PPA:MAL 16002

ASIAN DEVELOPMENT BANK

PROJECT PERFORMANCE AUDIT REPORT

ON THE

KEDAH WATER SUPPLY PROJECT
(Loan No. 652-MAL)

IN

MALAYSIA

May 1996

CURRENCY EQUIVALENTS

Currency Unit - Malaysian Ringgit (RM)

		At Appraisal	At Project Completion	At Postevaluation
RM1.00	=	$0.4260	$0.3914	$0.3930
$1.00	=	RM2.3475	RM2.5550	RM2.5445

ABBREVIATIONS

BME	-	Benefit Monitoring and Evaluation
FIRR	-	Financial Internal Rate of Return
JKR	-	Jabatan Kerja Raya (Public Works Department)
NRW	-	Nonrevenue Water
O&M	-	Operation and Maintenance
PCR	-	Project Completion Report
PEM	-	Postevaluation Mission
PPAR	-	Project Performance Audit Report
WSD	-	Water Supply Division

WEIGHTS AND MEASURES

m^3/day	-	cubic meters/day
km	-	kilometer
mm	-	millimeter

NOTES

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

CONTENTS

BASIC PROJECT DATA
Kedah Water Supply Project (Loan No. 652-MAL)

KEY PROJECT DATA ($ million):	As per Bank Loan Documents	Actual
Total Project Cost	38.80	24.32
Foreign Currency Cost	24.50	12.87
Bank Loan Amount/Utilization	24.50	12.87
Bank Loan Cancellation	-	11.63

KEY DATES:	Expected	Actual
Fact-Finding		5-18 April 1983
Appraisal		7-21 June 1983
Loan Negotiations		11-13 October 1983
Board Approval		15 November 1983
Loan Agreement		25 January 1984
Loan Effectivity	24 April 1984	25 June 1984
First Disbursement		27 September 1986
Project Completion	30 June 1988	31 October 1991
Loan Closing	31 December 1988	14 December 1990
Months (Effectivity to Completion)	50	88

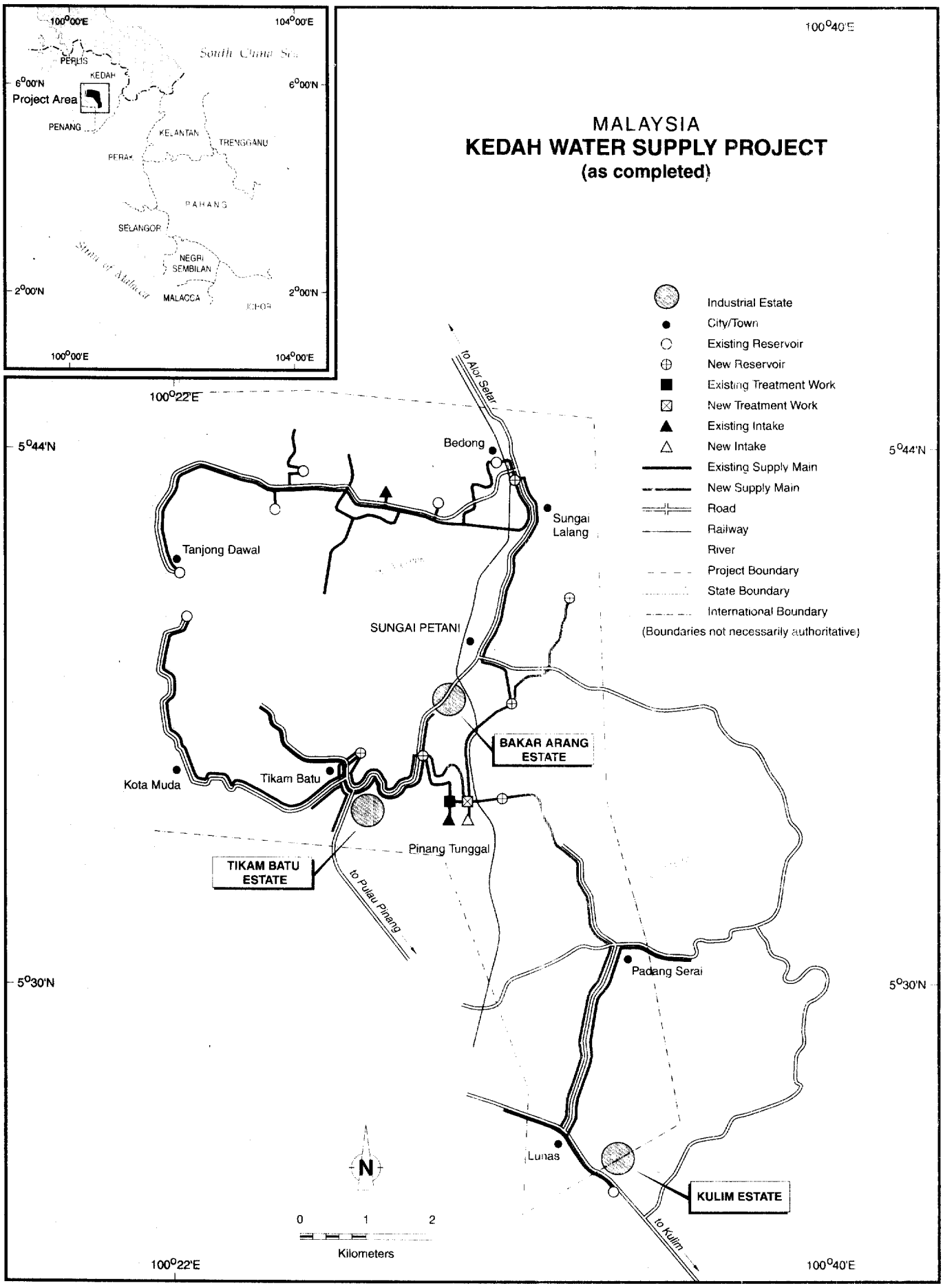
KEY PERFORMANCE INDICATORS (%):	Appraisal	PCR	PPAR
Economic Internal Rate of Return	not calculated	not calculated	not calculated
Financial Internal Rate of Return	5.1	5.6	4.0

