Completion Report

Project Number: 31467
Loan Number: 1812 (SF)
September 2010

Papua New Guinea: Provincial Towns Water Supply and Sanitation Project

Asian Development Bank

CURRENCY EQUIVALENTS

Currency Unit – kina (K)

		At Appraisal (14 October 2000)	At Project Completion (12 November 2008)
K1.00	=	$0.3500	$0.3590
$1.00	=	K2.8900	K2.7855

ABBREVIATIONS

ADB	–	Asian Development Bank
AusAID	–	Australian Agency for International Development
ICCC	–	Independent Consumer and Competition Commission
IPBC	–	Independent Public Business Corporation
LCS-CAHE	–	low cost sanitation and community awareness and health education
PNG	–	Papua New Guinea
PPTA	–	project preparatory technical assistance
PTCC	–	Provincial Towns Coordination Committee
PTIU	–	provincial town implementation unit
SDR	–	special drawing right
VIPL	–	ventilated improved pit latrine
WSS	–	water supply and sanitation

WEIGHTS AND MEASURES

m^3	–	cubic meter
m^3/day	–	cubic meters per day
km	–	kilometer
kl	–	kiloliter
Ml/day	–	megaliters per day
mm	–	millimeter

NOTE

(i) In this report, "$" refers to US dollars.

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BASIC DATA

A.	**Loan Identification**		
	1.	Country	Papua New Guinea
	2.	Loan Number	1812 (SF)
	3.	Project Title	Provincial Towns Water Supply and Sanitation
	4.	Borrower	Papua New Guinea
	5.	Executing Agency	Papua New Guinea Waterboard Limited
	6.	Original Amount of Loan	SDR11.985 million ($15.3 million)
	7.	Net Loan Amount	SDR8.081 million ($12.2 million)
	8.	Project Completion Report Number	PCR:PNG 1177
B.	**Loan Data**		
	1.	Appraisal	
		– Date Started	28 July 2000
		– Date Completed	29 July 2000
	2.	Loan Negotiations	
		– Date Started	30 October 2000
		– Date Completed	2 November 2000
	3.	Date of Board Approval	14 December 2000
	4.	Date of Loan Agreement	16 January 2001
	5.	Date of Loan Effectiveness	
		– In Loan Agreement	16 April 2001
		– Actual	31 May 2002
		– Number of Extensions	4
	6.	Closing Date	
		– In Loan Agreement	30 September 2005
		– Actual	12 November 2008
		– Number of Extensions	2
	7.	Terms of Loan	
		– Interest Rate	1.0% during grace period, 1.5% thereafter
		– Maturity (number of years)	32 years
		– Grace Period (number of years)	8 years

8. Disbursements

a. Dates

Initial Disbursement	Final Disbursement	Time Interval
31 October 2003	30 October 2008	60.67 months
Effective Date	**Loan Closing Date**	**Time Interval**
31 May 2002	12 November 2008	76.00 months

b. Loan Amount

11,985,000 (SDR)	15,300,000 ($ equivalent)

Category Description or subloan (1)	Original Allocation (2)	Partial Cancellations (3=2-4)	Last Revised Allocation (4)	Amount Disbursed (5)	Undisbursed Balance[1/] (6=4-5)
Civil works, Water Supply	3,145,000	674,864	2,470,136	2,471,135	(999)
Civil works, sewerage	277,000	(1,720,000)	1,997,000	1,501,195	495,805
Equipment and Material, water supply	1,421,000	1,421,000	0	0	0
Equipment and material, sewerage	199,000	199,000	0	0	0
Consulting services	3,292,000	(753,000)	4,045,000	3,599.470	445,530
Audit	78,000	67,000	11,000	10,663	337
Prior TA financing	492,000	94,000	398,000	397,652	348
Interest charge	705,000	0	705,000	101,201	603,799
Unallocated	2,376,000	195,640	430,360	0	430,360
Imprest Fund	0	0	0	0	0
Total SDR	**11,985,000**	**1,928,504**	**10,056,496**	**8,081,306**	**1,975,179**
Total $ equivalent	**15,300,000**	**3,000,000**	**15,142,497**	**12,207,005**	**2,395,492**
	a	b	c	d	e

[1/] For final cancellation

a- $ equivalent per RRP
b- $ equivalent as of the date of approval of cancellation
c- Total of (d+e)
d- Actual $ equivalent
e- $ equivalent as at report preparation

9. Local Costs (Financed)

- Amount ($) 638,160
- Percent of Local Costs 16
- Percent of Total Cost 4

C. Project Data

1. Project Cost ($ million)

Cost	Appraisal Estimate	Actual
Foreign Exchange Cost	13.20	11.57
Local Currency Cost	10.10	11.59
Total	**23.30**	**23.16**

2. Financing Plan ($ million)

Cost	Appraisal Estimate	Actual
Implementation Costs		
Borrower Financed (See Appendix 4)	6.10	10.96
ADB Financed	13.90	11.46
AusAID Financed	1.80	0.00
Total	**21.80**	**22.42**
IDC Costs plus TA funding		
ADB Financed	1.50	0.74
Total	**23.30**	**23.16**

ADB = Asian Development Bank, AusAID = Australian Agency for International Development, IDC = interest during construction, TA = technical assistance.

3. Cost Breakdown by Project Component ($ '000)

Component	Appraisal Estimate	Actual
Base Cost		
A. Water Supply		
1. Kerema	2,100	365
2. Mendi	6,900	375
3. Wabag	2,800	9,467
Subtotal (A)	**11,800**	**10,207**
B. Sewerage		
1. Alotau	300	0
2. Mt. Hagen	500	188
3. Madang	600	7,414
Subtotal (B)	**1,400**	**7,602**
C. Capacity Building	1,600	0
D. Project Management	2,300	4,615
Total Base Costs	**17,000**	**22,424**
Physical Contingencies	3,200	0
Price Contingencies	1,600	0
Interest during Construction and TA funding	1,500	744
Total Project Cost	**23,300**	**23,168**

TA = technical assistance.
Note: Actual contingency costs are included in the detail Base Costs Sections.

4. Project Performance Report Ratings

Implementation Period	Ratings	
	Development Objectives	Implementation Progress
From 31 Dec 2000 to 30 Jun 2001	Satisfactory	Satisfactory
From 31 Jul 2001 to 30 Apr 2002	Satisfactory	Unsatisfactory
From 31 May 2002 to 31 Dec 2008	Satisfactory	Satisfactory

D. Data on Asian Development Bank Missions

Name of Mission	Date	No. of Persons	No. of Person-Days	Specialization of Members
Appraisal	28–29 June 2000	3	6	a,b,c
Inception review	25 Feb 2002–7 Mar 2002	2	22	a,b,c
Project review 1	3 Feb 2003–5 Feb 2003	1	3	b
Project review 2	11 Feb 2004–16 Feb 2004	2	12	b,c
Project review 3	24 Feb 2005–11 Mar 2005	3	48	c,d,e
Project review 4	8 Mar 2006–17 Mar 2006	3	30	c,d,e
Project review 5	10 Aug 2007–18 Aug 2007	2	18	d,e
Project review 6	21 May 2008–24 May 2008	2	8	d,e
Project completion review	11 May 2010–31 May 2010	3	30	c,e

a = senior economist, b = senior project specialist (water supply and urban development), c = assistant project analyst, d = head of project administration unit, e = project implementation officer.

