project management, contract design & supervision services, & upgrading of DNSAS staff skills	1.759	3.006
4. Contingencies	0.760	
Total	7.500	7.415

DNSAS = National Directorate for Water Supply and Sanitation.

4. Project schedule

Item	Appraisal Estimate	Actual
Date of contract with consultants		
Project implementation consultant	Q1 2008	2 March 2010
Design and supervision consultant	Q3 2008	July 2010
Completion of engineering designs	Not applicable	
Civil works contracts		
Date of award	Q3 2008	28 September 2011
Completion of work	Q1 2010	31 August 2014
Equipment and supplies		
Dates		
First procurement	Not Identified	January 2010
Last procurement	Not Identified	January 2014
Completion of equipment installation	Not Identified	August 2014
Start of operations		
Completion of tests and commissioning	Not Identified	August 2014
Beginning of start-up	Not applicable	
Other milestones		

Note: Civil works contracts included equipment.

5. Project performance report ratings

Implementation Period	Ratings	
	{Development Objectives}	{Implementation Progress}
From 28 Apr 2008 to 31 Dec 2008	Successful	Successful
From 1 Jan 2009 to 31 Dec 2009	Successful	Successful
From 1 Jan 2010 to 31 Dec 2010	Successful	Partly Successful
From 1 Jan 2011 to 31 Mar 2011	Successful	Successful
	Single Project Rating	
From 1 Apr 2011 to 30 Jun 2011		On Track
From 1 Jul 2011 to 31 Dec 2011		Potential Problem
From 1 Jan 2012 to 31 Mar 2012		Potential Problem
From 1 Apr 2012 to 30 Sep 2012		Actual Problem
From 1 Oct 2012 to 31 Dec 2012		On Track
From 1 Jan 2013 to 31 Dec 2013		On Track
From 1 Jan 2014 to 31 Dec 2014		On Track
From 1 Jan 2015 to 31 Dec 2015		On Track
From 1 Jan 2016 to 30 Sep 2016		On Track

D. Data on Asian Development Bank Missions

Name of Mission	Date	No. of Persons	No. of Person-Days	Specialization of Members
Fact-finding	8–15 October 2007		7	Mission details
Pre-inception	18–21 August 2008		3	not available
Special review	18–22 May 2009	2	5	a, b
Review	31 Aug–7 Sep 2010	4	8	a, a, c, d
Review	12–15 April 2011	3	4	a, c, d
Review	7–14 February 2012	3	7	a, a, g
Review	27–30 March 2012	4	4	a, e, c, d
Review	8–19 May 2012	4	12	a, f, c, g
Special project administration	14–23 August 2012	6	10	e, e, e, c, h, i
Review	23–30 April 2013	2	8	e, c
Review	10–13 June 2013	2	4	e, c
Review	15 June–10 July 2015	2	10	e, c
Project completion review	12–23 June 2018	2	11	e, d

a = water supply and sanitation specialist, b = project administration unit head, c = project implementation officer, d = staff consultant, e = urban development specialist, f = policy and aid effectiveness specialist, g = portfolio management officer, h = project analyst, i = operations assistant.

I. PROJECT DESCRIPTION

1. The Government of Timor-Leste aimed to improve water supply services for households, businesses, and institutions in Dili, the capital city, by addressing the key underlying causes of the poor service, including (i) a lack of tertiary pipes (reticulation), (ii) the poor condition of tertiary pipes and service connections, and (iii) inadequate demand management. At project preparation, it was estimated that water sources, treatment plants, and transmission mains would have sufficient capacity to meet Dili's water needs for several years.

2. The project planned to use a zonal approach to rehabilitate the tertiary network and water connections in three sub-zones (within three of the 10 Dili zones), each with approximately 1,000 connections. The project report and recommendation of the President anticipated that the government would replicate the zonal approach across Dili's remaining seven zones.¹ During project preparation, no water billing was undertaken by the National Directorate of Water Services (DNSA), and consumers were making no payments for water.²

3. At project approval, the project impact was to improve water supply services for households, businesses, and institutions in Dili, with a target that the percentage of the Dili population receiving 24-hour water supply would increase from 25% in 2007 to 80% by 2015, and there would be an increase in customer satisfaction. The project outcome was improved hydraulic management of the Dili water supply system and more efficient tertiary distribution with a reduction in the Dili water system's non-revenue water (NRW) from 95% to 40%–50%, and in the project target zones, reducing the NRW from 95% to 25%–30%, and the percentage of the population receiving 24-hour water supply increasing from 40% to 80%.

4. The project outcome was to be achieved with the following outputs: (i) water losses reduced and controlled in six target sub-zones; (ii) visible leaks reduced with practical improvements made and stop valves refurbished, replaced, and installed to allow strategic improvements in the pipe network and better management of the system, and commercial customers metered in Dili's 10 zones; and (iii) skills of the technical and operations and maintenance (O&M) staff at DNSA upgraded in leak detection, leak reduction, distribution planning, and distribution management. The project cost at appraisal in 2007 was \$7.5 million, with an Asian Development Bank (ADB) grant approved for \$6 million on 18 December 2007.

II. DESIGN AND IMPLEMENTATION

A. Project Design and Formulation

5. At preparation stage, during implementation, and at completion, the project was fully aligned with (i) the government's Millennium Development Goals targets for access to safe water in Timor-Leste, aiming for an increase in access from 72% in 2001 to 86% in 2015 in urban areas; (ii) the Timor-Leste Strategic Development Plan, 2011–2030;³ (iii) the water sector policy and reform agenda; and (iv) ADB's country program and strategy and operational priorities.⁴

6. The Strategic Development Plan (footnote 3) committed the government to (i) sourcing and treating new water as required from bores, rivers, and other sources; (ii) constructing new

¹ ADB 2007. Report and Recommendation of the President to the Board of Directors: *Proposed Grant to the Republic of Timor-Leste to the Dili Urban Water Supply Sector Project*. Manila.

² During the project, DNSA became the new name for the former National Directorate for Water Supply and Sanitation (DNSAS).

³ Government of Timor-Leste. 2011. *Timor-Leste Strategic Development Plan*. Dili.

⁴ ADB. 2006. *Country Program and Strategy Update: Timor-Leste, 2006–2008*. Manila; ADB. 2011. *Country Partnership Strategy: Timor-Leste, 2011–2015*. Manila; ADB. 2016. *Country Partnership Strategy: Timor-Leste, 2016–2020*. Manila; and ADB. 2008. *Country Operations Business Plan: Timor-Leste, 2008–2010*. Manila.

water treatment facilities; (iii) extending the distribution system to new service areas; (iv) connecting additional households to the distribution system; (v) fixing leaks systematically and repairing faulty pipes, valves, and meters; (vi) training meter readers; and (vii) establishing a billing system. Targets established for Dili included (i) ensuring all households either had piped water or had access to communal taps; (ii) safe, well-operated, and maintained infrastructure in place by 2020 for the collection, treatment, and disposal of sewage; and (iii) improved operation and maintenance of the Dili drainage system by 2015.

7. The sector project modality was the appropriate approach for Timor-Leste, given the government's institutional, policy, and investment framework. It provided the opportunity to prioritize the investments using sub-zone (project) selection criteria based on technical, financial, and social criteria. The project design addressed key causes of poor and inadequate water supply and service provision, and the project's design monitoring framework (DMF) included relevant target indicators. The project outcome and output targets and achievements, as detailed in the project's report and recommendation of the President, are provided in the DMF in Appendix 1.⁵ The project preparation and fact-finding involved stakeholder participation and consultation. The DMF included one gender-based impact indicator on benefits to women. Given it was an urban water supply project that would have a significant impact on women, additional indicators should have been considered covering women as customers and as participants in project activities.

8. The design was overambitious given the fragile and recently post-conflict environment in Timor-Leste when the project was prepared, the institutional capacity of the key agencies, DNSA and Directorate of the Ministry of Public Works (MPW), the behavioral change required of consumers, and the timelines required for procurement and implementation.⁶ DNSA's institutional capacity was assessed during project preparation, with measures identified to improve planning, monitoring, operating systems, and service delivery. The support to be provided during the technical assistance for the Dili Water Supply Performance Improvement aimed to enhance DNSA's capacity.⁷

9. The project benefits were in part based on restructuring DNSA into an independent water utility. This later became part of ADB's strategy for water infrastructure for 2006–2010. This restructuring was not undertaken during the project period. In the early stages of the project, ADB missions documented in review reports that they had recommended to the government the preparation of a road map as an initial step for this reform process, but there were no defined actions. In the late stages of the project, the government undertook some initial study on public–private partnership options. During the project completion review (PCR) mission, ADB had initiated discussions with the government on a water supply and sanitation investment plan, policies, and institutional reform for 2018–2030.

B. Project Outputs

10. The project design outcomes and impact were to be achieved with three outputs. However, given the significant implementation delays, many output targets were achieved late or only partially achieved, and some were not achieved due to the lack of recruitment and retention of skilled staff in technical areas, including leak detection.

11. Under output 1 (water losses reduced and controlled in three target zones), the project increased access, water quantity, and household connections in the target zones with investment in improved connections, water control valves, metering (2,735 meters replaced),

⁵ ADB 2007. Report and Recommendation of the President, Asian Development Fund Grant, Democratic Republic of Timor-Leste: Dili Urban Water Supply Sector Project, November 2007.

⁶ During the project, the MPW became the new name for the former Ministry of Infrastructure.

⁷ ADB 2006. *Technical Assistance to the Democratic Republic of Timor-Leste for Dili Water Supply Performance Improvement*. Manila (TA 4869-TIM, approved 17 November 2006).

and piping (replacement of 16.4 kilometers [km] of pipeline). These interventions did have a positive impact at the completion of the civil works and for a short period after but did not result in the planned overall reduction in water losses post the project implementation period. From the 10 water supply zones in Dili, the project target areas were initially in three sub-zones—zone 2 (sub-zone 1), zone 4 (sub-zone 2), and zone 5 (sub-zone 3)—and later expanded to zone 1 (sub-zone 4) and zone 10.

12. After the completion of the interventions in the target sub-zones, the surrounding sub-zones also wanted improved water supply. So, under social and political pressure, the water control valves were opened, which resulted in the decline of service delivery, water pressure, and quality of service. As a result, the initial improvement in billing collection also declined. Combined with this was a lack of or inadequate ongoing O&M, with a maintenance approach that prioritized critical repairs only. Illegal connections were not actively controlled or regulated once the project zones were completed. Major damage that occurred to completed project work during implementation was not always repaired. This occurred in zone 10 when a road project damaged 2 km of pipe, which was only patched up and resulted in the eastern part of zone 10 getting a poor-quality service. Five years later, the pipe is still to be properly repaired. Likewise, in zone 1 (sub-zone 4), technical design issues with incorrect bore flow capacity estimates and poor piping connections to leaking existing pipelines were identified during contract implementation. These issues resulted in the target households receiving limited water for a short, defined period of the day due to low pressure. These problems have not been rectified.

13. In output 2 (visible leaks reduced and practical improvements made), the focus was on system-wide support to improve operations and reduce leaks and NRW, with identification and repair of visible leaks and open pipe discharges, with the replacement of authorized and commercial bulk connections, and chlorination equipment. The planned identification work on visible leaks and open discharges was achieved, though late, and completed in 2013–2014. The actual installation of seven bulk meters and 111 chambers and valves was partially achieved late with lower numbers than planned, and the metering coverage of large customers in all zones did not reach the 80%–90% target. Chlorination dosing units were repaired and replaced, though the number required was less than indicated in the DMF target, as several units did not need replacing.

14. In output 3 (skills of technical and O&M DNSA staff upgraded in leak detection, leak reduction, and sub-zone management), the focus was on the formation of three leak detection teams, training and leak planning, and recruitment of sub-zone caretakers. The training was provided by the project implementation consultant (PIC) team, as the planned training under the technical assistance for Dili Water Supply Performance Improvement did not occur due to the demand management task force and leak detection and caretaker teams not being in place prior to the end of the TA in June 2011. The PIC training was provided before the skills could be applied. As only one leak detection team was established with four team members, this target was not achieved. The DNSA retained the members of the leak detection team, but in 2018 only two staff remain. Leak repair work focused on the repair of visible leaks only. The initial absence of equipment and vehicles delayed implementation, and team size limited systematic work planning. Three caretakers were recruited for the three sub-zones (initially due to the delay in recruiting one of the caretakers the sub-zone 1 caretaker also covered sub-zone 2), and this target was achieved late.