BORROWER: Malaysia

EXECUTING AGENCY: Public Works Department of the State of Kedah

MISSION DATA:

Type of Mission	No. of Missions	Person-days
Fact-Finding	1	49
Appraisal/Follow-up	2	66
Project Administration		
- Inception	1	6
- Review	6	46
- Project Completion	1	16
Postevaluation	1	32


MALAYSIA
KEDAH WATER SUPPLY PROJECT
(as completed)
Project Area
PERLIS
KEDAH
PENANG
KELANTAN
TRENGGANU
PERAK
PAHANG
SELANGOR
NEGRI SEMBILAN
MALACCA
South China Sea
Strait of Malacca
100°00'E
104°00'E
6°00'N
2°00'N
100°40'E
100°22'E
5°44'N
5°30'N
Industrial Estate
City/Town
Existing Reservoir
New Reservoir
Existing Treatment Work
New Treatment Work
Existing Intake
New Intake
Existing Supply Main
New Supply Main
Road
Railway
River
Project Boundary
State Boundary
International Boundary
(Boundaries not necessarily authoritative)
to Alor Setar
Bedong
Sungai Lalang
Tanjong Dawal
SUNGAI PETANI
BAKAR ARANG ESTATE
Kota Muda
Tikam Batu
Pinang Tunggal
TIKAM BATU ESTATE
to Pulau Pinang
Padang Serai
Lunas
KULIM ESTATE
to Kulim
N
0
1
2
Kilometers

96-186 HR

I. HIGHLIGHTS

1. **Objectives and Scope**. The goal of the Project was to increase potable water supply and generate socioeconomic benefits. The main objective of the Project was to expand the water supply system serving the town of Sungai Petani and the surrounding areas in the State of Kedah. The Project included plant, equipment, and civil works for the abstraction, treatment, and transmission of 68,000 cubic meters a day (m^3/day) of water from the Muda River to the area covered by the Project. It included a water intake and treatment works, pumping systems, transmission mains, and service reservoirs. It also included consulting services for site investigations, preparation of design, construction supervision, identification of the causes of nonrevenue water (NRW), formulation of measures for reducing NRW, and implementation of leakage control programs.

2. **Cost, Financing, and Schedule**. The total cost of the Project was estimated at $38.8 million, of which the Bank's loan for $24.5 million was to finance the entire foreign exchange cost of the Project. The actual cost of the Project was $24.3 million or about 63 percent of the estimated cost at appraisal. The cost underrun was caused by lower than forecast prices for equipment and by lower than expected contractors' prices for plant and civil works because of the recession in the economy. Only $12.9 million (or 53 percent) of the Bank loan was disbursed. The Project was completed in October 1991, about 40 months later than estimated at appraisal.

3. **Implementation**. The Project was fully implemented as designed. Twelve major contracts were awarded and financed by the Bank. The standard of work was high and the contractor's performance was satisfactory. The Executing Agency, Kedah Public Works Department (JKR), implemented the Project without major technical problems.

4. **Institutional Aspects**. Some improvement in the operational performance of JKR was achieved through the Project. However, the financial management of the Water Supply Division (WSD) within JKR needs further improvement. The introduction of new computerized systems in 1994 resulted in a significant improvement in data relating to consumption, revenues, arrears, and losses. No training was provided by the Project to strengthen the institutional capability of JKR.