I. PROJECT DESCRIPTION

1. It is desirable that all citizens of Papua New Guinea (PNG), wherever they live, have access to potable water and an appropriate standard of sewerage collection and treatment. Unfortunately, PNG's rugged geography makes that difficult, if not impossible, to achieve. Most of PNG's people live in rural areas (with over 85% of the population depending on semi-subsistence agriculture) and lack access to safe drinking water or sanitation. Apart from the cities of Port Moresby and Lae, urban areas are mostly small towns with fewer than 1,000 households. Where piped water is available, its quality is generally good. However, large sections of urban areas suffer unsanitary conditions and lack potable water, especially at drier times of the year. Household surveys have confirmed that the poor have very limited access to services and an inadequate understanding of the links connecting water, sanitation, personal hygiene, and good health. Public health indicators show high incidences of diseases that are preventable with the provision of safe drinking water, adequate sanitation services, and awareness education. Diarrhea is a major cause of mortality, and the incidence of typhoid and other waterborne diseases is high.[1]

2. At the time of project appraisal, the Asian Development Bank (ADB) had over 20 years' experience in water supply and sanitation (WSS) in PNG. The Provincial Towns Water Supply and Sanitation Project was the fourth loan in the sector. It covered the capital towns of six provinces, sector policy support and capacity building for the PNG Waterboard, and overall project management support.[2] The towns to receive new or rehabilitated water supply investments were Kerema in Gulf Province, Wabag in Enga Province, and Mendi in Southern Highlands Province. The towns to receive new or rehabilitated sewerage works were Alotau in Milne Bay Province, Mt. Hagen in Western Highlands Province, and Madang in Madang Province. In addition, the complementary Low-Cost Sanitation and Community Awareness and Health Education (LCS-CAHE) Program[3] was included on a trial basis initially in Madang and in Lae, the capital of Morobe Province and PNG's second-largest urban area and a major trading port. This program was eventually expanded to cover Mt. Hagen, Alotau, and Wewak, the capital of East Sepik Province.

3. The project goal was to promote human and economic development in selected provincial towns by improving public health and the quality of life. The project objectives were to (i) increase coverage and improve quality in the delivery of basic WSS services and (ii) improve the management and coordination of the WSS sector by building the capacity of the Waterboard. The objective of the associated LCS-CAHE Program was to improve health and reduce poverty for poor households on the outskirts of town and other urban residents.[4]

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[1] In May 2010, when this project completion report was being compiled, the country was experiencing a cholera outbreak in many coastal towns, including Port Moresby.

[2] Previously, ADB had provided assistance to the sector through Loan 0278-PNG: Water Supply (ADB. 1976. *Report and Recommendation of the President to the Board of Directors: Proposed Water Supply Loan*. Manila.) for $13.5 million approved on 11 November 1976; and Loan 0346-PNG (ADB. 1978. *Report and Recommendation of the President to the Board of Directors: Proposed Second Water Supply*. Manila.) for $5.4 million approved on 25 July 1978; and L1211-PNG (ADB. 1992. *Report and Recommendation of the President to the Board of Directors: Proposed Third Urban Water Supply*. Manila.) for $11.3 million approved on 15 December 1992. Technical assistance has also been provided: for example TA 2196-PNG (ADB. 1994. *Technical Assistance Report on Water Supply and Sanitation Sector Study.* Manila.) for $380,000 approved on 2 November 1994.

[3] ADB. 2000. *Grant Assistance Report on JFPR 9002-PNG: Low Cost Sanitation and Community Awareness and Health Education Programme.* Manila.

[4] PNG Waterboard. 2008. *Project Completion Report for the Japan Fund for Poverty Reduction grant, Low Cost Sanitation and Community Awareness and Health Education*, Port Moresby.

4. The scope and anticipated outputs at appraisal were (i) the provision of WSS to the provincial towns of Kerema, Mendi, and Wabag; (ii) the rehabilitation of sewerage services and treatment in the towns of Alotau, Madang, and Mt. Hagen; (ii) policy support and capacity building to establish clearer sector planning and regulatory and financing arrangements and improved Waterboard management and operational efficiency, including environmental management; and (iii) project management support for procurement, detailed design, and construction supervision. A total of 675 person-months of consulting services were included at appraisal to support project management and engineering design, capacity building, environmental management, and the LCS-CAHE Program, which covered five provincial towns.

5. External funding was provided by ADB to cover foreign exchange costs and a proportion of local costs. The Government of PNG financed the remainder of the local costs. A Japan Fund for Poverty Reduction (JFPR) grant, administered by ADB, covered the cost of the LCS-CAHE Program. A proposed grant worth $1.8 million from the Australian Agency for International Development (AusAID) to provide technical support for the PNG Waterboard did not materialize.

II. EVALUATION OF DESIGN AND IMPLEMENTATION

A. Relevance of Design and Formulation

6. The ADB country operational strategy for PNG that was in place at the time of appraisal was consistent with ADB's policy on WSS and with the government's Medium-Term Development Strategy, 1997–2002, which stressed poverty reduction and investments in WSS infrastructure and services to improve public health care. The 1995 Organic Law had devolved responsibility to provinces, districts, and local governments, but had not brought the anticipated improvements in WSS. By regional Pacific standards, PNG trails in the provision of basic WSS services in urban areas.[5] The central and provincial governments signed the National Charter on Reconstruction and Development in 1999, signifying their commitment to work together to improve basic services. Institutionally, the Waterboard adopted pro-poor tariff changes and committed itself to putting in place low-cost sanitation infrastructure, especially in towns, using grant financing. The Waterboard was keen to expand into as many towns as possible. The project objectives were consistent with the government's stated priorities and with improving the efficient provision of basic services for water and low cost sanitation to achieve better health outcomes, especially for the urban poor. The complementary LCS-CAHE Program supported the project and improved its likelihood of success.

7. The project was designed as a loan preceded by a project preparatory technical assistance (PPTA).[6] PNG's twelve provincial towns were originally nominated for WSS improvements: Alotau, Arawa, Buka, Kerema, Kokopo, Lae, Madang, Mendi, Mt. Hagen, Namatanai, Wabag, and Wewak. As only those towns that yielded an economic internal rate of return of 10% were selected, the schemes included at appraisal were (i) water supply subprojects for Kerema, Mendi, and Wabag and (ii) sewerage subprojects at Alotau, Madang, and Mt. Hagen. In addition, the LCS-CAHE Program was included for urban fringe areas of Alotau, Lae, Madang, Mt. Hagen, and Wewak. Poor households were the target of this program, as they could not be reached by modern sewerage systems. All recommended town sites were

[5] Australian Agency for International Development. 2009. *Pacific Economic Survey.* Canberra (Table 2.1 shows that PNG has the lowest percentage of urban households with improved water supply in the Pacific region).

[6] ADB. 1999. *Technical Assistance Report on Papua New Guinea Provincial Towns Water Supply.* Manila (TA 3173-PNG for $908,000, approved on 23 March 1999).

on publicly owned land.[7] The scope of the water supply schemes was not well defined. Reliable and financially viable water supply schemes could not be implemented in either Kerema or Mendi. This is likely to have been caused, at least in part, by the PPTA team being requested to survey too many town sites with inadequate time to fully verify water supply affordability, resulting in insufficient technical assessment. Only the Wabag water supply scheme was completed. Similarly, the scope of the sewerage schemes was not well defined, and only the Madang sewerage scheme was completed with loan funds. Inadequate technical assessment during the PPTA was the major cause. The Alotau and Mt. Hagen sewerage schemes were not constructed.

8. The second component was sector policy support and capacity building for the PNG Waterboard. Consulting services were to be used to assist in developing improved rationalization and coordination of the sector and improving governance standards and environmental management of the Waterboard's operations. The bilateral grant that was to finance this work was, however, not approved. As a result, the Waterboard undertook internal reform of its human resources and transport and training policies, as well as governance improvements to comply with its obligations under the Water and Sanitation Act, 1986.[8] Parallel developments in PNG provided support for the Waterboard through (i) significant water tariff changes from the Independent Consumer and Competition Commission (ICCC) in two separate rulings in 2004 and 2009, which provided a major boost to the Waterboard's financial performance; (ii) regular monitoring of technical considerations, corporate governance, and customer relations services by the Independent Public Business Corporation (IPBC); and (iii) ADB's recent technical assistance work on community service obligations to define and quantify those provided by Government sponsored entities and look for alternative solutions. The third component was project management support through engineering consulting services to assist with implementation, including procurement, detailed design, and construction supervision. The consultants were terminated prior to the end of the project to save costs and alleviate disputes with the principal contractor.

9. Project design appropriately identified risks regarding the need for government commitment to sector reform and good governance, stability of staffing in the Waterboard, the timely release of counterpart funds, and the timely appointment of consultants. However, risks were not identified with respect to delays in obtaining the endorsement of the state solicitor, the lack of affordable sources of water at two of the three selected water supply sites, or that the proposed AusAID grant would not materialize. Following the state solicitor's opinion of the loan, it was declared effective on 31 March 2002, or 16 months after loan signing. The JFPR grant agreement was signed after the loan was signed.