C. Project Costs and Financing

15. The project was implemented within budget. At appraisal, the overall project cost was estimated at \$7.50 million. ADB was to finance 80% of the total cost (\$6 million) through a grant from ADB Development Fund IX, and the government was to finance 20% (\$1.50 million). Details are available in Appendix 3, Table A3.1. The overall project cost at completion was \$7.415 million, with the ADB grant financing \$5.920 million (80% of the total cost) and the government financing the equivalent of \$1.495 million (20% of total cost). Appendix 3, Table 3.2.

16. As planned at appraisal, the project component 1 (water losses reduced and controlled in three target zones) accounted for \$3.414 million (51% of the project cost at base cost). This component was to finance the infrastructure investment in the sub-projects in the three target zones, with two sub-zones in each zone having an integrated package of water supply and management support. The first three sub-projects were identified at appraisal with detailed sub-project appraisal reports covering technical, hydraulic, social, environmental, and safeguard aspects). An additional three sub-zones (within these zones) were to be identified during implementation. It was expected that the sub-zones would cover approximately 26% of Dili's customers.

17. Due to cost increases and implementation delays, funding was not available to implement this approach in the three further sub-zones. It was assessed that funding would be adequate for priority work in two other zones (zone 1 [sub-zone 4] and zone 10). The actual overall expenditure on component 1 was \$3.022 million, which was 41% of the total project cost, reflecting the cost reallocation and increases that occurred with the design and supervision consultant. The project component costs at appraisal and completion are in Appendix 2.

18. At appraisal, the project component 2 (visible leaks reduced and practical improvements made) accounted for \$1.567 million (23% of the project cost at base cost). This component was to operate across the Dili water supply system and (i) identify and repair visible leaks and open pipe discharges; (ii) inspect, replace, and install meters in authorized commercial and bulk connections; (iii) repair and replace chlorination equipment at groundwater sources; and (iv) relocate existing water service connections to allow disconnection of old leaking main pipes. At project completion, the cost for component 2 was \$1.387 million (19% of total project cost), reflecting, like component 1, the reallocation of funds to the design and supervision consultant.

19. At appraisal, component 3 (skills of technical and O&M DNSA staff upgraded in leak detection, leak reduction, and sub-zone management) accounted for \$1.759 million (26% of the project cost at base cost). This component was to provide training, a project implementation consultant, and the design and supervision consultant. During implementation, additional inputs were required to establish a project management unit team composed of three national staff, (40.5 person-months in total) after the completion of the project implementation consultants in September 2011, an international construction supervisor for two months (after the completion of the design and supervision contract), and for the costs of the auditors.

20. At project completion, component 3 accounted for \$3.006 million (40% of total project costs). This significant cost increase arose from the delays in the contracting and implementation of civil works. A large part of the additional cost was incurred by the design and supervision consultant contract being extended four times by a total of 29.45 months to (i) provide supervision for the three sub-zone interventions; (ii) design the additional civil works in zone 1 and zone 10, which required a consultant for a study assessment and design work; and (iii) for supervision of the civil works (which were delayed) in zones 1 and 10. The extensions resulted in an increase in the value of the contract from \$0.862 million to a final cost of \$1.968 million.

21. During the project, six reallocations of project funds were approved to reflect the required funding changes outlined in paras. 17–20. There were also approved changes in the percentages of disbursement financing between ADB and the government. This was required given the reallocation affecting the 80/20 balance between ADB and the government. As a result, the uncontracted balance for works (ADB 62%) and equipment (ADB 88%) of approximately \$1.717 million of ADB funds were canceled (approved 19 November 2013) with a transfer of \$0.923 million into a new civil works category with a lower ADB percentage of 52% to ensure the required balance was maintained. The remainder of this canceled amount plus most of ADB's unallocated funds were used for incremental funding of project management consulting services (\$1.230 million), which were 100% ADB financed. Also, small amounts were

used to fund ADB's financing of the additional cost categories introduced into the project covering leak detection team vehicles, equipment, and operational support, and project management and audit. With the purchase of vehicles, the government requested, and ADB agreed to increase its financing share to 100%. The project cost and financing plan at appraisal and at completion are in Appendixes 2 and 3.

D. Disbursements

22. Total project grant disbursements were \$5.920 million, or 98.7% of the total grant, with the cancellation at grant closing of \$0.080 million (1.3% of total grant). The imprest account was established with a ceiling of \$0.100 million with the Ministry of Infrastructure responsible for managing the account.

23. The original disbursement projections were unrealistic given the DNSA's institutional capacity and lack of prior experience with ADB procurement and implementation. The project was extended six times from the original 31 May 2011 closing date to 30 September 2015 due to delays with the recruitment of the PIC, associated delays with the recruitment of the design and supervision consultants, and delays with the civil works tendering and contract awards for the three target sub-zones and the additional works in zones 1 and 10, and with contract implementation. These delays and the slow implementation of the first major civil works contract (with Ensul) meant disbursement was significantly delayed.⁸

24. The approved extensions reflected the additional time required. The contract award and disbursement plan projections were revised and approved on 20 August 2012. In 2014, the projected contract awards and disbursements were revised given the implementation delays that occurred due to the procurement and contract completion for the additional civil works (in zones 1 and 10), with this revision being approved as part of an ADB-wide revision of projections on 1 April 2014. Contract awards and disbursements over the project implementation period are detailed in Appendix 5. They reflect the revised projections over the extended project implementation and indicate the scale of the divergence between the appraisal projections and the actual contract awards and disbursements.

E. Project Schedule

25. The project implementation did not occur as planned at appraisal, with significant extensions in the grant agreement timeline. The grant for the project (grant 0100) was approved on 18 December 2007, and it became effective on 25 April 2008. While the original grant physical completion date was 31 May 2011, six extensions were required during implementation. The first extension was to 31 May 2012 (approved on 17 February 2009) and the final extension was to the closing date on 30 September 2015 (approved on 13 March 2015). These extensions were required due to the initial start-up delays with slow recruitment of the PIC, associated delays with the recruitment of the design and supervision consultants, followed by delays with the civil works tendering and contract awards for the three target sub-zones and the additional works in zones 1 and 10, and with the contractor being slow at implementing the contract.

26. The project financial closing on 25 August 2016, was approximately 11 months after the physical closing date to allow for the liquidation of the imprest account and refund any unliquidated balances.

F. Implementation Arrangements

27. The project implementation arrangements did not perform as anticipated during the project period. The Ministry of Public Works (MPW) was the executing agency, responsible for

⁸ Ensul was the Dili urban water supply sector project contractor for subzones 1, 2 and 3.

overall project management. The DNSA was the implementing agency, responsible for day to day project implementation. The plan was for project management to align with existing MPW and DNSA structures and use their systems. A separate project management unit (PMU) was not planned. The project team, under the project implementation consultant (PIC), were spread as planned across different sections, with the team leader and the water supply engineers located in the Dili Water and Sanitation Division of the DNSA, the financial management specialists located in the Corporate Services Directorate of the MPW, and the monitoring and evaluation specialists located within the Development and Planning Division of the DNSA. Procurement was to be undertaken in the Procurement Division of the MPW with support from the project team.

28. This project implementation structure was planned on the assumption that the PIC contract would be in place for the duration of the project. When this did not occur, a number of planned project implementation activities did not continue and additional resources were required. The PIC resources could have been better coordinated and utilized given the delays with linked project activities. The PIC contract closed in September 2011, before civil works started. This was due to the lengthy delays in project implementation and the extensions in closing date. After the closing of the PIC contract, the project had to recruit individual consultants for a PMU in the DNSA, which operated from October 2011 to August 2015. The PMU functioned satisfactorily.

G. Technical Assistance

29. ADB approved a project preparatory TA grant on 15 September 2005 to assist in the preparation of the proposed project.⁹

30. On 17 November 2006, ADB approved the Dili Water Supply Performance Improvement Technical Assistance (footnote 7) for \$1 million, with the fielding of consultants in July 2008 (footnote 08). The TA objective was to support the project by strengthening the capacity of the DNSA in implementing the planned project. The TA was rated *partially successful*. The TA provided the executing agency with improved management, human resources, and technical skills to maintain the new network systems (distributional management) and improved the training on meter management and customer service systems (billing and collection) for customer service. In many cases, however, these skills were not able to be applied during the TA as the project implementation activities had not commenced by the time of the TA closing on 31 March 2011.

31. Similarly, the restructuring of the DNSA into an independent financial entity did not occur. The demand management task force, leak detection and caretakers were not in place, so the TA was unable to provide the planned training. The PIC provided the training later during the project. The TA design was based on three key conditions that did not occur: (i) the MPW would allocate sufficient resources to the DNSA, (ii) the DNSA would be restructured to become a commercially focused water business, and (iii) the TA and the project would be implemented concurrently. These shortfalls reduced the TA output achievements and expected outcomes.

H. Consultant Recruitment and Procurement

32. Consultant recruitment was undertaken in accordance with ADB's Guidelines on the Use of Consultants (2007, as amended from time to time). International consulting companies were selected under the quality- and cost-based selection for the provision of services as the project implementation consultants, and as the project design and supervision consultants. The PIC contract closed in September 2011, prior to the start of the civil works contracts, so a number of key supporting implementation functions (monitoring and evaluation, preparation of bid

⁹ ADB. 2005. *Technical Assistance to the Democratic Republic of Timor-Leste for Dili Urban Water Supply Sector Project*. Manila (TA 4646-TIM, approved 15 September 2005).

documents) were not continued. The DNSA decided not to extend this contract and instead recruit some national project management consultants for the PMU office.

33. The design and supervision contract was extended by the DNSA five times (by 29.45 months) from the original closing date of September 2012 to February 2015, so it was able to provide the design and ongoing supervision of the civil works. Prior to the first extension, the government evaluated the consultant's performance as satisfactory. The initial scope of the design and supervision services was increased, and the contract amount rose from \$0.862 million to a final contract of \$1.968 million. The extensions were approved under contract variations 3, 4, 5, 6, and 7. While the terms and conditions remained the same in the first extension, the second extension covered the design and supervision of the rehabilitation works in zones 1 and 10 on the same terms as for the sub-zones 1, 2, and 3. The third extension covered the implementation of the construction works involvement in the international competitive bidding (ICB) tender process. The fourth extension was to supervise the completion of the contract for zones 1 and 10, and the fifth extension was to finalize the last payments to the contractor.

34. Individual international and national design and supervision consultants were recruited to provide supervision of [insert what was being supervised] for 1.75 months (May–July 2015) after the closing of the design and supervision contract.

35. At appraisal, 63 person-months of international and 136 national person-months of professional consulting services were included to provide project implementation and design and supervision services. At project completion, 108 person-months of international, 259 person-months of national professional consultants, and 113 person-months of support staff had been used. A significant part of this increase in consultant resources is linked to the extension of the design and supervision contract and for the additional input of a water supply consultant (international 1 person-month) to assess the best option for the improvements in the water supply system rehabilitation in zones 1 and 10. The remaining additional inputs were used for recruitment of individual consultants to staff the PMU (national 26 person-months) and for an international design supervision consultant to supervise the completion of the works in zones 1 and 10 (2 person-months).

36. Civil works, goods, and services were procured in accordance with ADB's Procurement Guidelines (2007, as amended from time to time). During project implementation the following procurement and selection methods were used: (i) for civil works, ICB, national competitive bidding (NCB), and shopping; (ii) for goods (equipment and materials), ICB and shopping; and for (iii) consulting services, QCBS and individual consultant recruitment. Four civil works and equipment contracts were awarded and completed. Vehicles and leak equipment were procured using the shopping method. The civil works and equipment contracts for the three initial sub-zones were planned to be undertaken as NCB contracts; however, after the first NCB package was advertised (for sub-zone 2) and there were no responsive bidders, it was agreed with the DNSA and MPW to have one ICB package rather than as three NCB contracts, which simplified the bid documentation and procurement.

37. The implementation of the civil works contract for the three sub-zones (Ensul; footnote 09) was delayed due to initial issues with the contractor's bank guarantee, delays with material deliveries, and the contractor lacking the adequate equipment to complete the contract on time. Given these delays, it was recognized that Ensul would not be able to complete all works. Options were considered to complete the works, including Ensul using a subcontractor. The DNSA, MPW, and ADB decided that funds (of approximately \$700,000) be re-allocated under the existing contract and that Ensul would subcontract the works to a national contractor with an established record in the water sector to install these works. The works covered bore wells and pumps, 160 household connections, and some piping. While Ensul's work was completed late (in July 2013), it was of good quality.