5. **Environmental Impact**. There were no significant adverse effects on the environment.

6. **Cost/Benefit Assessment**. The financial internal rate of return (FIRR) for the Project was reevaluated at about 4.0 percent, compared with the estimate of 5.6 percent in the Project Completion Report (PCR) and the estimate at appraisal of 5.1 percent. The FIRR estimated by the Postevaluation Mission (PEM) is lower because of higher estimates of operating cost, more conservative assumptions about the level of NRW reduction, and lower incremental water production compared with the estimates in the PCR and at appraisal. An economic cost/benefit analysis was not carried out in the PCR or at appraisal. The rapid socioeconomic assessment in the field indicated that consumers are satisfied with water supply and are willing to pay higher tariffs to sustain the benefits.

7. **Overall Performance and Sustainability**. Overall, the performance of the Project is rated as generally successful. It has achieved its objective of expanding the water supply system in Kedah with substantial socioeconomic benefits. The expanded system is meeting the

projected need and the physical facilities are well maintained and operating efficiently. The quality of water is good. No incidence of water-borne diseases has been reported during the last five years. The population covered by water supply has increased from 58 percent in 1984 to over 90 percent in 1995. The capacity of the treatment system is fully utilized (see Appendix 1). While the proceeds from water sales are directly credited into the Federal treasury, JKR continues to receive sufficient annual budget from the Government to ensure the sustainability of the system to provide an essential good (potable water) to private, commercial, and industrial consumers. JKR is improving its institutional and management capabilities to strengthen its operational performance.

8. **Feedback**. The Project demonstrated that while the least-cost approach to water supply project planning is effective in achieving technical efficiency, it is important to enhance the Project's economic efficiency by adopting a well-defined approach including institutional strengthening, improvements in financial management, and ensuring appropriate pricing mechanism. The Project also demonstrated that it is not sufficient to judge water supply projects on FIRR alone because the wrong impression about the value of the Project may be made. An economic assessment of a water supply project would determine the real benefits. The Project also illustrated the difficulties of achieving certain loan covenants such as instituting a commercial accounting system, and increasing tariffs especially for a project in which resources and assistance are not incorporated in the design.

II. BACKGROUND

A. Rationale

9. Kedah was one of the least developed states in Malaysia in the 1980s. About half of the population were without a safe piped water supply. The Fourth Malaysian Plan (1981-1985) accorded high priority to developing the water supply system in Kedah to increase the access to piped water supply of acceptable quality for the population. At appraisal, about 82,000 (or 42 percent) of the population in the area covered by the Project (see Map for the location of Project) were without piped water supply. The population in the area was projected to grow at about 3.9 percent per annum in the urban centers and about 1.4 percent per annum in the rural areas. The average per capita domestic water demand was projected to grow from 150 liters per day in 1983 to 205 liters per day by 1995. Total water demand was estimated to increase from 46,200 m^3/day in 1983 to 103,000 m^3/day in 1995. There was urgent need to establish a sustainable water supply system and to bring about socioeconomic benefits by increasing access to potable water supply for the population in the area as well as to ensure a sufficient water supply for the adjacent industrial estates such as Tikam Batu, Bakar Arang, and Kulim (see Map). The Project was expected to increase economic activities in the area, create additional employment, and help raise the income and standard of living of the population.

B. Formulation

10. The Project was preceded by a Government-funded feasibility study prepared by a local firm of consultants in 1982. A Fact-Finding Mission from the Bank visited Malaysia in April 1983. Based on the findings of Bank's Mission, the components and detailed costs of the Project were revised slightly to suit local conditions and requirements. The Project was subsequently appraised in June 1983.

C. Objectives and Scope at Appraisal

11. The Project was formulated with the goal to increase potable water supply for the population in Kedah and generate socioeconomic benefits. The main objective of the Project was to expand the water supply system serving the town of Sungai Petani and the surrounding areas in the State of Kedah. The Project was designed to expand the existing water supply by 68,000 m^3/day to meet the projected demand for water of about 90 percent of the population in the area (250,000 people) by 1995 as well as the institutional, commercial, and industrial water requirements in the area covered by the Project.

12. The scope of the Project consisted of the following components: (i) expansion of river intake works, treatment plant, and pumping system with a capacity of 68,000 m^3/day, (ii) construction of five service reservoirs with a total capacity of 45,000 m^3, (iii) supplying and laying of 55 kilometers (km) of pipes with diameters of 600 millimeters (mm) and larger, (iv) supplying and laying of 5 km of pipes with diameters of 450 mm and smaller, and (v) consulting services for site investigations, preparation of design, construction supervision, identification of causes of NRW, formulation of measures for reducing NRW, and implementation of leakage control programs.