B. Project Outputs

10. The anticipated project outputs were (i) the provision of water supply and sewerage to the provincial towns of Kerema, Mendi, and Wabag with the construction of surface and groundwater intakes, treatments plants, and reticulation systems to serve 20,700 people; (ii) the rehabilitation of sewerage services and treatment in the towns of Alotau, Madang, and Mt.

[7] ADB. 2000*. The Report and Recommendation of the President to the Board of Directors for Provincial Towns Water Supply and Sanitation Project,* Manila. (page 15) noted that "all proposed systems were designed to be sited within the present town boundaries on public-owned land or roads because nearly all remaining candidate sites for treatment plants and other facilities were on customary land, which is rarely made available in PNG on an indisputable, long-term basis."

[8] The Waterboard, using its own resources, also upgraded its computer system to facilitate integrated billing and management information system and commenced long-term corporate planning for future expansion.

Hagen with the construction of sewerage networks and upgraded treatment and effluent disposal systems for 20,800 people; (iii) sector policy and coordination through the implementation of reforms to be developed during implementation with the assistance of consultants; (iv) building capacity in the Waterboard through the design and installation of an integrated management information system and a compliance and licensing unit, as well as the preparation of a revenue generation and income plan, including a reviewed WSS price and tariff structure; and (v) project management assistance through consulting services focused on engineering, project management, design and construction supervision, and procurement. Appendix 1 compares targets and actual achievements.

11. The project completed only one of the three anticipated water supply schemes. The contract for the Wabag water supply scheme was awarded on 22 February 2006, with completion expected in March 2008. The completed subproject was commissioned on 24 July 2008 and formally opened in February 2009. The previously disused water treatment plant was replaced, the existing reservoir was replaced, intake works were upgraded, the reticulation system was upgraded and extended throughout the town, and all house meters were replaced. Connections were provided to 542 customers including 389 domestic residences, 31 commercial establishments, 28 institutions, 20 settlements, and 74 others, serving some 6,000 people. In Kerema and Mendi, however, adequate supplies of groundwater could not be found. Revised surface water designs were drawn up, but they were far more costly and so were not implemented. The project completed only one of the three anticipated sewerage schemes, in Madang, which was commissioned on 15 October 2007 with 47 connections serving 1,000 people. In the two other towns where sewerage schemes were planned, Alotau and Mt. Hagen, land-availability issues were factors preventing development.

12. Sector policy and coordination targets were only partly met. As policy, coordination, and capacity building assistance for the Waterboard were to be supported by consultant services financed with an AusAID grant that was not forthcoming, the Waterboard requested that these activities be cancelled, and ADB agreed. The Waterboard undertook internal reforms and was supported by parallel developments in water tariffs (involving the ICCC), governance and monitoring (involving the IPBC), and the definition and quantification of community service obligations (involving ADB) as described in para. 8. Project implementation, including engineering and procurement, used consultancy services. These arrangements worked satisfactorily.

C. Project Costs

13. The original project cost estimate and the actual project costs are shown in Section C of the Basic Data section, while the breakdown and utilization of loan funds is shown in Section B. The original cost was $23.3 million. The actual cost was $23.2 million. Of the ADB loan amount of SDR11.9 million, SDR3.9 million ($5.94 million equivalent) was cancelled. The government's counterpart funding amount was $6.1 million equivalent at appraisal, but the actual counterpart funding contribution was $11.0 million equivalent, primarily because of cost overruns, implementation delays, and the lack of reimbursement due to delays in processing claims prior to loan closure. Delays in payment resulted from the lack of expenditure categorization for electrical, mechanical, and civil works for the Madang and Wabag subprojects, which were lumped under civil works. Upon the Waterboard's request, ADB processed the change in implementation arrangements by merging the civil works and equipment categories, and reimbursements and payments were released toward the end of the loan period. Other delays were encountered because of lengthy land compensation issues and lack of support from some provincial governments. For the Mt. Hagen sewerage subproject, the planned sewerage pond

upgrade, land, and environmental damage claims carried over from the past, and the late release of waste water permit from the Department of Environment and Conservation necessitated retendering the subproject and eventual cancellation with the expiry of bid validity.

14. The costs of physical construction were significantly underestimated at appraisal in the WSS components, and loan funds were used for only one of the three proposed water supply subprojects and one of the three sewerage subprojects. The Wabag water supply subproject was completed for a contract sum of $9.5 million, more than three times the estimated cost of $2.8 million at appraisal. The Mendi water supply subproject, which was re-scoped to use surface water after a reliable source of groundwater could not be found, was re-estimated to cost $9.3 million, compared with $6.9 million at appraisal. The Kerema water supply subproject was also re-scoped to use surface water, as adequate groundwater could not be found. The revised cost estimate was $6.2 million, nearly three times the $2.1 million estimate at appraisal. The initial low cost estimates required further feasibility studies at Kerema and Mendi, which required reallocating loan proceeds to the engineering consultant to undertake the studies. These feasibility studies were completed, but cost overruns and time limitations meant that construction could not take place.

15. The sewerage subprojects required the following cost revisions: (i) the Alotau sewerage subproject was re-scoped, and the revised estimate was $4.1 million, or nearly 14 times the appraisal estimate of $0.3 million. (ii) the Mt. Hagen sewerage subproject was re-scoped, and the revised estimate was $6.8 million, more than 17 times the appraisal estimate of $0.5 million. (iii) the Madang sewerage subproject was completed for a contract sum of $7.4 million, or 14 times the appraisal estimate of $0.6 million. The proposed Alotau and Mt. Hagen sewerage subprojects were not constructed because of the higher costs of revised estimates and the unavailability of land in both towns. In Alotau, an additional feasibility study was undertaken, as was the case for the Kerema and Mendi water supply subprojects, but could not be implemented for lack of time and higher design cost.

16. Consultancy services were a significant project cost. At appraisal the total cost, including project management, was estimated at $3.4 million, or 22.6% of the loan. The actual cost on completion was $5.3 million. Additional drilling for water that was required in Kerema and Mendi to identify alternative sources of groundwater accounted for a large portion of the higher costs.

D. Disbursements

17. ADB approved the loan for SDR11,985,000 ($15.3 million equivalent at appraisal) on 14 December 2000. The government relent the ADB loan proceeds to the Waterboard through a subsidiary loan agreement on the same terms and conditions as the ADB loan to the government. The government also provided $11.0 million equivalent in counterpart funds for civil works, consulting services for the WSS subprojects, the water supply subproject in Wabag, civil works, and the project management unit in the Waterboard. Counterpart funds were provided efficiently in a timely manner.

18. Government approval processes delayed loan effectiveness, which contributed to significant delays in implementation. It took 16 months after loan signing for the loan to become effective, with the first disbursement made on 31 October 2003 for consulting services.[9] In February 2005, the Waterboard submitted its first withdrawal request, and disbursements

[9] By comparison, this was quicker than the previous ADB loan for the water and sanitation sector (*Third Urban Water Supply*), which took 24 months to become effective.

remained slow in 2005 because of the substantial delay in awarding civil works contracts. Disbursement improved in 2006 and 2007, and the final disbursement was made on 30 October 2008. Loan disbursements were made in accordance with ADB's *Loan Disbursement Handbook* (1997, as amended from time to time) using direct payments, reimbursement procedures, and an imprest fund. All disbursement worked well.

19. Loan funds were reallocated during implementation in line with the revised design. The cancellation of SDR3.9 million ($5.9 million equivalent) occurred in September and November 2008.

E. Project Schedule

20. The loan was approved on 14 December 2000 and became effective on 31 March 2002. A delay in the legal opinion from the state solicitor prevented the loan from becoming effective in a timely manner. The loan was extended twice from its original closing date of 30 September 2005 by 36 months to allow the completion of the Wabag water supply scheme, finally closing on 12 November 2008. Implementation took 95 months.

F. Implementation Arrangements

21. The PNG Waterboard, the executing agency for the project, is experienced in implementing urban WSS projects. The Waterboard coordinated the project through its project management office, which was established in 2002. The Waterboard, the government, consultants, and ADB coordinated closely. Resources provided under the project were effectively allocated.