38. With the works in zones 1 and 10, both contracts were tendered in two ICB packages, with the tender process under the management of MPW. The contract for zone 1 was for 7.5 and for zone 2 was for 6.5 months. Both contracts were awarded to the same contractor (RMS Engineering) and work was completed within 8 months (by end August 2014).

39. Procurement arrangements under the project suffered a number of delays and were not efficient. The procurement of major contracts involved changes from NCB to ICB due to a lack of responsive bidders and delays in the evaluation of bids and with the award, signing, and effectiveness of contracts. The delays in part, reflected the DNSA and MPW's lack of capacity and experience with ADB bid documentation and procurement, and the limited technical support available once the PIC contract was completed in September 2011, as PIC had responsibility for preparing bid documentation. The DNSA decided not to extend the PIC contract. Project reports noted that the ADB procurement adviser in MPW during this period assisted the project by providing some support with bid documentation.

I. Safeguards

40. The project was categorized B for the environment. Initial environment examinations (IEEs) and environment management and monitoring plans (EMMPs) were prepared for each of the sub-zone projects in line with ADB's environment policy and guidelines. No environment impact assessments were required. Similarly, IEEs and EMMPs were prepared for the zones 1 and 10 project works. The project supervision consultants oversaw the implementation of the EMMPs. The proposed projects were in urban areas and involved the rehabilitation of facilities. In the project target areas, pipe leakages and water infusions meant that the water supplied was not safe and would need treatment. No test results are available on water quality at the end of the project. There were no social safeguards and land acquisition issues during project implementation.¹⁰

J. Monitoring and Reporting

41. Of the 25 project covenants, 16 were complied with, three were partially complied with, and six were not complied with. The covenants are detailed in Appendix 7. The three partially compliant covenants covered the project implementation team and leader, and the DNSA capacity to retain project staff. The DNSA provided an office and the project team worked with the related departments. Departments lacked counterpart staff or, at times, the available departmental staff to work with the project team. The DNSA did not have all the required data for the project team, and the consultants needed to do primary data collection and field verification.

42. The PIC contract closed in September 2011, prior to most of the procurement activities. The team leader and team were not able to contribute to the bidding processes, contract management, implementation progress monitoring, or the preparation of withdrawal applications. During the contract period, the PIC did prepare progress reports, and maintain project accounts, but did not undertake socio-economic impacts, or provide support to the project completion report.

43. While three leak detection teams were planned (as per the covenant) only one leak team consisting of four members was formed. However, at [month year], only two of the members remained on the DNSA staff. The PIC consultant trained the team staff. The project provided equipment, vehicles, and operational budget. In total, five sub-zone caretakers, with one covering two sub-zones, were hired by the DNSA, with selection by local leaders. The caretakers had the role of liaison between community, contractor, consultants, and the DNSA. The DNSA recruited three of the caretakers. The limited size of the leak detection team reduced their capacity to undertake the planned project leak detection work, reduce NRW and improve

¹⁰ ADB. 2009. *Safeguard Policy Statement*, Manila.

the water supply system. Project mission reviews and reports do not explain the critical factors that constrained the recruitment of the leak team staff.

44. All six non-compliant covenants involved key aspects of the DNSA development, with a sustainable institutional structure having the capacity to efficiently deliver improved services, improve revenue performance, and ensure the provision of O&M financing. The O&M budget covenant was not complied with, as was the covenant relating to the DNSA's planned institutional development, and the proposal for an independent water supply enterprise. The covenants covering the establishment and implementation of performance monitoring systems involved the establishment of the system, but it was not operationalized by the DNSA as the PIC contract ended in September 2011. Similarly, the planned project performance monitoring systems were not operationalized, impact and evaluation surveys were not completed, and performance benchmarking was not undertaken. These performance and monitoring systems would have provided the DNSA with the ability to assess service performance and improve efficiency, and the opportunity for comparative analysis with equivalent water utilities.

45. These six covenants were realistic in terms of the requirements to develop a sustainable institution that provides reliable services. The timeline required for some actions could have been extended to strengthen ownership and effectiveness. While the non-compliance was raised with the government and noted in review mission reports, limited remedial action was taken by the government to rectify the shortfall.

46. Under the project, the PIC provided training support to the DNSA and the PMU in setting up sound financial management systems, with internal and external financial and accounting controls that would meet ADB requirements. After the completion of the PIC contract in September 2011, the ADB grant financed the PMU accounting staff. The PMU recorded all transactions and balances and prepared regular and reliable financial statements and reports. All seven audited project financial statements for the fiscal years 2009–2015 were submitted to ADB, they were compliant and were reviewed by ADB. All but one (for fiscal year 2009) had an unqualified opinion. Two audited statements were submitted 6 months after the end of the fiscal year but were less than 1 month late in submission.

III. EVALUATION OF PERFORMANCE

A. Relevance

47. While the project design was relevant in focusing on the key underlying causes of the poor water supply in Dili, it was overambitious in terms of the required scope and necessary integration of activities, and timelines to achieve the planned outputs and outcomes in a fragile and recently conflict-affected country (paras. 7, 8, and 9). For this reason, the project is rated *less than relevant*. Given the state of the water system prior to the project, the limited capacity of the relevant institutions, and consumers who treated water as a free commodity, the project had to address core institutional capacity, community awareness, and behavioral change, combined with infrastructure investment and development of sustainable systems. As such, the range of interventions in the design should have been more focused and integrated, with a more limited scope (in terms of coverage given the level of funds). Investment at a zonal level rather than at the sub-zone level, and a stronger emphasis on the supporting utility capacity and institutional reform, and the streamlining of payment and collection systems would have had a greater potential as a pilot project to demonstrate best practice that could have been replicated subject to additional funding.

48. The project faced significant implementation delays with six extensions of the closing date. The phasing of the key consulting contracts and civil works contracts was poor due to procurement, recruitment delays, and mobilization issues, which resulted in training being provided before it could be used, and loss of trained individuals prior to the project activity being implemented. The small size of the PMU and the non-implementation of the performance

benchmarking and monitoring systems resulted in limited data being available to assess efficiency and effectiveness. The increased costs for the design and supervision consultants and initial civil works reduced funding for the final packages.

B. Effectiveness

49. The project sub-zone approach demonstrated what could be achieved with a focused investment and support services, and with a functioning regulatory environment that monitored illegal connections, and this achieved an increase in service, billing collections, and revenues. However, for the approach to work there needed to be a phased and planned investment in the other sub-zones in that zone, which did not occur.

50. The limited number of consumers receiving a high-quality service caused local social and political issues, as the surrounding sub-zones also wanted an improved water supply. So, under social and political pressure, the control valves were opened, and service delivery, pressure, and quality of service declined (paras. 11 to 14). As a result, the initial improvement in billing collection also declined. Combined with this was inadequate ongoing O&M and the lack of active regulation of illegal connections once the project zones were completed, and this resulted in high NRW losses. On this basis, the project is rated *less than effective*.

51. The project targeted reducing Dili's percentage of NRW (i.e., the share of water supplied but not charged) from 100% in 2007 to 40%–50% by the end of 2010. Key initiatives to undertaken were reintroducing charges, reducing unofficial connections, and establishing a demand-management taskforce. Despite these changes being considered essential to reducing demand for water to sustainable levels and providing the funding needed to rehabilitate, operate, and maintain the water system, they were never implemented. NRW remained, however, close to 100% at the end of 2010 as the civil works were yet to start. The assessment undertaken by the Japan International Cooperation Agency of the Dili water zones in 2015, indicated that NRW losses ranged from 70% to 95 % across the ten zones.¹¹ For the zones under this project, NRW was 70% in zone 3, 81% in zone 10, and ranged from 90% to 95% in zones 1, 2, and 5. The percentage of the population receiving 24-hour supply also did not reach the planned target of 80%. The project did not achieve the outcome indicator targets for NRW, hours of supply, or for procurement contracts on leak detection.

52. The customer satisfaction, as measured by the number of complaints per thousand customers, improved during the project implementation. However, the number of complaints may not be an accurate measure of performance, as it is a manual system that involves a very lengthy response time, and customers are aware they are unlikely to get a reply and action to a malfunctioning water problem and on this basis take no action. No data or survey collection was undertaken on the benefit to women from the improved water supply services, so this impact indicator could not be measured.

C. Efficiency

53. The project is rated *less than efficient*. The economic internal rate of return (EIRR) estimated at project preparation for the three sub-zone projects, was 20.2% indicating that they were economically viable and above the opportunity cost of capital, which was estimated at 12%.

54. The benefits at project preparation covered the incremental and non-incremental water and time savings. In estimating the benefits, it was assumed that there would be (i) an increase in household connections and a shift from non-piped water sources, (ii) improved water treatment and quality, (iii) improved system pressure, (iv) a 24-hour water supply, and (v) a

¹¹ Japan International Cooperation Agency. Timor-Leste: The Project for Study on Dili Urban Master Plan in the Democratic Republic of Timor-Leste. Unpublished.

reduction in disease risk. The investment would result in a reduction in water losses from 70% to 25% in the target sub-zone areas, and this reduction would result in savings in pumping electricity costs for both groundwater sources and water treatment plant operations (i.e., chemical costs). The health benefits and improved productivity from improved access, better water quality, and associated lower disease and health issues while identified as a benefit were not quantified.

55. The sub-zone EIRR and economic net present value (ENPV) were recalculated at project completion, using actual economic costs and estimates when required due to limited data. At project completion, some of the key expected economic benefits had not been achieved. While there have been more households connected to the system in the sub-zones, it is fewer than planned at approval, and the project investments did not provide full coverage to all households in the sub-zones. Also, there is no reduction in NRW losses, or in energy and chemical use that were to generate savings. The water supply service hours were generally significantly less than 24 hours, and variable across the sub-zones. The water quality is poor given the leakage from pipes and infusion and bore well water is untreated. The sub-zone water pressures are generally low as the operating valves were opened to surrounding sub-zones, and the system is not being maintained, with an increase in consumers receiving poor service.

56. The above factors explain why the sub-zone project EIRR and ENPV, when recalculated at project completion, have lower economic benefits, with an EIRR of 10%, and an ENPV of \$256,950. The economic opportunity cost of capital used at project approval was 12%, and on this basis, the sub-zone project, with an EIRR of 10%, is not economically viable (Appendix 8).

57. Project processes were established for procurement, contract, project, and financial management. There were significant delays in procurement, contract award, and implementation, with the project being extended by 52 months and as a result, disbursements were much delayed. Appendixes 4 and 5 provide details on planned and actual contract awards and disbursements. Planned institutional reforms did not occur, and operational processes for leak detection and water demand management were only partially implemented and largely discontinued at project closing.

D. Sustainability

58. In the target sub-zones, where investment was made in meters, piping, and water access and quantity, service delivery, O&M, and response to customer's complaints improved, and there was an increase in billing and collection rates (up to 80% paying) and an increase in revenues. When the project was approved, tariffs for customers were only just being reintroduced. This increase in revenue was not maintained post the project investment and collections have declined since project completion, with only 12% of customers (5000) having meter readings under the Dili public system as of June 2018 (from PCR meetings) and of these, only approximately 4% are making payments. There is no penalty for non-payment and disconnections do not occur and the incentive for payment, given on average 5–8 hours supply in many zones, is limited. This decrease reflects the declining service provision in many zones, the lack of a regular O&M program with only major repairs being addressed, the lack of regulation on illegal connections, and the hours of water delivery being allocated for short periods of the day. In the project zones, when pumps broke down, they were not immediately repaired, and with low-pressure water, customers get poor service and have little incentive to pay. The payment system is time-consuming and has not been streamlined.

59. At project preparation, the financial benefits expected to result from this investment were estimated as (i) the incremental revenue from the increase in customers and in billing and higher collection rates and (ii) the savings in costs from the reduction in NRW from 75% to 25%, which would reduce electricity use and chemical use for the treatment of water. Incremental financial costs would be incurred from O&M, meter reading, and billing. Based on the above improvements being implemented, the combined financial analysis of the three sub-zone

projects was estimated and had a financial internal rate of return (FIRR) of 2.5%. The weighted average cost of capital (WACC) was estimated at 1%, which indicated the sub-projects would be financially viable.

60. The sub-zone FIRR and financial net present values (FNPVs) were recalculated at project completion, using actual costs and estimates, and both were negative. The FIRR was minus 18% and the FNPV was minus \$2.230 million. The FIRR at project completion indicates the sub-zone projects were not financially viable, as the FIRR was below the WACC, which was estimated at 2.20 (Appendix 9). The lower FIRR reflects the significantly lower water revenue (from poor service, fewer customers than planned, and low billing collection rate) and the absence of any saving in electricity and chemical costs from a reduction in NRW, as the planned decrease in NRW losses did not eventuate.

61. The Dili public water supply system is rated *unlikely to be sustainable* in its current operating mode. It is in decline and for it to shift onto a sustainable base will require a total change in approach with an integrated package of measures covering institutional reform and re-organization. The institutional reform would require establishing an independent water utility, be it a government entity or with some management contract operation included, and with the necessary technical and financial skills to operate the system. The government would need to make a financial commitment and allocate budget resources to operate the system, and strategic investments to enable the system to function efficiently and be maintained. The tariff structure, once these foundations are in place, would need to be determined, based on cost recovery in the medium term. Development partner engagement will be required to support this change, but it should be based on a clearly defined road map with milestones that benchmark the government's performance.

E. Development Impact

62. The project sub-zone approach demonstrated the development impact that could be achieved with focused investment and support services, and with a functioning regulatory environment that monitored illegal connections, and achieved an increase in service, in billing collections, and revenues. Unfortunately, by the end of the project, the institutional capacity, the regulatory change, the financing, and the commitment to complete the investment in other sub-zones and across the Dili water supply system were not in place. By project close, some of the project outputs and outcomes were already in decline, and this has continued, as noted by the PCR team. The potential development impact will not be achieved, as there was a negligible change in NRW losses across the system. The impact on the benefits to women was not measured, though it is expected to be limited given the project outcomes. The development impact is rated *unsatisfactory*.

63. For the project approach to work there needed to be a phased and planned investment in the other sub-zones within a zone, as a limited number of consumers receiving a high-quality service caused local social and political issues. As a result, the water valves from the tertiary network were opened to provide a better water service to surrounding areas, which reduced service in the target area, and caused the loss of many of the initial project benefits. This issue combined with the lack of institutional reform, the poor utility service provision, limited operations and maintenance, and lack of ongoing monitoring of performance resulted in high non-revenue losses, and declining consumer payment and revenues.

F. Performance of the Borrower and the Executing Agency

64. The performance of the borrower is rated *less than satisfactory*. The DNSA, the implementing agency, was an active counterpart for ADB during the project, and financial management systems were established in the MPW, the executing agency. During implementation, the capacity of DNSA staff to support the project was at times limited due to staff numbers. The limited support created issues that affected project implementation, including

having only one leak detection team (not 3), undertaking procurement (MPW), and providing required counterpart funding (especially for O&M). The MPW, as the executing agency, provided strategic project support, though it was unable to implement the planned reforms, as demonstrated by the non-compliance with the covenants, or fully meet the staff resources requirements. On this basis, the executing agency's performance was *less than satisfactory*.

65. The government did not comply with six key covenant commitments (para. 44), which would have provided the basis for a sustainable project outcome. These covenants covered: (i) reforming the DNSA structure and developing an independent water entity, (ii) commitment to fund the rehabilitation of the tertiary water networks in the other sub-zones in the target areas, (iii) the provision and release of O&M funding to maintain the systems, and (iv) implementing and maintaining a project performance monitoring and benchmarking system. These actions would have provided an institutional structure, financial and operating systems, and monitoring to enable performance assessment. In addition, the borrower partially complied with three covenants (para. 41).

66. The project monitoring and performance system was designed but not implemented, as the PIC contract finished in 2011, and the small PMU staff indicated they did not have the capacity for this task. Project reporting was not undertaken on a regular basis once the consultants (PIC) finished. The government did submit a brief PCR outline with output achievements.

G. Performance of the Asian Development Bank

67. ADB's performance is rated *satisfactory*. ADB, in consultation with the government and other stakeholders, prepared the project in 2007, when Timor-Leste was recovering from a long period of conflict and internal disruption. The government institutions, particularly those responsible for water resources, had limited capacity. ADB supported the government's priority to improve household access to water. The project was designed quickly to meet that immediate need and, as such, ADB designed a project that it considered could be implemented in a 29-month period. This was found to be unrealistic once the project was effective, and there was a better understanding of the institutional and operating environment, the capacities of the executing and implementing agencies, the human resources available to support the project, the limited understanding of ADB procedures, and the adequacy of financial resources.

68. During implementation, ADB demonstrated strong commitment and flexibility in responding to an ongoing set of project issues in procurement, consultant recruitment, cost overruns, changes to project focus on the additional civil works, and having to make a series of cost re-allocations to cover equipment, vehicles, and operating costs to enable the leak detection teams to operate. This demonstrated ADB's commitment to adjust to the environment in undertaking what was effectively a pilot project to improve the water supply systems. ADB undertook regular review missions to provide support to the project. The slow implementation necessitated six extensions of the closing date, and these were accommodated, though with hindsight there may have been the opportunity to have extended the project for longer periods and reduced the number of extensions.

69. During implementation, the ADB project officer was transferred to the resident mission, which facilitated project administration and provided a strong presence with the government to administer project activities. The challenge for ADB was the government's lack of response to core actions covered in the covenants. ADB was not successful in getting the government to commit to policy reform, though it engaged in an ongoing dialogue with the government and development partners.

H. Overall Assessment

70. The overall project is rated *less than successful*. While the project sector loan modality was appropriate and responsive, the project design did not reflect the institutional capacity and operating environment and was overoptimistic in what could be achieved in outputs, outcomes, and impact with a pilot project. The government's commitment to institutional reform and provision of further investment for the water supply system, and for the operating costs of the system did not eventuate, as indicated by the non-compliance with covenants. The performance of the borrower, as well as the executing agency are rated *less than satisfactory*, while ADB's performance in project implementation and administration is rated *satisfactory*. The project achieved a number of the DMF indicators (Appendix 1).

Overall Ratings

Criteria	Rating
Relevance	Less than relevant
Effectiveness	Less than effective
Efficiency	Less than efficient
Sustainability	Unlikely sustainable
Overall Assessment	Less than successful
Development impact	Unsatisfactory
Borrower and executing agency	Less than satisfactory
Performance of ADB	Satisfactory

ADB = Asian Development Bank.

Source: Asian Development Bank.

IV. ISSUES, LESSONS, AND RECOMMENDATIONS

A. Issues and Lessons

71. The lessons learned from ADB's and the government's engagement in the project include:

- (i) In a fragile and recent post-conflict country such as Timor-Leste in 2007, when preparing an urban water supply project, a thorough assessment is required of government and institutional capacity to support proposed reform actions, provide counterpart staff and budget, and implement tariffs and sustainable financial systems that will involve significant changes in customer behavior. Such an assessment would provide a baseline when designing the proposed project, with risk analysis and a phased incremental approach adopted with building blocks based on achievement of critical actions.
- (ii) Given the limited capacity and budget resources available, a flexible approach may need to be adopted to financing operating costs and O&M contracts and the provision of skilled national expertise as part of an initial capacity development and service delivery plan. In a fragile environment, it is important that ADB is committed to a long-term sector engagement, based on the partnership with government achieving critical performance and reform milestones, so there will be a basis for a long-term sustainability plan.
- (iii) A clearly defined partnership agreement on the human and financial resources is required, as well as on the timeline for critical actions, and remedial measures to be implemented should these not occur. Given the importance of the sector to human development, livelihoods, and poverty reduction, it is important that ADB stays engaged. Further, if the government's policy actions are slow, it is recommended that a slower reform road map be detailed, with a lower investment plan, until the environment exists to continue implementing the required actions.
- (iv) The project design overestimated the capacity of the government to guide policy development, given that its capacity to implement infrastructure projects was overburdened and that it lacked the required expertise for design and project administration and supervision. To ensure efficient and effective project implementation

- in the future, a reform process to establish the right institutional structures and build capacity within the government should be considered.
- (v) Coordination and phasing of all critical linked project activities is required to achieve the project benefits. Similarly, when having a linked capacity development TA, the TA needs to be undertaken concurrently to be effective and ensure an efficient use of resources.
 - (vi) It is important to set feasible implementation schedules that reflect the actual capacity of the project's executing and implementing agencies. When undertaking revisions and extensions in project closing dates, it is essential to be realistic about the project implementation capacity, so a series of short extensions are avoided.
 - (vii) In urban water supply projects that have a significant impact on women, it is essential that the role of women and the potential benefits for them are integrated into the project design through a gender action plan and in the DMF target indicators. Women should be considered as customers, users, and as participants in project activities (as staff and as contractors).

B. Recommendations

72. **Future monitoring.** The project did not comply with agreed covenants and failed to undertake planned performance, benchmark, and impact monitoring. It is important that there is a baseline to assess progress for future projects. Given ADB has other water supply projects in Timor-Leste, it is recommended that these projects' monitoring and evaluation systems use the information on the key indicators from the Dili water supply system. Such performance indicators would provide an additional measure when undertaking feasibility studies for future investment. Financial and tariff indicators will also be required to monitor financial sustainability.

73. **Further action or follow-up.** Given the uneven progress achieved to date in implementing urban water sector reforms in Timor-Leste, and ADB's ongoing investments, it is important that a clearly defined road map for the sector is agreed including time-based deliverables, which if not achieved would result in a reduced level of ADB investment. On the basis that there is a strong partnership with the government, and that the water sector remains a government priority, it is recommended that ADB continues its engagement in this critical sector.

74. ADB has recently assisted the government in preparing a Dili Metropolitan Area Water Supply Master Plan, 2016–2030 under Technical Assistance for Urban Services Improvement Sector Project (December 2017).¹² The plan is part of an ongoing dialogue with the government on policy and institutional reforms. This engagement is important, as ADB has expertise and experience in supporting governments across the region and in implementing successful urban water supply institutional and policy reforms and related investment. Based on an agreed road map, there is the opportunity to assist the government in developing a sustainable water system for the residents of Dili.

75. **Timing of the project performance evaluation report.** It is recommended that ADB carries out the evaluation report in late 2020 as by then, it could be expected that the government has had sufficient time to implement its water sector policy and institutional reform and develop a sector road map for the next 10–15 years, having clear milestones for the operation of sustainable and efficient water utilities.

¹² Government of Timor-Leste. 2017. *Dili Metropolitan Area Water Supply Master Plan, 2016–2030*. Dili; and ADB. 2014. *Technical Assistance to the Democratic Republic of Timor-Leste for Urban Services Improvement Sector Project*. Manila (TA 8750-TIM, approved 7 November 2014).