G. Conditions and Covenants

22. Loan effectiveness depended on (i) the formation of provincial town coordination committees in each town with WSS subprojects and (ii) the execution of a subsidiary loan agreement between the government and the Waterboard with terms and conditions satisfactory to ADB to cover relending to the Waterboard. Appendix 2 shows details of compliance with loan covenants. All covenants dealing with Waterboard financial planning, water pricing, fee collection, non-revenue water, environmental management, and financial management were partly complied with. The project had little capacity to assist in the pricing and financial management aspects, as the AusAID grant to fund consulting services was not forthcoming. Fortunately, from 2004 the ICCC had a process through which water pricing was set and monitored more systematically, which improved profitability for the Waterboard. One covenant partly complied with dealt with operation and maintenance action planning to improve overall asset quality. One covenant was waived during implementation, after the Mendi water supply subproject was cancelled. Covenants not complied with were the failure (i) of the proposed AusAID grant to materialize, (ii) to undertake a comprehensive mid-term review, (iii) to meet the requirement that the membership of each provincial town coordination committee be at least 50% women, and (iv) to establish the benefit monitoring and evaluation system or provide reports.

H. Complementary Awareness and Education Program

23. The objective of the LCS-CAHE Program was to encourage poor residents of the urban fringe personal and household behavioral changes in hygiene and sanitation. This was to be done by raising awareness and providing affordable, environmentally friendly, and appropriate

sanitation facilities. The program had two elements. The first was low-cost sanitation. The target number of ventilated improved pit latrines (VIPLs) for Alotau, Lae, Mt. Hagen, and Wewak was 4,200, of which only 674 (16%) were installed. In addition, 176 septic tanks were installed in Madang, after the Madang provincial government prohibited the installation of latrines. Cost escalation for latrines and the need for septic tanks in Madang, costing K5,000 per unit at construction, largely explains the number of units installed being lower than the target at appraisal. The large number of small contracts (e.g., seven contracts awarded to build 375 latrines in Lae) may have accounted in part for the cost overruns, from K740 per unit at appraisal to an actual cost of K3,500. The number of actual beneficiaries was 7,000 people, or 19% of target of 36,000.

24. The second element of the program was community awareness and health education, comprising audio awareness materials and 6,000 posters distributed in Alotau, Lae, Madang, Mt. Hagen, and Wewak; radio programs; and monitoring and evaluation. These targets were met. The LCS-CAHE Program, limited in its implementation by slow-moving government processes, was partly successful. Further information is provided in the project completion report prepared by the Waterboard (footnote 4).

I. Consultant Recruitment and Procurement

25. The Waterboard retained the services of a qualified engineering consulting firm to assist in project implementation, including design and construction. These services were financed by the loan and procured in accordance with ADB Guidelines on the Use of Consultants (2010, as amended from time to time). The procurement of consultants was 24 months late. To accommodate changes in the scope of the project resulting from the need to significantly change the construction program for both water supply and sewerage subprojects, the consulting services contract was extended.

26. Goods and services were procured with loan funds according to ADB Procurement Guidelines. Civil works, equipment, and materials were procured in line with the agreed changes in project scope. All civil works contracts, equipment, and materials were procured through international competitive bidding. No major problems were encountered in the packaging of contracts, preparation of bidding documents, or evaluation of bids. However, implementation disputes that arose between the consultants and the contractor for the WSS subprojects resulted in the consultants being terminated before project completion.

J. Performance of Consultants, Contractors, and Suppliers

27. The physical facilities completed under the project are of good quality, reflecting the *satisfactory* performance of the consultants on the project-financed sites where the facilities were completed. The relationship between the contractor that constructed facilities at both Wabag and Madang and the engineering consultant was problematic. The latter's contract was awarded on 7 October 2003 and terminated in July 2007, after implementation reached an impasse. The Waterboard acted in accordance with contract provisions, in the interest of the project, and with ADB's approval. The Waterboard assumed the role of engineer and supervisor to complete the Madang and Wabag subprojects, which were commissioned on 15 October 2007 and 24 July 2008, respectively.

K. Performance of the Borrower and Executing Agency

28. The performance of the government and the Waterboard were *satisfactory*. Both met their responsibilities and obligations in project implementation. Lengthy legal opinion procedures caused a delay of 16 months after loan approval. After this delay, good progress was made. The changes in scope resulted from inadequate preparation before appraisal and during PPTA, when the reliability and affordability of sources of water were not adequately assessed, not from poor performance during implementation. However, had a comprehensive mid-term review been conducted, as planned at appraisal and as covenanted to take place no later than 24 months after the effective date, the project scope might have been revised in a more timely manner.

L. Performance of the Asian Development Bank

29. ADB's performance during implementation was *partly satisfactory*. ADB carried out six annual review missions, including review of the JFPR-financed program, over the 6 years from loan effectiveness to completion to monitor progress and address implementation issues. However, the lack of a comprehensive mid-term review might have prevented a change in scope, as it was clear that AusAID cofinancing was not available to address building capacity in the Waterboard and improving its management. In the March 2006 review, ADB's general conclusion on progress was that implementation had been greatly hampered by underestimation of costs in the original design, the emergence of physical problems at some locations, changes in the intentions of provincial governments, and changes in overall policy direction on the part of the proposed cofinancier.[10] The lack of identification of water sources and the resulting cost underestimation is traced to shortcomings in the supervision of the PPTA by ADB. However, throughout implementation, ADB worked closely with the government and the Waterboard to meet the challenges of inadequate water availability at the selected sites of Mendi and Kerema and cost escalation resulting from the need to revise the scope of sewerage work at Mt. Hagen and Alotau.

III. EVALUATION OF PERFORMANCE

A. Relevance

30. The goal and objectives of the project were *highly relevant* to addressing the need for improved access to modern infrastructure to improve public health and the quality of life in provincial towns was in accordance with government policy. However, the project did not adequately verify the reliability and affordability of water sources in four of the six towns included in the project scope. During implementation, it was found that the cost of constructing suitable water supply infrastructure was double appraisal estimate, and the cost of sewerage infrastructure was 6–14 times more expensive than estimated at appraisal. As a result, facilities were constructed as per appraisal in only two towns: water supply in Wabag and sewerage in Madang. The LCS-CAHE Program provided poor households with low-cost sewerage infrastructure in five provincial towns and was *highly relevant*, despite unit cost overruns.

31. Sector policy and capacity-development aspects of the project were *less successful*, as the grant to cover consulting services was not available. These aspects were too ambitious in a project context in the absence of ADB finance and supervision. The Waterboard used its own resources to carry out internal reforms and was supported by the regulatory work of the ICCC on water tariffs, ADB advisory work on community service obligations, and IPBC monitoring,

[10] ADB. 2006. *Project Performance Report System.* Manila.

which has become more intensive since 2008. Project management supported engineering consulting services to assist with implementation, including procurement, detailed design, and construction supervision, and was *highly relevant*. The project's overall objectives were unchanged and remained *relevant* despite changes in the design of all subprojects.

B. Effectiveness in Achieving Outcomes

32. The project partly achieved its objectives of increasing coverage and improving quality in the delivery of basic WSS services and improving management and coordination of the sector by building capacity in the Waterboard. Only one-third of the physical WSS targets were achieved. Water supply services were improved in one of three target towns and sanitation services were improved in one of three target towns.

33. Water supply services were rehabilitated and improved for 542 connections serving 6,000 people in Wabag. The completed subproject exceeded its original target of 2,700 people. However, the project's original water supply target was 20,700 people in three towns.

34. Sanitation infrastructure was constructed in Madang. The existing treatment system was replaced, as redesigned during implementation, with a large septic tank, three new aerated ponds, and a disposal area. Three new pumping stations were constructed at the Madang hospital, new town, and provincial government office. The two existing sewerage systems at the hospital and new town were connected into the new pumping stations. The original target was approximately 120 connections to the existing system. The project achieved 18 new connections to the government offices, and, with the two existing system connected, it serves 1,000 people. The project's original sanitation target was 20,800 people. Overall, the project is rated as *less effective*.

C. Efficiency in Achieving Outcome and Outputs

35. As the project completed only two of the proposed six WSS construction subprojects, and did so at a far higher cost that at appraisal, a revised economic internal rate of return has not been recalculated.[11] The project did not make efficient use of ADB and government funds. There were implementation delays in recruiting consultants and approving contracts. The unit costs of all proposed subprojects were significantly underestimated during design. Considerable cost was incurred in redesigning, drilling, and seeking alternative sources of water in Mendi and Kerema, yet neither subproject could be constructed, as viable water sources were not found and the costs were too high. The loan closing date was delayed by 3 years. These delays resulted in (i) a 4-year delay in providing water supply benefits and a 3-year delay in sanitation benefits; (ii) additional cost to the government in paying commitment fees over an additional 3 years; and (iii) the failure to reimburse a significant part of the project cost. The JFPR grant was implemented quite successfully but at a higher unit cost than planned, providing VIPLs to only 7,000 people, far fewer than the planned 36,000 people. AusAID did not approve its grant which constrained capacity building in the Waterboard. The project is rated *inefficient*.

D. Preliminary Assessment of Sustainability

36. The PNG Waterboard is mandated to advise the government, enforce regulations, and operate water and sanitation systems in both rural and urban areas, including issuing licenses to resource companies for water use. The Waterboard has focused on developing WSS

[11] It would be negative.

services in provincial towns under the National Water Supply and Sewerage Act of 1986.[12] The Waterboard has progressively expanded the number of systems it operates to 15 and plans to further expand under its strategic plan for 2006–2015.

37. Since 2000, the Waterboard has modestly improved its financial viability to the extent of making moderate operational surpluses, mostly as a result of its operations in Lae. However, the lack of full cost recovery has made it difficult to maintain aging water reticulation and treatment systems or properly maintain new systems. In Wabag, a gravity-fed scheme and therefore cheaper than some towns to operate, is not financially viable as only 26% of water supplied is currently being paid for. This percentage is expected to significantly improve but the Waterboard estimates that transfers will be required for at least 4–5 years or until further connections are made, the ICCC's price path is implemented, and full payment is made for at least 90% of water supplied. Madang is already a profit center for the Waterboard, and the new sewerage facilities can be operated and maintained from sales revenue there. Major maintenance, such as that required to repair recent vandalism, will require more transfers.

38. In Wabag, the provincial government regularly released counterpart funds and gave good support during implementation, e.g., providing K300,000 to purchase the land for the water intake and funding a K51,000 feasibility study for a town sewerage scheme. However, most provincial governments are not as responsive as in Enga Province and rarely showed any responsibility for the facilities in their towns. Especially in the Highlands, residents do not take adequate care of the facilities provided by the Waterboard, despite their need for clean water for good health. Many people do not understand this link. The lack of a good relationship between the Waterboard and its customers is a major problem that undermines sustainability. The project is rated *less likely* to be sustainable.

E. Impact

1. Environmental Impact

39. At appraisal, the project was assessed as environmental category B. It was anticipated that, in the short term during the design, construction, and operation of project facilities, environmental impacts would be minor. Over the longer term, the impacts were anticipated to be positive for households and communities as modern infrastructure and services improved WSS. Two environmental covenants were included, one for the Mendi water supply subproject that was cancelled when the subproject was not constructed, and another to cover training in environmental awareness, especially for the Waterboard's operational staff, which was complied with. In Wabag and Madang, the WSS subprojects achieved favorable environmental impacts, as anticipated at appraisal. The LCS-CAHE Program has similarly delivered positive environmental impacts.

[12] The act restricts the Waterboard from becoming involved in noncommercial activities unless funding is made directly available by the government or others.

2. Social Impact

40. At appraisal, the project was expected to benefit 41,500 people: 20,700 people in Kerema, Mendi, and Wabag with improved water supply, and 20,800 people in Alotau, Madang and Mt Hagen. The LCS-CAHE Program was expected to provide low-cost sanitation to 36,000 poor people in Alotau, Lae, Madang, Mt. Hagen, and Wewak. It was also to provide community education on health and hygiene. For those who directly benefited—some 14,000 people, some of whom are among the poorest in the country—the project is a success from a social perspective. However, the low numbers are a disappointment. The principal reason for this is the high cost of providing the infrastructure, of whatever kind. The low-cost VIPLs, even at an actual unit cost of $1,200 equivalent, provide a service to an average family of eight, or $150 equivalent per person. It is likely that the government's procurement processes inflated costs. The project completion mission found in one settlement in Mt. Hagen a privately built latrine (of inferior design but still functional) that cost $66 equivalent, or $8.50 equivalent per person. The Madang sewerage subproject, by comparison, cost $3.9 million to serve 1,000 people, or $3,900 equivalent per person.[13] While the Waterboard offers some people high-cost infrastructure that is often not adequately appreciated by citizens or governments, the remaining 85% of the population is underserved. No provincial government has invested in its own water supply or sewerage system. Waterboard officials freely acknowledge the lack of support that they receive from citizens and all levels of government, apart from a development project context in which counterpart funds are provided by the central government.

3. Other Impact

41. The health impacts at Madang and Wabag are highly likely to be positive for urban residents, as planned at appraisal. At appraisal, the high incidence of typhoid in Wabag was highlighted. At project completion, the provincial administrator of Enga Province felt that the project would have a positive impact on the health of some urban residents and that this would increase over time as more connections were made. However, it was noted that typhoid is endemic in the province and that Wabag is surrounded by villages whose residents do not have access to potable water or modern sanitation.[14] The project also had a positive gender impact particularly through the LCS-CAHE Program, though not as large as planned. Community awareness and health education activities were beneficial for the entire population of PNG, and especially so for women who bear the main responsibility for rearing children in PNG. The Waterboard does not monitor the impact of the project on public health in Wabag or Madang.

IV. OVERALL ASSESSMENT AND RECOMMENDATIONS

A. Overall Assessment

42. The project was partly successful in implementing the designed components. Wabag town now has a functioning water supply system, and Madang town now has a functioning sewerage system. Low-cost VIPLs were installed in the towns of Alotau, Lae, Mt. Hagen, and Wewak, and the community health education program that was successfully implemented has positively affected these towns as well as Madang. The constructed facilities in Wabag and Madang are likely to be sustainable in the medium-long term as the user-pays principle

[13] The Madang sewerage system has 47 connections—38 domestic, 3 industrial, and 6 institutional—serving 1,000 people.

[14] Conversation between the project completion mission and Samson Amean, provincial administrator in Enga Province.

becomes fully accepted and more connections are made but will rely on Waterboard transfers in the short term. The project was not well designed as the WSS investments for Kerema, Mendi, Mt. Hagen, and Alotau were not built because of a combination of technical and cost factors. The project is therefore rated *partly successful*.

B. Lessons

43. The following lessons can be drawn:

(i) Inadequate project design undermines project implementation. Good project design is a basic requirement for project success, and inadequate design can prevent project success. In this case, design did not demonstrate adequate technical understanding of the availability of suitable water or the feasibility of its use for WSS projects in four of the six provincial towns. The cost estimates at appraisal, based on PPTA, were too low, as actual costs were almost 225% higher than the appraisal estimate for the Wabag water supply subproject and 650% higher for the Madang sewerage subproject. The risk of the AusAID grant not being approved was not identified, and this curtailed capacity building in the Waterboard.

(ii) Only priority sites should be surveyed at project design. Identifying a short list, not a long list, of priority sites before PPTA starts is good practice. Frequently, executing agencies in PNG do not identify priority sites or undertake preliminary analysis, citing their lack of preparatory budgets or skills. This does not foster ownership and passes on responsibility to consultants. In this case, PPTA consultants were asked to survey 12 provincial towns, out of which only 2 were ultimately developed. Inadequate preparatory work was done prior to project approval, causing high cost overruns and the need for re-design during implementation. ADB did not have the capacity to verify results from so many sites. Commitment from citizens in the form of willingness to pay and from governments in the form of investment, maintenance, and protecting assets from vandalism should be regarded as a part of future Waterboard investment decisions. The Waterboard should require an enforceable contract with provincial governments prior to new town investments.