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Indicators and Targets	Project Achievements
<p>Impact Improved water supply services for households, businesses and institutions in Dili City.</p>	<p>Percentage of Dili population receiving 24-hour supply increased from 25% in 2007 to 80% by 2015.</p> <p>Customer satisfaction with Dili piped water supply 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>Not Achieved. A limited number of the population received 24 hour supply, across all zones average supply is 4-8 hours per day.</p> <p>Partially achieved. Household survey (2016) indicated that response to customer complaints is a cause of dissatisfaction. The customer complaints system was improved, though remained non- computer based, with paper registration of complaints and often long settlement times (up to 3 months). Given the limited resources available for repair and maintenance, and the customer awareness of this, the number of complaints has declined, but this is influenced by the poor expected response, rather than improved satisfaction levels.</p> <p>The households surveys undertaken do not provide gender disaggregated data on benefits. Qualitative evidence indicates that there are significant benefits from improved water services.</p>
<p>Outcome Improved hydraulic management of the Dili Water Supply System and more efficient tertiary distribution.</p>	<p>NRW ratio got Dili City water supply reduced from 95% to 40%-50% by month 29.</p> <p>NRW ratio for 3 target zones reduced from 95% to 25-30% by month 29.</p> <p>Percentage of population in 3 target zones receiving 24 hour supply increased from 40% in 2006 to 80% in 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.</p>	<p>Not achieved. Estimated in 2016 average NRW 90%.</p> <p>Not achieved. NRW's ranged from 70 to 95% (in 2015) in the 4 sub-zones. In zone 1 (sub-zone 4) 95%, zone 2 (sub-zone 1) 90%, zone 4 (sub-zone 2) 95% and zone 5 (sub-zone 3) 70%, and in zone 10 81%.</p> <p>Partially achieved. Population in sub-zones had increased water access, and increased hours of water after completion of works, but it was not maintained as the sub-zone isolation valves were opened to provide access to users in outside sub-zones, pressure decreased and service delivery and access reduced. This combined with inadequate maintenance (and leak management) led to reduced customer service, reduced payment of tariff, and as water sources in target zones are often groundwater based, a reduction in pumping hours to less than 24 hours. The 80% target was not achieved.</p> <p>Not achieved. During project implementation, one leak detection team worked, as the project provided operating budget, transport and equipment. No leak detection workplans, or contracts let for ongoing detection work in future target zones.</p>

Design Summary	Performance Indicators and Targets	Project Achievements
<p>Outputs</p> <p>1. Water losses reduced and controlled in 3 target zones.</p>	<p>Water loss reduction and control program completed in three target zones by month 29, including:</p> <p>(i) including six subzones in the three target zones metered and controlled by valves;</p> <p>(ii) 51 km of tertiary pipes and service connections surveyed for leaks, repaired or replaced;</p> <p>(iii) 2,950 meters of registered connections replaced or installed;</p> <p>(iv) 5,100 unauthorized connections regularized or disconnected; and</p> <p>(v) metering of all registered customers in target zones increased from 30% (September 2007) to 70%-80% by month 29.</p>	<p>Partially achieved late. Work undertaken in 5 target zones (zone 1, 2, 4, 5, and 10)</p> <p>(i) Achieved covering 4 sub-zones in Zones 1, 2, 4 and 5, and all of Zone 10.</p> <p>(ii) Achieved, with replacement of 16.4 km of pipeline.</p> <p>(iii) Partially Achieved, with 2,735 meters replaced in existing connections and installed (covering legal and illegal).</p> <p>(iv) Not Achieved. No data. Refer (iii).</p> <p>(v) Achieved. Registered customers metered.</p>
<p>2. Visible leaks reduced; practical improvements made, stop valves refurbished, replaced or installed to allow better management of the system; and commercial customers metered in all Dili water zones.</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 better management of water by month 29.</p> <p>Nine chlorine-dosing units refurbished or replaced by month 29.</p>	<p>Achieved late, and completed by 2013-2014.</p> <p>Partially achieved late. 7 bulk meters and chambers, and 111 valves and chambers installed. Did not reach 80-90% by month 29.</p> <p>Partially achieved late, with 1 km disconnected in sub-zone 1.</p> <p>Achieved late as per requirements. For the two new boreholes chlorine dosing units installed (in sub-zones 1 and 4). A number of the existing boreholes did not require replacement units, as dosing units had been installed by DNSA prior to the project.</p>
<p>3. Skills of DNSAS technical and O&M staff upgraded in leak detection; leak reduction, and subzone management. On-the-job training will be included under the project.</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 recruited, trained and operating effectively in target zones at maximum ratio of one</p>	<p>Not achieved. One leak detection team established. (4 members) recruited under associated TA 4869, and team members retained by DNSA (2018 currently 2 remain).</p> <p>Not achieved. Leak repair work focused on repair of visible leaks only. Initial absence of equipment/ vehicles delayed implementation, and team size limited work planning.</p> <p>Achieved late. Three caretakers recruited for the three sub-zones (the sub-zone 1 caretaker also covered sub-zone 2).</p>

Design Summary	Performance Indicators and Targets	Project Achievements
	caretaker per 1,000 customers by month 29. 80 trainees successfully completed 470 days of classroom instruction (supplemented by on-the-job training) by month 29.	Partially achieved late. Limited training records, leak detection team (classroom and on-the-job training), and benefit monitoring training.

Source: Asian Development Bank.

PROJECT COST AT APPRAISAL AND ACTUAL
(\$ millions)

Item	Appraisal Total Cost	Actual Total Cost
A. Components		
1. Water Loss Reduction in Target Zones	3.414	3.022
2. Leak Reduction & Commercial Metering in all Zones	1.567	1.387
3. Project Management, Contract Design and Supervision Services, and upgrading of DNSAS skills	1.759	3.006
Subtotal (A)	6.740	7.415
B. Contingencies		
1. Physical	0.525	
2. Price	0.236	
Subtotal (B)	0.760	
Total (A+B)	7.500	7.415

Source: Asian Development Bank estimates.

PROJECT COST BY FINANCIER

Table A3.1: Project Cost at Appraisal by Financier (\$ millions)

	ADB		Government		Total Cost ^a	
	Amount	% of Cost Category	Amount	% of Cost Category	Amount	Taxes and Duties
A. Investment Costs						
1. Works	1.731	63%	1.026	37%	2.757	
2. Equipment	1.925	88%	0.275	12%	2.200	
3. Environment Management Plans	0.024	100%		0%	0.024	
4. Consultants						
a. Project management and capacity development	1.036	100%		0%	1.036	
b. Contract project design and supervision	0.723	100%		0%	0.723	
Total Base Cost (A)	5.439	81%	1.301	19%	6.740	0.275
B. Unallocated	0.561	74%	0.199	26%	0.760	
Total Project Cost (A+B)	6.000	80%	1.500	20%	7.500	0.275

Notes:

- Numbers may not sum precisely because of rounding.
- The estimated cost of the audits of project financial statements should be identified by a footnote, i.e., At appraisal the estimated audit fees for the audit of the annual project financial statements for {2008–2011}, were not explicitly included as a project cost. It was indicated that the Government would have an international accountant to undertake the audit. With implementation a allocation was made from project contingencies for ADB to finance audit costs.

^a Local taxes and duties (at appraisal) of \$0.275 million were identified, though not allocated to cost categories.

Source: Asian Development Bank appraisal estimates and actual costs.

Table A3.2: Project Cost at Completion by Financier (\$ millions)

	ADB		Government		Total Cost ^a	
	Amount	% of Cost Category	Amount	% of Cost Category	Amount	Taxes and Duties
A. Investment Costs						
1. Works	0.894	62%	0.548	38%	1.442	0.029
2. Equipment	1.036	88%	0.141	12%	1.177	0.024
3. Civil Works	0.874	52%	0.806	48%	1.680	0.034
4. Works Leak Detection	0.029	100%		0%	0.029	
5. Vehicles	0.081	100%		0%	0.081	
6. Environment Management Plans		100%		0%		
7. Consultants	2.932	100%		0%	2.932	
a. Project management and capacity development		100%		0%		
b. Contract project design and supervision		100%		0%		
8. Training	0.034	100%		0%	0.034	
9. Financial Audit	0.031	100%		0%	0.031	
Project Management	0.009	100%		0%	0.009	
Total Project Cost	5.920	80%	1.495	20%	7.415	0.085

Notes:

1. Numbers may not sum precisely because of rounding.

2. Four reallocations of grant funds were undertaken during the project period. Up to 19 November 2013 there were separate cost categories for equipment and works each with a different ADB financing percentage, after that date the un-contracted balance in these two cost categories was reallocated to a new financing category (civil works) to cover both equipment and works with an ADB financing percentage of 52%.

3. The cost of the audit of the annual project financial statements for {2009–015} was financed from ADB grant resources.

^a Local taxes is based on tax of 2% on gross payments for construction services.

Sources: Asian Development Bank actual costs and Government financial data.

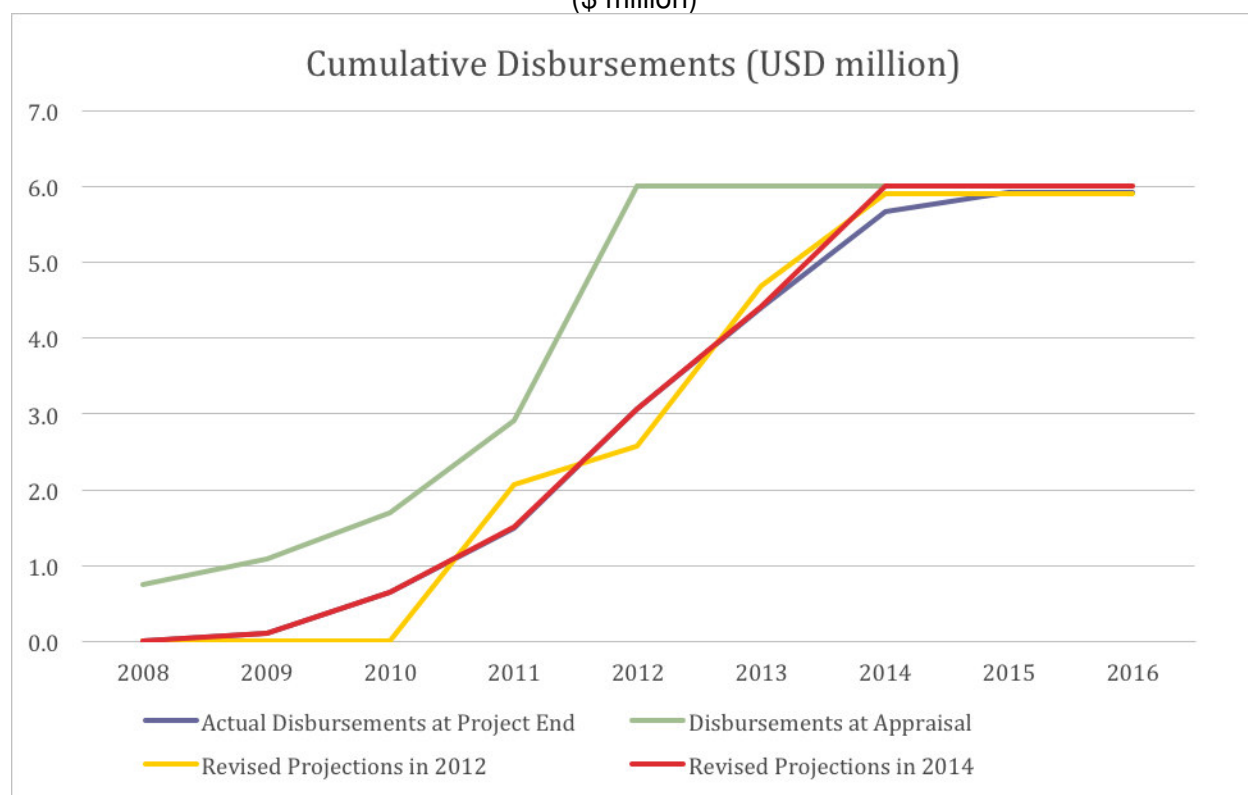
DISBURSEMENT OF ADB GRANT PROCEEDS

Table 4.1: Annual and Cumulative Disbursement of ADB Grant Proceeds
(\$ million)

Year	Annual Disbursement		Cumulative Disbursement	
	Amount (\$ million)	% of Total	Amount (\$ million)	% of Total
2008				
2009	0.112	2%	0.112	2%
2010	0.532	9%	0.644	11%
2011	0.856	14%	1.500	25%
2012	1.562	26%	3.062	52%
2013	1.344	23%	4.406	74%
2014	1.254	21%	5.660	96%
2015	0.253	4%	5.913	100%
2016	0.007	0%	5.920	100%
Total	5.920	100.0%	5.920	100%

ADB = Asian Development Bank.
Source: Asian Development Bank.