(iii) Targeting poor families with grant funds and low-cost technology makes good sense. The LC-CAHE component was the most successful part of the project, despite cost overruns and reduced impact compared with the original targets. It combined low-cost infrastructure improvements with vitally needed information to improve awareness and understanding of the need for greater cleanliness and modern sanitation to improve public health. It also involved working with poor communities in a participatory manner to build commitment. It is a model that can be replicated at minimal cost in PNG and elsewhere in the Pacific.

(iv) Lower-cost technologies have significant potential to improve public health. The very high cost of servicing small and isolated towns in PNG through reticulated WSS systems means that lower-cost alternatives should be considered. Water prices have risen and will rise further with the ICCC's regulatory contract with the Waterboard. This improves the commercial environment for the Waterboard, which it may be able to exploit if it can provide improved services more efficiently. However, water prices are unlikely to increase enough, even in the medium to

long term, to financially justify reticulated WSS systems throughout urban PNG. Alternative models for providing WSS services should be considered that aim to alleviate capital constraints on reaching customers.[15]

C. Recommendations

1. Project-Related

44. The Waterboard is recommended to redouble its efforts to build relationships with its customers and with the provincial governments that participated in the project to ensure they protect and appreciate the WSS infrastructure provided, as well as the work done through the LCS-CAHE Program. If staff members are seen doing surveys to monitor the impacts of the project and other WSS facilities, this will build community relations and provide feedback to the Waterboard in Port Moresby. The Waterboard is also encouraged to take a strong leadership role in promoting low-cost WSS investments and to encourage provincial governments, nongovernment organizations, and private groups and individuals to invest in their own WSS systems. Innovative ways to offer incentives and information to people in PNG should be aggressively pursued by the Waterboard, so that more private investment can take place, especially in urban fringe settlements and rural areas. The Waterboard is also encouraged to implement the loan covenants relating to monitoring of the impacts of the project.

2. General

a. Project Design

45. **Social aspects and poverty targeting.** The JFPR-financed grant for LCS-CAHE provided innovative support to the project. It was the first time such a grant had been included in a PNG project. It enabled poor urban and peri-urban households that could not otherwise expect to have access to sanitation infrastructure to have suitable facilities. Through the use of mass media and posters, it also communicated information on the need for cleanliness and the use of modern sanitary practices to promote improved public health and safety to a far wider audience. This is an appropriate use of such targeted grants, and their future use in PNG is recommended.

b. Project Implementation

46. The implementation schedule for the project was impractical and did not take into account the long lead times required for consultant recruitment, detailed design, and contract approval. Consultant recruitment was delayed by 24 months, due to slow standard procedures prevailing in the country and the need to base decisions on consensus. Identifying ways to speed this process would be in the interest of PNG.

[15] The actual costs of reaching urban customers—e.g., approximately $3,900 per user for the sewerage upgrade under the loan project in Madang, compared with $212 per user for septic tanks in Madang or $150 per user for ventilated improved pit latrines in the LCS-CAHE Program—is evidence that far cheaper solutions are available. Alternative providers of these services, in competition with the Waterboard, should be encouraged if the Waterboard is unable to offer lower-cost alternatives. In Wabag, the investment cost of $6.3 million to serve 6,000 beneficiaries, at $1,050 per person, may be sustainable if all water supplied is paid for. Currently, only 29% of consumers pay their bills, a figure that is expected to significantly increase as the user-pays principle becomes established in Wabag.

c. The Water Supply and Sanitation Project Design Process

47. Lacking adequate capital to expand WSS coverage in provincial and district towns, the Waterboard depends on development partners to provide capital and design expertise for rehabilitating existing systems and building new facilities. The Waterboard has a list of the towns for future WSS projects but has not completed its own technical investigations of water availability and general feasibility in any of the towns on the list. Undertaking such investigations, by contracting specific technical studies, should be done in advance of requesting development partners for future project support. This would greatly improve efficiency in the use of future overseas funds and counterpart funds and build confidence in the Waterboard's leadership in the sector. Identifying a short list, not a long list, of priority sites before PPTA starts should be done in all future WSS projects. It is recommended that ADB support technical investigations of water availability in advance of PPTA, should ADB decide to engage further in the WSS sector.

V. FUTURE ASSISTANCE IN THE WATER SECTOR

48. Capital is lacking for WSS investments to connect the remaining 85% of PNG's citizens who currently lack potable water and modern sanitation. Government investment in the sector is low at all levels, and private investment has been constrained by the lack of commercial options in PNG's rugged physical environment. It will be at least 7–8 years before significant returns are made from PNG's equity share in the PNG Liquefied Natural Gas project that is under construction, and even longer before significant taxation receipts are available to the government. Public–private partnerships have been successfully implemented in many countries and are one modality to actively consider for future investments in the WSS sector. The Waterboard is encouraged to pursue public–private partnership options with the IPBC, as PNG Ports has recently done. For ADB, the ongoing work with the government on community service obligations is of considerable benefit to the sector and the Waterboard. If this work proves to be successful, a role in developing a national water policy is a logical next step.

49. The Waterboard is encouraged to undertake surveys to determine if viable water sources are available prior to requesting development partner support for urban or larger rural WSS projects. An alternative may be to request support for such surveys as phase one of a project, with the understanding that physical investment in phase two can proceed only if the water source is proven to be available and cost effective. For smaller WSS investments, the Waterboard is encouraged to seek development partner support to target the needs of poor households, including for information related to clean water and improved health.

PROJECT FRAMEWORK

Design Summary	Achievements and Performance Indicators	Monitoring Mechanisms	Actual Achievements
Goal			
Promote human and economic development in selected provincial towns, improve social and environmental indicators and the quality of life for the poor and other residents, and improve governance in the water supply and sanitation (WSS) sector.	Improved social and economic conditions and overall quality of life through WSS improvements in 6 provincial towns Low-Cost Sanitation and Community Awareness and Health Education (LCS-CAHE) Program to benefit the poor in 5 provincial towns Governance reforms and capacity building for the PNG Waterboard Target population: 77,500 people	Various reports and economic studies Various statistics surveys, other studies and reports. Household satisfaction survey at evaluation phase, benefit monitoring and evaluation(BME) monitoring targets achieved	Rehabilitated WSS systems in 2 provincial towns. Quality of life improvement for some residents Program implemented in 5 towns with less impact than planned Project had minor impact on Waterboard governance and capacity Population impacted: 14,000 people
Project Objectives			
Increase coverage and improve the quality of basic WSS services. Improve public health and reduce poverty in the towns. Improve management and coordination of WSS sector	By 2004, 41,500 people to directly benefit from WSS facilities in Alotau, Kerema, Madang, Mendi, Mt. Hagen, and Wabag 36,000 poor to benefit from Japan Fund for Poverty Reduction (JFPR)-funded LCS-CAHE Program in 5 towns, including the construction of 4,200 ventilated improved pit latrines (VIPLs) and promotion of community awareness and	Project progress reports, implementation targets reached per component and subprojects Number of persons using these services by year and per town. Other socioeconomic statistics at the town level Institutional and	7,000 people in Wabag and Madang received rehabilitated WSS facilities. 7,000 poor people in 5 towns benefited as 674 VIPLs were built, along with 176 septic tanks. 6,000 posters distributed and mass media programs conducted Cofinance was not approved. The government's