Figure 4.1: Projection and Cumulative Disbursement of ADB Grant Proceeds
(\$ million)



CONTRACT AWARDS OF ADB GRANT PROCEEDS

Table 5.1: Annual and Cumulative Contract Awards of ADB Grant Proceeds
(\$ million)

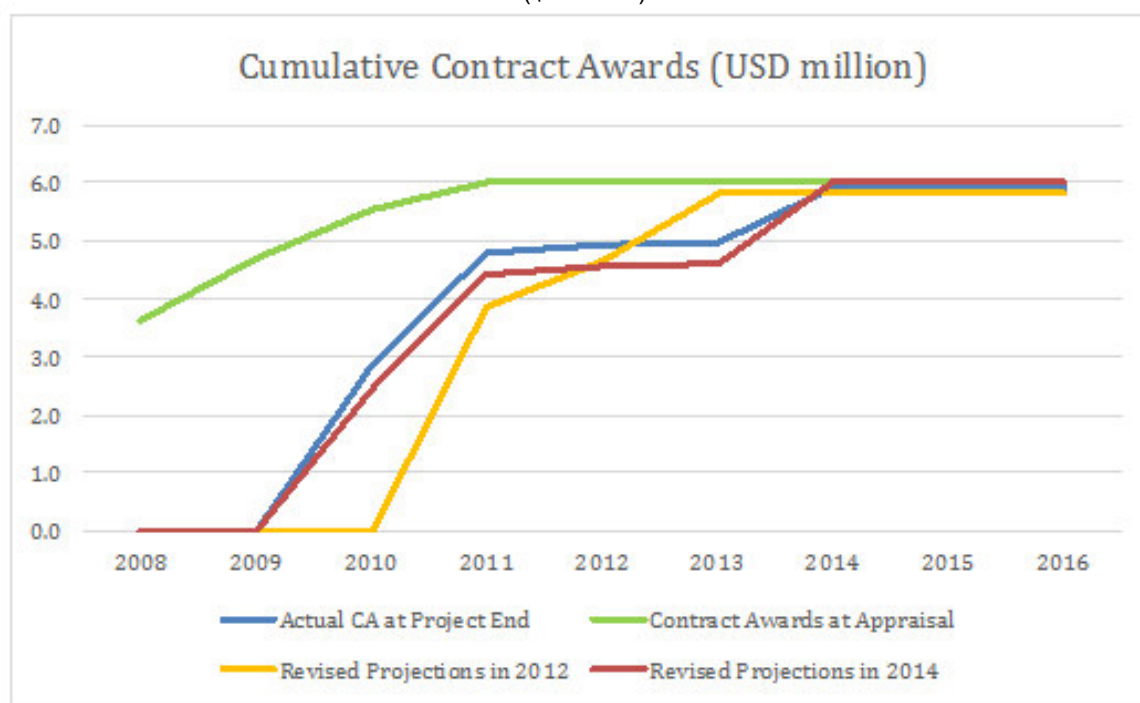
Year ^a	Annual Contract Awards		Cumulative Contract Awards	
	Amount (\$ million)	% of Total	Amount (\$ million)	% of Total
2008				
2009				
2010	2.881	49%	2.881	49%
2011	1.933	33%	4.814	81%
2012	0.136	2%	4.950	84%
2013	0.043	1%	4.993	84%
2014	0.927	16%	5.920	100%
2015				
2016				
Total	5.920	100%	5.920	100%

ADB = Asian Development Bank.

^a {Classified by contract signing dates.}

Source: Asian Development Bank.

Figure 5.1: Projection and Cumulative Contract Awards of ADB Grant Proceeds
(\$ million)



**PROCUREMENT PACKAGES FOR ADB FINANCING
ADB Grant 0100-TIM**

Cost Category No.	Description and Title of Packages	Procurement Method		Contract Signing		Supplier/ Contractor	Contract No.	Final Contract Price	Contr. Completion	
		Plan	Actual	Planned	Actual				Planned	Actual
A	Works and Equipments									
1	Supply and Installation for Rehabilitation works for Sub Zones 1,2 and 3	NCB (three contracts)	ICB (one)	Quarter 3, 2008– Quarter 1, 2009	28-09-11	Ensul Engenharia SA	1/DWSP-TIM/ADB 20011-1	2,538,505.67	31-10-12	16-07-13
2	Installation and exploratory Bore in Sub Zone 1, Kampung Alor Dili		S	Quarter 3, 2008	05-06-12	H ₂ O Pump and Power	00001-MOI-DWUSSP-VII-2010	61,904.00	Sep-10	01-09-10
3.	Supply and Installation for Rehabilitation works for Zone 1 (Sub Zone 4)	ICB (two to three contracts)	ICB	Quarter 3, 2008- Quarter 1, 2009	14-01-14	RMS Engineering and Construction Pty.ltd	ICB/014/MP W-2013	1,323,675		31-08-14
4.	Supply and Installation for Rehabilitation works for Zone 10	As above	ICB	As Above	14-01-14	RMS Engineering and Construction Pty.ltd	ICB/015/MP W-2013	356,226.24		31-08-14
B	Equipments									
2.1	4WD Vehicles		S		12-07-12	Mutiara Unipessoal Lda		80,900	Sept-12	Oct - 12
2.2	Leak Detection equipment		S		Jan-10	Gutermann Pty.ltd		14,664	Apr-10	Apr-10
C.	Training									
3.1	Management Trainings for MOI Staffs							33,972		Jun-13
D.	Consulting Services									
D1.	Project Management Consultancy									
1.	Project Implementation Unit	QCBS	QCBS	Quarter 1, 2008	02-03-09	SMEC International Pty.ltd		953,826	Sep-11	Sep-11
2	Deputy Team Leader		Individual		3-11-11	Amelio Quintas		30,230.53		Nov-12
3	Financial Management Specialist		Individual		3-11-11	Sanzinha de Jesus		22,035.25		Nov-12
D2.	Design and Supervision Consultancy									
1	Design and Supervision Consultant	QCBS	QCBS	Quarter 3, 2008	Jul - 10	Aurecon Australia Pty Ltd	00001-MOI-DWUSSP-VII-2010	1,981,063.83	Sep -12	Feb-15
2	Construction Supervision		Individual		May - 15	Pedro Morante		14.600		Jul-15
3	Finance and Administration Officer		Individual		May - 15	Patricio Maia		1,800		Jul-15

E.	Project Management									
5.1	Audit for FY 2009				May-10	Tjia Soh Siang & Associates		1,000		Jun - 10
5.2	Audit for FY2010				Apr -11	CC Business and Solutions		6,000		Jun-11
5.3	Audit for FY2011				May -12	Tjia Soh Siang & Associates		2,500		Jun-12
5.4	Audit for FY2012				May -13	Tjia Soh Siang & Associates		3,800		Jun-13
5.5	Audit for FY2013				May -14	CC Business and Solutions		6,500		Jun-14
5.6	Audit for FY2014 - 15				Sep-15	Mazars Vietnam, Co Ltd		12,086.80		Nov-15

STATUS OF COMPLIANCE WITH GRANT COVENANTS

Covenant	Reference in Grant Agreement	Status of Compliance
<u>Project Executing Agency</u> As the Project Executing Agency, MOI shall be responsible for the overall Project execution and management.	Schedule 4, para 1.	Complied.
<u>Project Implementing Agency</u> DNSAS shall be the Implementing Agency, responsible for the day-to day Project implementation.	Schedule 4, para 2.	Complied
<u>Project Team</u> The Recipient, through MOI, shall arrange the Project Team to be located in CSD and in DNSAS, and shall provide office accommodation for all members of the Project Team. The Project Team shall comprise: (i) two (2) water supply engineers (including the Project Team Leader); (ii) two (2) financial management specialists; and (iii) two (2) monitoring and evaluation specialists. Water supply engineers shall be responsible for undertaking planning, preparing bid documents and managing contracts and shall be located in DWSD. Monitoring and evaluation specialists shall be located in DPD. Financial management specialists shall be located in CSD. The procurement specialist engaged under the TA 4942 shall help Procurement Division of CSD and the Project Team undertake procurement under the Project. The Recipient shall ensure close cooperation between the Project Team and MOI/DNSAS staff, including provision of all necessary data and information to the Project Team in a timely manner.	Schedule 4, para 3.	Partially Complied. Office provided and project team worked with the related departments. Departments lacked counterpart staff, and at times there were no available departmental staff to work with the project team. Due to delays with the project procurement, TA 4942 closed prior to preparation of procurement documents. DNSA did not have all required and necessary data for the project team. Consultants needed to do primary data collection and field verification.
<u>Project Team Leader</u> The Project Team Leader shall be located within DWSD. The Project Team Leader shall be responsible for coordinating all Project inputs and shall oversight 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 financial records for auditing, and (vii) monitoring the Project's socioeconomic impacts. The Project Team Leader shall report to the Director of DNSAS and to the Director of CSD.	Schedule 4, para 4.	Partially Complied. The PIC contract closed in September 2011, prior to most of the procurement activities. The team leader and team were not able to contribute much to bidding processes, to contract management, implementation progress monitoring, and on the preparation of withdrawal applications. During the contract period it did prepare progress reports, and maintain project accounts, and did not undertake socio-economic impacts, or provide support to the project completion report.
<u>Counterpart Financing</u> The Recipient shall make available on a timely basis an amount equivalent to one million five hundred thousand Dollars (\$1,500,000) from its ordinary budgetary allocations as counterpart financing to ensure timely completion of the Project.	Schedule 4, para 5.	Complied. Counterpart funding provided, though as noted on review mission reports, there were delays, due to delayed implementation and budget allocations.

Covenant	Reference in Grant Agreement	Status of Compliance
<p><u>Construction Quality</u> The Recipient, through the Project Team, shall ensure that all Project water supply facilities are rehabilitated and improved in accordance with the design technical specifications, and that construction supervision, quality control, and contract management are carried out in accordance with internationally accepted standards.</p>	Schedule 4, para 6.	Complied, the design and supervision consultants ensured that contract management and quality of work met required internationally accepted standards. In the final stages of the project, the completion of works was under the supervision of an independent consultant.
<p><u>Environment</u> The Recipient, through DNSAS, shall ensure that for every Subproject: (a) an IEE, EIA, as necessary, and EMMP are prepared in accordance with the EARP, consistent with (i) ADB's <i>Environment Policy</i> (2002), and (ii) applicable environmental laws, regulations, and guidelines of the Recipient, as and when such laws, regulations, and guidelines are adopted and become effective; and (b) the EMMP in the IEE is part of the bidding documents and Works contracts; (c) any adverse environmental impacts arising from the Project are to be minimized by implementing the agreed mitigation measures; and (d) the environmental monitoring is done properly by the construction supervision team. Prior to signing of 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.</p>	Schedule 4, para 7.	Complied
<p><u>Subproject Preparation, Selection and Approval</u> The Recipient shall ensure that all Subprojects are prepared, selected and submitted for approval by ADB in accordance with the eligibility criteria and procedures agreed between the Recipient and ADB, in particular, each Subproject shall meet the following criteria: (i) Subproject is consistent with the SIP and is identified by DNSAS as a high priority; (ii) Subproject is technically feasible and meets the Recipient's technical standards and requirements; (iii) Subproject is justified as the most feasible subproject to achieve the stated objectives and is shown to be designed to minimize costs; (iv) Subproject does not have land acquisition or resettlement impacts. In the event land acquisition or resettlement is unavoidable, the Recipient shall (a) prepare a resettlement plan in accordance with ADB's <i>Involuntary Resettlement Policy</i> (1995) and the LARF; and (b) submit the resettlement plan to ADB for approval; (v) ADB determines that DNSAS has necessary staff, implementation and financial management capacity to implement the Subproject, or that DNSAS can provide specific assurances that assessed short comings can be rectified by adding qualified staff, or by providing timely in-service training for existing staff; (vi) Subproject's implementation timeframe is reasonable, and surveys and design can be prepared, reviewed, safeguard procedures and other procedures followed with implementation able to be completed within the Project period; (vii) the financing plan for the Subproject clearly identifies confirmed sources of financing, including counterpart</p>	Schedule 4, para 8.	Complied. (i) to (vii b) Complied (vii c) operational costs for O&M funding provided for this purpose was inadequate and the infrastructure declined. This may be due to the process required to access funds, and the level of funding. (viii) –(ix) Complied.

Covenant	Reference in Grant Agreement	Status of Compliance
<p>financing, and includes the provision of budgetary resources to meet: (a) counterpart funding requirements for capital expenditure during the implementation phase, (b) environmental management costs, and (c) routine operations costs;</p> <p>(viii) Subproject does not have an adverse impact on DNSAS' ability to meet financial and other covenants of this Grant Agreement; and</p> <p>(ix) all required approvals of the Recipient are obtained.</p> <p>In addition to the above, each Subproject shall meet the following environmental criteria:</p> <p>(i) Subproject is not located in nature reserves;</p> <p>(ii) Subproject does not involve any significant loss of primary forest, mangroves or sensitive wetland;</p> <p>(iii) Subproject does not involve any permanent negative effect on known rare or endangered species;</p> <p>(iv) Subproject does not involve significant impacts on air quality and water quality;</p> <p>(v) Subproject does not involve any permanent damage to irreplaceable cultural relics and archaeological sites; and</p> <p>(vi) Subproject does not require a preparation of the full EIA.</p>		(i) –(vi) Complied
<p>DPD shall identify and select proposed subprojects in accordance with the eligibility criteria agreed between ADB and the Recipient and obtain DNSAS's approval to assess the feasibility of the proposed Subprojects. DNSAS shall prepare an SPAR for each proposed Subproject. SPAR shall include: (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 a (vii) resettlement plan, if required.</p>	Schedule 4, para 9.	Complied. Sub-project SPARS prepared for the sub-zones. For the additional sub-projects, while a selection was undertaken of sub-projects, project funding was limited. For this reason an individual consultant was recruited (under the design supervision consultancy) to prepare the feasibility assessment for proposed work in zones 1 and 10, which was considered financially feasible.
<p>The Recipient shall ensure that DNSAS submits a sub-project appraisal report (SPAR) for each proposed subproject to ADB and obtains ADB's approval on a no-objection basis before proceeding with detailed engineering design and construction of the Subproject. Each SPAR shall be submitted to ADB for review and approval on a no-objection basis and shall contain sufficient evidence of the proposed Subproject's eligibility under the criteria agreed between the Recipient and ADB, and shall be prepared in accordance with the detail and quality required to enable ADB to assess the viability and suitability of the Subproject. After ADB's endorsement of the SPAR, DNSAS shall submit the SPAR to the Secretary of State of MOI for review and approval.</p>	Schedule 4, para 10.	Complied. SPARS prepared for the sub-zones, and feasibility assessments for the latter zonal work.
<p><u>Subproject Works</u></p> <p>The Recipient shall ensure that (a) all Works under the Subprojects are undertaken within existing water supply facility sites, easements, and public rights-of-way; (b) no land acquisition or resettlement is required for any proposed Subproject and Subprojects are screened in view of potential resettlement impacts in line with the LARF. If</p>	Schedule 4, para 11.	Complied.

Covenant	Reference in Grant Agreement	Status of Compliance
<p>land acquisition or involuntary resettlement becomes unavoidable, the Recipient shall (a) prepare a resettlement plan in accordance with ADB's <i>Involuntary Resettlement Policy</i> (1995) and the LARF; (b) submit such resettlement plan to ADB for approval prior to 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 Recipient shall ensure that the resettlement plan includes 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 Recipient shall 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.</p>		
<p><u>Retention of Project Staff</u> The Recipient shall cause MOI to retain as regular or contractual staff of DNSAS, or contract through a firm or non-government organization, all nine (9) members of the three (3) leak detection teams and all six (6) sub-zone caretakers (1 sub-zone caretaker for approximately every 1,000 connections throughout the Project area) recruited and trained under TA 4869, provided that those retained shall have performed their duties satisfactorily.</p>	Schedule 4, para 12.	Partially Complied. Only 1 leak detection team was formed (with 4 members). Currently, 2 remain as DNSA staff. Staff were trained by the PIC consultant. Project provided equipment, vehicles and operational budget. In total, 5 sub-zone caretakers (1 covered 2 sub-zones) were hired by DNSA, with selection done by local leaders for the role of liaison between community, contractor, consultant and DNSA. 3 caretakers recruited by DNSA.
<p><u>Operations and Maintenance Budget</u> The Recipient shall make timely budgetary allocations to DNSAS for costs related to the sub-zone operations and maintenance, estimated at seventeen thousand Dollars (\$17,000) per annum per sub-zone.</p>	Schedule 4, para 13.	Not complied. Investment has not been maintained, and O&M funding is not being made available.
<p><u>DNSAS Institutional Development</u> The Recipient shall approve, by 30 November 2009, a ministerial order setting out a roadmap for organizing DNSAS into an independent public entity, with appropriate management, technical, and financial autonomy.</p>	Schedule 4, para 14.	Not complied. In 2017, Government has undertaken an assessment on options for reform.
<p><u>DNSAS Revenue Performance</u> The Recipient shall ensure that, by 31 December 2009, DNSAS has reinstated its revenue improvement program, with a target to increase during fiscal year 2010 the number of billed customers by a minimum twenty percent (20%) and the amount of gross water supply revenue by thirty percent (30%). The Recipient shall ensure that the Dili Water Demand Management Task Force is mandated to carry on reducing non-revenue water in other water zones in the Project area.</p>	Schedule 4, para 15.	Not complied. No works completed by 2009, and when works were completed, revenue did increase initially, but as the sub-zones were not maintained, and valves opened to supply adjoining sub-zones, service declined and revenue fell. No revenue collection in 2006. The water demand management task force did not continue its work after the close of TA 4869, and did not extend into other water zones.

Covenant	Reference in Grant Agreement	Status of Compliance
<p><u>DNSAS Performance Benchmarking</u> The Recipient shall ensure that, by 30 November 2009, DNSAS has instituted a performance benchmarking program preferably in association with the IBNet.</p>	Schedule 4, para 16.	Not complied. The PIC consultant designed and initiated a performance benchmarking program, but when the PIC consultancy closed in September 2011, it was not implemented by DNSA.
<p><u>Public Consultation and Participation</u> The Recipient shall 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 design, preparation 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.</p>	Schedule 4, para 17.	Complied. Several consultations undertaken with communities during project preparation and construction phase. This included training and awareness raising on efficient water use, which was initially effective while the system was being maintained.
<p><u>Labor Standards</u> The Recipient shall ensure that all Works contracts incorporate provisions to ensure that contractors comply with the Recipient's applicable labor laws and regulations. In particular, all Works contractors engaged for Subprojects shall 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 Works under Subprojects.</p>	Schedule 4, para 18.	Complied.
<p><u>Anticorruption</u> The Recipient, through MOI and DNSAS, shall comply with ADB's <i>Anticorruption Policy</i> (1998, as amended to date). 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, the Recipient shall (a) include relevant provisions of ADB's <i>Anticorruption Policy</i> in all bidding documents for the Project; and (b) include provisions in contracts financed by ADB in connection with the Project specifying the right of ADB to audit and examine the records and accounts of MOI, DNSAS, all contractors, suppliers, consultants and other service providers as they relate to the Project.</p>	Schedule 4, para 19.	Complied.
<p><u>Project Performance Monitoring and Evaluation</u> The Recipient, through the Project Team, assisted by the international and national consultants engaged under the Project, shall monitor and evaluate Project impacts. The Recipient shall discuss and agree with ADB on the indicators and baseline data prepared by these consultants prior to the commencement of Works, and shall 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 shall</p>	Schedule 4, para 20.	Not complied. Impact assessment not undertaken. A socio-economic household survey was undertaken in the 3 sub-zones. A monitoring system was designed by the PIC consultants, for baseline data and monitoring indicators. The PIC consultancy closed prior to the civil works, and it was not implemented

Covenant	Reference in Grant Agreement	Status of Compliance
make full use of gender-disaggregated data and information.		by the PMU, DNSA. DNSA does collect water production data by zone, and water billed and tariff collections.
The Recipient, through MOI, shall establish a Project performance monitoring system (PPMS) to facilitate the reporting requirements. The PPMS shall assess progress and implementation of the Project, including compliance with EMMPs for Subprojects and compliance with covenants of this Grant Agreement. In conjunction with TA 4869, the PPMS shall assist DNSAS in monitoring its operational efficiency, and financial position and projections to enable performance benchmarking against other utilities.	Schedule 4, para 21.	Not Complied. DNSA did not monitor key indicators to enable performance assessment against other utilities. A monitoring system was designed by the PIC consultants but not implemented, after the closure of their contract (September 2011) by PMU, DNSA.
<p><u>Project Reviews</u></p> <p>The Project shall be reviewed every six (6) months. Each review shall cover all institutional, administrative, organizational, technical, environmental, social, economic, financial and other relevant aspects that may have an impact on the performance of the Project and its continuing viability. MOI shall undertake joint mid-term review with ADB approximately fourteen (14) months after the start of the Project implementation.</p>	Schedule 4, para 22.	Complied. The project was reviewed on a regular basis, given the slow implementation progress. No mid-term review was undertaken at 14 months as at stage only limited project activities were being implemented. Project administration was transferred to the resident mission in the latter stages of the project (when a relevant ADB staff was posted to the resident mission).
<p><u>Audit</u></p> <p>The Recipient shall (i) maintain or cause to be maintained, separate accounts for the Project; (ii) have such accounts and related financial statements audited annually, in accordance with appropriate auditing standards consistently applied, by independent auditors whose qualifications, experience and terms of reference are acceptable to ADB; (iii) furnish to ADB, as soon as available but in any event not later than six months after the end of each related fiscal year, certified copies of such audited accounts and financial statements and the report of the auditors relating thereof (including the auditors opinion on the use of the Grant proceeds and compliance with the financial covenants of this Grant Agreement as well as on the use of the procedures for imprest account), all in the English language; and (iv) furnish to ADB such other information concerning such accounts and financial statements and the audit thereof as ADB shall from time to time reasonably request.</p>	Article IV Section 4.02	Complied. All 7 audited project financial statements (2009-2015) submitted (2 were submitted 6 months after the end of the fiscal year, but were late by less than 1 month) and all complied and were reviewed by ADB. All bar one (for 2009) had an unqualified opinion.

Economic Reevaluation

A. Introduction

1. The economic reevaluation was undertaken, in accordance with ADB's Guidelines. It is based on a reevaluation of the representative sub-zone projects identified in the Report and Recommendation of the President to the Board of Directors for Grant 0100. Under Grant 0100 the three sub-zone projects in Zones 2, 4 and 5 of the Dili urban water supply system were identified, and the sub-zone project appraisal report was prepared during project preparation.

2. The economic analysis, based on the economic internal rates of return (EIRR) was reevaluated, on the basis of the non-incremental and incremental projects costs and benefits using the actual costs incurred with the sub-zone project during implementation.

B. Methodology

3. The economic internal rates of return (EIRR) estimated at project preparation for the three sub-zone projects, was 20.2% indicating that they were economically viable and above the opportunity cost of capital, which was estimated at 12%.

4. The economic benefits at project preparation covered the incremental and non-incremental water, and time-savings. In estimating the benefits it was assumed that there would be: an increase in household connections and a shift from non-piped water sources, improved water treatment and quality, improved system pressure and a 24 hour water supply, and a reduction in disease risk.

5. The investment would result in a reduction in water losses from 70% to 25% in the target sub-zone areas, and this reduction would result in savings in pumping electricity costs for both groundwater sources and water treatment plant operations (ie. chemical costs). The health benefits and improved productivity from improved access, better water quality and associated lower disease and health issues while identified as a benefit were not quantified. At project completion these benefits while identified remain non-quantified.

6. Economic benefits from the cost savings on non-incremental supply (to connected and unconnected user households) are estimated based on the resource cost savings. The incremental benefits of increased volume of sales are estimated and based on the incremental demand and willingness to pay.

7. In determining the economic costs and benefits, the standard methodology for calculating EIRRs and economic net present values (ENPVs) of the sub-projects was used consistent with the ADB guidelines for economic analysis of investment projects. Financial prices are converted to economic values which involves the removal of taxes and other transfer charges, and the application of standard wage rate factors for skilled and unskilled labor of 1 and 0.75 respectively, to establish economic prices. The economic opportunity cost of capital used is the same as at appraisal of 12 percent.

8. In calculating the economic internal rates of return (EIRRs) the following assumptions are used:

- Project economic projection is analyzed over a period of 20 years post completion of works.

- Capital investment costs are the actual sub-zone project capital investment cost spread over the construction contract period, and with taxes and other charges removed from this cost.
- O&M costs have been estimated, given the lack of actual project data. A low rate of 1% of capital cost has been used for this estimate, this would not be adequate for long-term sustainability to provide a quality service. The meters are replaced every 5 years from 2018.
- For economic prices of non-incremental and incremental water, the resource cost savings and average incremental economic cost of the water were estimated. The economic non-incremental water price is based on time and cost savings, which included water collection cost, storage costs of water, tanker costs of water and bottled water use. The economic incremental water price is based on the household willingness to pay per m³ of water (previous estimate from 2007 project preparation with data updated for domestic inflation). Details are provided for the sub-zone project.
- A domestic price numeriere is the basis used for the economic analysis.

9. At project approval the economic analysis, EIRR and ENPV sub-zone projections were based on the project preparation study report. The PCR reevaluation has used a similar methodology to that at project preparation, and where variations in assumptions were required these are detailed.

10. In estimating the sub-zone economic costs and benefits, as outlined above the sub-project economic costs are the actual capital investment and O&M costs are estimates as no data is available. For the economic benefits with the sub-zone non-incremental and incremental water volumes, these are estimated based on the number of incremental households and the incremental benefits to existing households. Given the poor system operation and performance and the very limited project monitoring and performance data, estimates had to be made on the incremental service to new household connections these are estimated at 50 percent of household water requirements and for the existing households that the incremental benefits are 25 percent of the household water requirements. The benefits are estimated using the respective economic prices for incremental and non-incremental water as outlined above.