Design Summary	Achievements and Performance Indicators	Monitoring Mechanisms	Actual Achievements
	health education Reformed policy framework for the sector; strengthened capacity in Waterboard & improved sector coordination. Cofinance from Australian Agency for International Development (AusAID)	organizational sector studies, review reports, operating and financial efficiency of WB, management information systems reports	Independent Public Business Corp (IPBC) monitors Waterboard performance, comparing it with best sector practice. Improved monitoring and transparency
Output			
Improve provincial towns' water supplies Provide provincial sanitation schemes Sector policy and coordination support through reforms recommended during implementation Build the capacity of the Waterboard through operational changes and training	New water supply schemes for Kerema and Mendi and rehabilitated water supply scheme for Wabag to provide 90% of residents with safe drinking water year round; by 2004, 20,700 urban residents to directly benefit New sewerage system for Alotau, and rehabilitated sewerage systems for Madang and Mt. Hagen, with 20,800 direct beneficiaries by 2004; 80% of households satisfied with Waterboard services and the quality and quantity of water Waterboard prepares Water Supply and Sanitation Development Program	Progress reports and project implementation targets met. Major policy and institutional changes including funding, planning, tariff structure adjustment, cost recovery and agreed-upon poverty oriented measures The strategy and policies adopted by the WB organizational changes to implement the new system, suitability and use of reports produced by the PMU. Periodic reporting against targets set, attainment of indicators for revenue generation and income tariffs and price changes	Wabag water supply scheme rehabilitated and commissioned in July 2008. 90% of residents have safe drinking water through 542 connections (389 of which are domestic to serve 3,000 people), as well as 31 commercial users, 28 institutions, 20 settlement connections, and 74 others. Total impact: 6,000 people Madang sewerage system rehabilitated and commissioned in October 2007; 47 connections (38 domestic, 3 industrial, and 6 institutional) serve 1,000 people, the provincial hospital, and government offices Waterboard drafted National Water Policy, 2008, but it was not adopted by

Design Summary	Achievements and Performance Indicators	Monitoring Mechanisms	Actual Achievements
Increased water tariffs and revenue plan for Waterboard Strengthen environmental management and monitoring institutionally and technically. Provide project implementation assistance for water supply and sanitation improvements	Waterboard efficiently performs its mandate; operation and maintenance training for Waterboard staff; integrated management information systems installed; compliance and licensing unit established; organizational structure and operating focus aligned to Waterboard's primary business with adequate competent personnel	achieved by year and town Project reports	government; national water policy and a clear sector administrative structure are still lacking; 15-year Water Supply and Sanitation Development Program launched in 2006 IPBC indicators show Waterboard making efficiency gains, issuing internal policies on training, human resources, and transport; over 140 companies licensed to operate private WSS schemes, but challenges remain in debt collection, planning, asset maintenance, and customer relations.
Japan Fund for Poverty Reduction-Funded Program			
Implement low-cost sanitation (LCS) Implement community awareness and health education (CAHE)	LCS in 5 provincial towns to benefit 36,000 people. 4,200 VIPLs constructed in Lae (1,400); Madang (1,000); and Alotau, Mt. Hagen, and Wewak (1,800). Pilot programs to be conducted for installing LCS in urban fringe and unserviced areas CAHE to be developed and delivered to raise awareness of WSS and related health	Available statistics and comparison with project socio-economic data. BME conducted during the project and public/customer feedback	674 VIPLs built in Alotau (109), Lae (375), Mt. Hagen (83), and Wewak (107); 176 septic tanks built in Madang, but not latrines; 7,000 people benefitted, with demonstration impact leading to unknown number of additional private latrines built 6,000 posters distributed, 1,200 each in Alotau, Lae, Madang, Mt. Hagen, and Wewak; radio programs conducted

Design Summary	Achievements and Performance Indicators	Monitoring Mechanisms	Actual Achievements
	and lifestyle practices to improve public health, targeting 36,000 people in 5 provincial towns 90% of adults and children wash their hands after going to toilet in all 6 towns; 90% of households in the selected towns to receive information on healthy hygiene		in all towns; target met Monitoring and evaluation completed only in Lae, with no impact measured in other towns

STATUS OF COMPLIANCE WITH LOAN COVENANTS AS OF 27 MAY 2010

Covenant	Reference in Loan Agreement	Status
Increase WSS tariffs by submitting a necessary application for tariff increase to the Borrower authorities on or before 30 September 2005. The applicable tariff rates charged to consumers will not be less than approximately K1.3/kl for water and K0.5/kl for sewerage (in constant March 2000 prices).	Project Agreement Schedule, Paragraph 2	The project completion date was extended from 30 September 2005 to 30 June 2008. The Independent Consumer and Competition Commission has set and reviewed water tariffs since 2004. The Waterboard awarded 7.8% above the consumer price index from 2005 to 2009. In 2009, the rate was reset for 2010–2014 with annual price increases of 10% above consumer price index. This has had a significant impact on the Waterboard financial performance and will continue to do so to 2014. Above 12 KL=K7.30 per minute flat for water supply Sewerage= K6.60 per min
Increase O&M expenditures from the current rate of 0.5% to not less than 1% of the average asset value of the Waterboard in any given year.	Project Agreement Schedule, Paragraph 4	Complied with.
Prepare an O&M Action Plan to improve its O&M of the system.	Project Agreement Schedule, Paragraph 4	Complied with.
The Waterboard shall implement its first five-year corporate plan (1999-2003), including: (a) maintaining a collection rate of not less than 90%, i.e, amounts realized from periodic billings shall be not less than 90% of amounts billed during the relevant period; (b) ensuring that its average non-revenue water from all Waterboard districts shall not be more than 20% by 31 March 2005; and (c) ensuring that the percentage of current receivables due from Waterboard customers outstanding for more than 90 days will not exceed 15% of the total value of all current receivables per annum.	Project Agreement Schedule, Paragraph 1	Partly complied with. The target date shifted with the extension of the closing date. The Waterboard has a current 2006–2010 business plan that guides its operations. (a) Partly complied with. The Independent Public Business Corporation (IPBC) has monitored the Waterboard's collection rate and other indicators to test compliance with industry best practice benchmarks since 2007. (b) Partly complied with. Non-revenue water is 29%–30%. The IPBC monitors non-revenue water as one of a number of indicators. (c) Partly complied with. The Waterboard actively monitors receivables and reports monthly to the IPBC.

Covenant	Reference in Loan Agreement	Status
The Waterboard shall ensure that the environmental mitigation and monitoring measures recommended in the initial Environmental Examination for the Project shall be followed in design and implementation of the Project, including (a) for the WSS subprojects under Part A(i) of the Project that regular monitoring will be undertaken of (i) abstraction of water from aquifers and related impact on the level of available surrounding shallow groundwater; (ii) downstream flow of Mangani River and Pagwa Creek below the relevant abstraction points and related impacts, if any, on downstream users and fish and wildlife and timely measures to mitigate any adverse environmental impacts monitored under (i) and (ii) will also be undertaken; and (b) for WSS subprojects under Part A(ii) of the Project, that sewerage works and treatment, including construction of facilities, disposal of sludge and discharge of effluent, will comply with applicable national standards of the Borrower and relevant Bank guidelines.	Project Agreement Schedule, Paragraph 5	Covenants were waived for cancelled subprojects. For those subprojects undertaken in Wabag and Madang, relevant environmental laws of the borrower and Asian Development Bank (ADB) were complied with. Other environmental management covenants were partly complied with.
Training will be provided for senior and operational staff in environmental awareness, with particular reference to Waterboard activities including Project implementation, in form and substance acceptable to the ADB.	Project Agreement Schedule, Paragraph 5	Complied with. All project engineers and accountants have attended ADB seminars.
Counterpart Funding should be $0.1 million (1st year), $2.0 million (2nd year), $3.4 million (3rd year) and $0.6 million (4th year).	LA Sch 6 Para 6	Complied with. Timely and adequate government counterpart funding received, with $10.96 million equivalent from the Government of Papua New Guinea trust account spent.
Obtain co-financing from AusAID within 6 months from effectivity date.	LA Sch 6 Para 7	Not complied with. Cofinance was not approved, but the government did some work using its own resources for this component.
LA Sch 6 para 11- Without prejudice to the generality of Section 2.09(a) of the Project Agreement, for purpose of audits of accounts and	LA Sch 6 para 11	Complied with. Independent auditors were selected and engaged in accordance with competitive selection procedures