B. Economic Reevaluation

11. The sub-zone EIRR and ENPV were recalculated at project completion. At project completion a number of the key expected economic benefits had not been achieved. While there have been more households connected to the system in the sub-zones it is less than planned at approval, and the project investments did not provide full coverage to all households in the sub-zones. Also, there is no reduction in NRW losses, or in energy and chemical use that were to generate savings. The water supply service hours were generally significantly less than 24 hour, and variable across the sub-zones. The water quality is poor given the leakage from pipes and infusion, and the bore well water is untreated. The sub-zone water pressures are generally low as the operating valves were opened to surrounding sub-zones, and the system is not being maintained, with an increase in consumers receiving poor service.

12. The above factors provide the background, on why the sub-zone project EIRR and ENPV when recalculated at project completion have lower economic benefits, with an EIRR of 10%, and an ENPV of \$256,950, refer Table 2. The comparison of the appraisal and completion EIRRs is provided in Table 1. The opportunity cost of capital used at project approval was 12%,

and on this basis the sub-zone project with an EIRR of 10% is not economically viable. Given the non-viability, sensitivity analysis was not undertaken.

Table 1: Sub-zone project EIRR

Sub-zones	Approval EIRR %	Completion EIRR %
Sub-zones 1,2,3	20.2	10.0

Table 2: Sub-Zone Economic Analysis

Year (\$ '000)	Capital	Operating Cost	Benefits	Net Benefit
2012	993.0	38.3		-1031
2013	1489.5	38.3	316.1	-1212
2014		38.3	316.1	277.9
2015		38.3	316.1	277.9
2016		38.3	316.1	277.9
2017		38.3	316.1	277.9
2018		67.9	316.1	248.2
2019		38.3	316.1	277.9
2020		38.3	316.1	277.9
2021		38.3	316.1	277.9
2022		38.3	316.1	277.9
2023		67.9	316.1	248.2
2024		38.3	316.1	277.9
2025		38.3	316.1	277.9
2026		38.3	316.1	277.9
2027		38.3	316.1	277.9
2028		38.3	316.1	277.9
2029		67.9	316.1	248.2
2030		38.3	316.1	277.9
2031		38.3	316.1	277.9
2032		38.3	316.1	277.9
2033		38.3	316.1	277.9
	OCC	12.00%		
	ENPV('000s)	(\$256.95)	EIRR	10%

Financial Reevaluation

A. Introduction

1. The financial reevaluation was undertaken, in accordance with ADB's Guidelines. It is based on a reevaluation of the representative sub-zone projects identified in the Report and Recommendation of the President to the Board of Directors for Grant 0100. Under Grant 0100 the three sub-zone projects in Zones 2, 4 and 5 of the Dili urban water supply system were identified, and the sub-zone project appraisal report was prepared during project preparation.

2. At project approval, the financial analysis projections were based on pre-feasibility appraisal report, and the analysis used discounted cash flow analysis, financial internal rates of return (FIRR) and sensitivity analysis based on calculations with a constant price base. The PCR financial reevaluation has used a similar methodology, and where variations in assumptions were required these are detailed.

B. Key Assumptions At Project Approval

3. As detailed at approval, the sub-zone project investments were designed to rehabilitate the sub-zones with improvements in infrastructure (piping, valves, connections and meters) to increase water access, quantity, quality and service hours. It was assumed that all customers in the sub-zone would be metered and billed. The system would be maintained with regular O&M systems, NRW losses would be reduced from 75% to 25%, and customers would be billed and the collection rates would progressively rise over four years (after completion of civil works) from 50% to 90%.

4. It was assumed that the existing 2004 approved tariffs would be maintained for all classifications during the project. These tariff rates are detailed in Table 1. The tariff and billing system was suspended in 2006 during a period of conflict.

Table 1: Dili Water Supply Tariff (unchanged from 2004 to 2018)

Monthly Tariff \$/ m3	Consumption Band/ m3 per month	Dili \$/m3
Domestic (piped)	0-14.0	0.20
	>14.0	0.40
Public taps		0.10
Social (school, hospital, church)		0.15
Commercial/ industrial		0.60

5. The financial benefits expected to result from this investment were estimated as: (i) the incremental revenue from the increase in customers, and in billing and higher collection rates; and (ii) the savings in costs from the reduction in water losses NRW from 75 to 25 percent, which would reduce electricity use and chemical use for the treatment of water. Incremental financial costs would be incurred from the O&M, meter reading and billing.

6. Based on the above improvements being implemented, the combined financial analysis of the three sub-zone projects was estimated and had a FIRR of 2.5%. The WACC was estimated at 1%, which indicated the sub-projects would be financially viable.

7. At approval, it was estimated that in 2007 the DNSA Dili water supply billing revenue would be approximately \$50,000. It was noted that the service was declining. Further, that the 3 sub-zone projects would represent about 13% of the population, and potentially 25% of the revenue.

8. After project completion it was estimated that the total revenue from the three sub-zones (4 years after completion when collection rates are 90% would be \$144,900. For sub-zone 1 (Zone 2) \$55,300; sub-zone 2 (Zone 4) \$43,300; and sub-zone 3 (Zone 5) \$46,300.

C. Financial Reevaluation.

9. This is undertaken on the three sub-zones. The sub-zone projects that was analyzed at project preparation, for some when the detailed design was completed there were adjustments in costs and the planned scope of activities, including a change in the number of meters to be installed.

10. **Capital Investment.** It was planned as 3 separate contracts, this was not successful, and one ICB contract was tendered and awarded. In this contract it was not possible to disaggregate the data by sub-zone.

11. **Change in sub-zone meter coverage.** The design and supervision consultants report (2015) states that during the design phase for these sub-zones the DNSA decided that only houses which had existing connections, either legal or illegal, would receive new connections, which included an entirely new connection, including a meter. No new connections would be made to any houses without existing connections.

12. This change meant that there would not be total coverage of all households in each sub-zone, a change from the assumption made in the original preparation estimate. In Table 2 the existing number of households and those connection with meters and without meters are detailed, using the project 2007 data, and the PIC survey (2011) there are some differences and changes, and based on this data the number of households, commercial and public entities who would be directly benefiting from the project investment are detailed.

13. **Data Availability.** Project data is limited as the planned project performance monitoring and benchmarking systems were not implemented. They were designed but not operationalized as the PIC consultants contract finished before civil works started. This has made sourcing of data for the re-evaluation difficult, and as will be noted it is reliant on using a range of sources: DNSA water production, water sales, and revenue; the PIC (2011) and design and supervision consultants (2015) completion reports, TA 8750 survey data as presented in the Dili Urban Metropolitan Area Water Supply Master Plan 2016-2030 (ADB, December 2017).

14. **NRW Losses.** The DNSA data for the Dili water system indicates that NRW losses in 2015 remained at 90 percent, and using the JICA 2015 data at a zonal level the water losses in zones 1, 4 and 5 are respectively 90, 95 and 70% respectively. NRW data at the sub-zonal level is not available.

Table 2: Sub-Zone Households, Household Connections and Meters

	Sub-zone 1 Zone 2	Sub-zone 2 Zone 4	Sub-zone 3 Zone 5	Total Number
Project (2007 estimates)				
Households				
-not connected	549	751	480	1780
-connected	366	312	320	998
Total	915	1063	800	2778
PIC Survey (2011)				
Households				
-not connected	465	276	270	1011
-connected	241	834	139	1214
Total	706	1110	409	2225
Proposed Meters No. at project preparation				
-new HHs	900	900	800	2600
-existing HHs	300	400	300	1000
Project Actual HH connection Installed	349	920	291	1560

Note: At design phase DNSA decided only houses with existing connections either legal or illegal would received new connections. No new connections would be made to any houses without existing connections. Given the PIC survey (2011) numbers there were some new connections.

15. In calculating the financial internal rates of return (FIRRs) the following assumptions are used:

- Project financial projection is analyzed over a period of 20 years post completion of the works.
- Capital investment costs are detailed, with actual investment of \$2.538 million expended over 2012 and 2013. Work was completed in 2013 under 1 contract.
- O&M costs are the incremental costs incurred with the investment. As the system is currently not being maintained, with only urgent repairs being considered, the incremental O&M cost, is based on a low 0.6% of capital cost (for a basic service) and a caretaker.
- As the NRW losses have not been reduced (as planned at approval) there are not savings in water production, pumping or chemical costs. The groundwater is not treated.
- Sub-zone revenue, it is assumed that the connected households in each sub-zone will be billed.
- The 2015 and 2017 DNSA tariff collection data for each of the sub-zones is used to provide the actual revenue data in those years. For post 2017 data, and years it is assumed that DNSA will maintain the system at current levels, and that the revenue will remain at 2017 levels. There is a risk if the DNSA allow the system to decline that revenues will also continue to decrease. For the initial years off 2013 and 2014 it is assumed that the initial revenue declined 10 percent a year from 2013 to 2015. For 2016 it is the average of the revenue from 2015 and 2017.

- The expected billing and collection rates (at approval have not occurred). In the immediate period after the civil works were completed, there was improved provision of services and collection rates increased. As service, maintenance and performance declined, the collection rates declined to the current low levels.
- Tariffs. As noted above there is no change in tariff.

16. **Incremental Water.** The actual incremental water use by legally connected households and businesses were significantly lower than the appraisal estimates. The challenge that arose given the target sub-zone values were opened to improve access to other sub-zones that the target sub-zone water access declined. Given the lack of regulatory control the number of illegal households is likely to have risen. On this basis the project did assist in increasing water supply, and this increase did improve access at various levels for a period for both legal and illegal customers, and increased NRW.

17. **Number of Households.** The data as per Table 2 indicates that the number of connected households in each sub-zone is less than originally planned and does not cover all households. As a result the potential revenue base is lower, and given the significantly lower collection rates revenue it is about 20% of the projected level anticipated.

18. **Hours of Water.** The expectation at approval was that the sub-zone customers would have 24 hours of uninterrupted supply. Only small areas and a small percentage of customers have achieved this outcome. In the sub-zones given the lack of project data, the ADB TA-8750 (water supply continuity survey, 2015) data is used to provide an indicative outline of the hours of service in each of the sub-zones:

- sub-zone 1 (Zone 2) small part receives 0 hours, rest receives 6-24 hours;
- sub-zone 2 (Zone 4) most of the sub-zone receives 0-6 hours, rest receives 6-24 hours;
- sub-zone 3 (Zone 5) large part receives 6-24 hours, the rest 0-6 hours.

19. Further indicative data from a number of studies (outlined in Dili Urban Metropolitan Area Water Supply Master Plan 2016-2030 (ADB, December 2017)) provide an estimate of the percentage of service connections supplied 24 hours (from 2006 to November 2015) indicated this ranged from 21 to 27%. A 2016 survey provided a higher percentage of 41%.

D. Weighted Average Cost of Capital

20. The average weighted average cost of capital (WACC) for the sub-zones is estimated at 2.2%. The details for the calculation are outlined in Table 2, with the funding allocation based on actual ADB financing 80% and Government 20%.

Table 3: Weighted Average Cost of Capital

Particulars (%)	Capital Cost	ADB Loan	Government Equity
Weighting (%)		80	20
Nominal Cost (%)		3.8	3.8
Tax Rate (%)		0	0
Tax Adjusted Nominal Cost (%)		3.8	3.8
Inflation Rate (%)		1.50	2.0
Real Cost (%)		2.3	1.8
Real WACC (%)	2.20	1.84	0.36

Note: Government Petroleum Fund (long term return to 2016) is 3.8%, which is used as the nominal cost for government equity (in the absence of a L-T bond rate) and the same nominal cost is used for ADB grant financing.

E. Financial Reevaluation

21. The sub-zone FIRR and financial net present values (FNPVs) were recalculated at project completion they were -18% and -\$2.230 million respectively. The FIRR at project completion indicates the sub-zone projects were not financially viable, as the FIRR was below the WACC. As outlined the lower FIRR reflect the significantly lower water revenue and the absence of any saving in electricity and chemical costs from a reduction in NRW, as NRW losses did not decrease. Given the negative FIRR below the WACC no sensitivity analysis was undertaken.

Table 4: Sub-zone FIRR

Sub-Zones	Appraisal FIRR %	Completion FIRR %
Sub-zones 1,2, and 3	2.5	-18