Covenant	Reference in Loan Agreement	Status
financial statements carried out pursuant thereto, the Borrower shall cause the Waterboard to ensure that any independent auditors financed under the Loan shall be selected and engaged in accordance with competitive selection procedures acceptable to ADB.		and were acceptable to ADB.
The Waterboard shall carry out the Project with diligence and efficiency, and in conformity with sound administrative, financial, engineering, environment and WSS practices.	PA Article l Section 2.01 (a)	Complied with. Applications for environmental permits were assessed and completed by the Department of Environment and Conservation before permits were issued.
The Borrower shall ensure that at least 50 percent of the community representatives who are members of each PTCC shall be women.	LA Sch 6 para 8	Not complied with, as fewer than 50% of members of provincial town coordinating committees were women.
Ensure that all title to land (and related easements or rights of way) required for each WSS subproject shall have been obtained before construction.	LA Sch 6 para 10	Complied with. All necessary land titles and related rights of way were obtained before construction at the two project sites.
Ensure that land acquisition shall be carried out in accordance with the ADB's Policy on Involuntary Resettlement.	LA Sch 6 para 10	Complied with. The resettlement of people from the site of the Madang water treatment plant was undertaken successfully.
Develop and implement a Project Performance Monitoring and Evaluation (PPME) system within 12 months of the effective date.	PA Sch Para 6	Not complied with.
Conduct benefit monitoring and evaluation (BME) surveys throughout project implementation and for 24 months thereafter. Such BME surveys shall be carried out every six months commencing from the effective date.	PA Sch Para 6	Not complied with. The Waterboard was to provide reports to ADB, but this was not done.
The Waterboard, as the Project Executing Agency, shall be responsible for the carrying out of the Project. The Borrower shall ensure that: (a) the Project Management Unit (PMU) established prior to the Effective Date will be provided with adequate resources and qualified staff, acceptable to the Bank, throughout the period of Project Implementation; (b) the Project Director heading the PMU will remain in such position for at least	LA Sch 6, Para 1	Complied with. The PMU was established and staffed with one project manager and three finance and administrative staffers. The project director position had continuity throughout project implementation. With the promotion of the first project director, the project manager was promoted to project director, which was acceptable to ADB.

Covenant	Reference in Loan Agreement	Status
three years from the date of appointment, and (c) engagement of any replacement for the Project Director will be subject to the prior concurrence of the Bank.		
The PMU shall be responsible for planning, monitoring and reporting on Project activities, Project cost, quality control and overall Project Management and Administration functions.	LA Sch 6, Para 2	Complied with. The PMU undertook all activities required except providing a project completion report.
Fielding of Consultants and establishment of the Provincial Town Implementation Unit (PTIU).	LA Sch 6 Para 3	Complied with. the PTIU was established on 17 May 2001.
Establishment of the Project Steering Committee.	LA Sch 6 Para 4	Complied with. The committee was established on 17 May 2001.
The Borrower shall ensure that each Provincial Town Coordination Committee (PTCC) established prior to effectivity date shall continue to facilitate participatory and consultative processes and promote dissemination of information and informed discussion among provincial, town and local-level authorities and the community concerned on WSS issues and shall include as its members throughout Project implementation: the relevant provincial administrator (Chair), the town manager concerned, a representative of women's interests, representatives of selected NGOs active in the district concerned, the Waterboard District Management concerned, and designated community representatives. Each PTCC shall meet no less than once each quarter and the provincial office concerned of the Waterboard will serve as the Secretariat to each PTCC.	LA Sch 6 Para 5	Complied with.
The Borrower shall ensure that any proposal for privatization of the Waterboard through sale of more than 20 percent of the Borrowers equity and/or transfer of management of any part of the operations of the Waterboard to private sector operators by way of lease, concession or otherwise shall be submitted to the Bank for prior review and comment.	LA Sch 6 Para 9	Not relevant. The Waterboard was not privatized.

Covenant	Reference in Loan Agreement	Status
The Borrower shall carry out a comprehensive mid-term review not later than the expiry of 24 months from the effective date.	LA Sch 5 Para 12	Not complied with. Major changes should have been done at this stage but never happened.

PURPOSE, TARGETS, AND ACTUAL ACHIEVEMENTS

Purpose/Scope	Targets	Actual Outputs and Outcomes
A. Wabag Water Supply	Rehabilitate and upgrade existing supplies from surface water for the following:	
	intake upgrading and rehabilitation and expansion of existing water treatment plant, chlorination system, and building;	Augmentation of existing raw water intake works with a water treatment plant with capacity of 1,940 cubic meters (m^3)/day, or 1.94 megaliters per day (Ml/day)
	1.1 kilometer (km) pressure trunk main with a diameter of 450 millimeters (mm);	1.1 km pressure trunk main with a diameter of 450 mm
	two pressure break tanks;	Two pressure relief valves
	1,500 m^3 (1.5 Ml) storage reservoir; and	1,500 m^3 (1.5 Ml) storage reservoir
	reticulation network and metered connections	Restoration of existing DN (nominal diameter) 150 polyvinyl chloride raw water gravity supply pipeline, new parallel 508 meter DN225 DICL (ductile iron cement lined) gravity pipeline and gravel access road over the two parallel pipelines
		Restoration and expansion of distribution and reticulation system comprising approximately 9,320 meters, ranging from DN225 mm to DN40 mm, and extending to the Wabag Secondary School with two existing road bridge pipeline crossings
	Population to be served is 6,000	Population served is 6,000
B. Mendi Water Supply	Construction a new water supply system from surface water, including the following:	Not implemented
	raw water intake,	
	pump house,	
	water treatment plant,	
	chlorination system and building,	
	elevated reservoir with gravity distribution, and	
	reticulation network and metered connections.	
C. Kerema Water Supply	Construction of a new water supply system from a ground water source, including the following:	Not implemented
	bore holes with pumps;	
	rising mains;	
	chlorination system, building, and storage reservoir.	

Purpose/Scope	Targets	Actual Outputs and Outcomes
D. Madang Sewerage	Rehabilitation of existing collection, treatment, and disposal system, including the following:	
	connections to existing reticulation systems with new collection sewers,	47 connections (38 domestic, 3 industrial, and 6 institutional) to existing reticulation systems with new collection sewers, 500 meters of DN150 house drains, and 1 km of DN 225 gravity sewer main
		Population served is 1,000 people.
	pumping stations,	3 pumping stations
	rising main, and	DN140 and 250 and PE (polyethylene)100 DN20 rising main
	upgrading of existing treatment pond	Construction of new and bigger treatment plant lagoons with fencing and a septic tank before the new treatment lagoons
E. Alotau Sewerage	New sewerage system for central business district only, to include the following:	Not implemented
	network reticulation with property connection,	
	sewerage treatment plant, and sea outfall.	
F. Mt. Hagen Sewerage	Rehabilitation of existing and disposal system, to include the following:	Not implemented
	conversion of the existing treatment pond to an aerated lagoon,	
	additional effluent treatment and disinfection unit,	
	outfall pipeline, and	
	building and equipment	
JFPR- Low Cost Sanitation, Community Awareness and Health Education Programme		
Lae, ventilated improved pit latrines (VIPLs)		375 VIPLs constructed.
Lae, community awareness and health education (CAHE)		Distributed 1,200 posters and awareness raised by radio
Madang, VIPLs		176 septic tanks constructed for low income households of Madang town
Madang, CAHE		Distributed 1,200 posters
Mt Hagen, VIPLs		Constructed 83 VIPLs
Mt. Hagen, CAHE		Distributed 1,200 posters
Alotau, VIPLs		Constructed 109 VIPLs
Alotau, CAHE		Distributed 1,200 posters

GOVERNMENT OF PAPUA NEW GUINEA ANNUAL EXPENDITURES (IN $)

Cat No.	Description	2004	2005	2006	2007	2008	2009	TOTAL
01A	Civil works, water supply	0	61,001	758,637	1,131,395	2,295,795	408,916	4,655,744
01B	Civil works, sewerage	0	1,091	881,841	1,547,631	1,368,739	317,758	4,117,059
02A	Equipment and materials, water supply	0	0	0	0	0	0	0
02B	Equipment and materials, sewerage	0	0	0	0	0	0	0
03	Consulting services	62,903	669,478	509,096	231,881	0	14,968	1,488,325
	Project management unit	5,346	79,060	137,853	136,180	272,670	69,343	700,453
04	Audit	0	0	0	0	0	0	0
05	Prior technical assistance financing	0	0	0	0	0	0	0
	TOTAL	**68,249**	**810,630**	**2,287,427**	**3,047,086**	**3,937,204**	**810,984**	**10,961,581**

Note: Government expenditure is just about the same as Asian Development Bank loan disbursement.
Source: Papua New Guinea Waterboard records (transactions from project trust account, 2003–2009).