D. Financing Arrangements

13. The total cost of the Project was estimated at appraisal at $38.8 million comprising $24.5 million in foreign exchange cost and $14.3 million in local currency cost equivalent. A Bank loan of $24.5 million from the ordinary capital resources was approved on 25 January 1984 to finance the entire foreign exchange cost of the Project. The balance, equivalent to 37 percent of the total cost, was to be financed by the Borrower ($14.3 million equivalent). The Borrower was Malaysia and the Executing Agency was JKR in Kedah.

E. Completion

14. The Bank loan was closed on 14 December 1990 and the Project was completed in October 1991. The PCR was prepared by the Bank's Agriculture and Social Sectors Department (formerly Infrastructure Department) in December 1993 and circulated to the Board on 21 December 1993. The PCR provides detailed information about the scope, costs, implementation, and operational aspects of the Project. It also provides an objective assessment of the achievements of the Project and highlights the difficulties in compliance with major loan covenants. However, the PCR made no assessment about the sociocultural and socioeconomic aspects of the Project. The PCR also did not make any analysis or comment on the appropriateness of the design of the Project or the efficiency of organization and management of the Executing Agency.

F. Postevaluation

15. The Project Performance Audit Report (PPAR) focuses on pertinent aspects of the Project and assesses its effectiveness in achieving its objectives, implementation and operation, benefits, and the sustainability of the operations of the Project.

16. The PPAR is based on a review of the PCR, the Appraisal Report, material in Bank files, and the findings of the PEM that visited Malaysia from 26 October to 12 November 1995. In Malaysia, the Mission had discussions about the Project with officials of JKR in Kedah, and general developments in the area with the State Economic Planning Unit. The Mission visited the sites of the Project at Sungai Petani and surrounding areas, and conducted field assessment of the facilities at Pinang Tunggal, Tanjong Dawal, Tikam Batu, Bedong, and Kulim. Data relating to water supply production, costs, and revenue were reviewed, and water demand and supply projections were made. In addition to the discussions with JKR staff about water consumers' perceptions, a rapid socioeconomic assessment was conducted by PEM to interview a number of domestic and industrial water consumers regarding their perceptions about water supply in the area. Copies of the draft PPAR were provided to the Borrower and to Bank staff for review and comments. Their comments have been taken into consideration and incorporated in the final PPAR.

III. IMPLEMENTATION PERFORMANCE

A. Design

17. The design of engineering works was reasonably straightforward, traditional and appropriate. The design focused mainly on expanding water supply through physical engineering works and did not emphasize the institutional development aspects. Following detailed engineering design, the length of distribution mains, and the capacity of service reservoirs were increased, compared with the original estimates at appraisal (see para. 29 for details). These changes did not affect the costs significantly and no other major changes were made during implementation.

18. The design was based on a least-cost approach in which the projected water demand in the area covered by the Project was met through a least-cost engineering designed system without consideration to the other aspects of water supply such as pricing, institutional and management strengthening, and other cross-cutting issues. Such a least-cost approach to water supply project planning is appropriate in achieving technical efficiency. At the time of appraisal, water supply was treated as an essential good and there was little need for a well-defined approach to achieve economic efficiency, which includes technical and pricing efficiency. Thus, the design did not focus on components such as the structure of water pricing, institutional strengthening, improvements in financial management, and adequate information technology. The outcome of the Project would have been improved if components that contributed to pricing efficiency had been included. Although the need to increase water tariffs was included in the loan covenants, there was no analysis of water pricing at appraisal. The increase in water pressures as a result of the Project appears to have aggravated breakages in the older parts of the distribution system; the Project could have been improved if detailed assessments had been made on the need to upgrade the older pipelines in the distribution system.

19. While the Project was simply designed to achieve the objective of expanding water supply to generate social benefits, several major loan covenants on establishing a commercial accounting system, reducing NRW, and increasing tariffs (see para. 27) were included in the Loan Agreement without any consideration whether the design of the Project was able to achieve these conditions. Because the Project was a small part of a nationwide system, some of the major loan covenants could have been achieved better through a policy dialogue or through a

sector or program loan. The Project also illustrated the difficulty of achieving significant improvement in NRW levels without providing sufficient resources and capital in the financing plan for a longer time frame.

B. Contracting, Construction, and Commissioning

20. JKR recruited a local consulting firm which was familiar with local working conditions, to undertake the site investigations, prepare the design, supervise construction, identify the causes of NRW, formulate measures to reduce NRW, and implement leakage control programs. The firm maintained good working relationships with the JKR at the Federal level and in Kedah. The overall performance of the consultants was satisfactory.

21. The Bank financed 12 contracts, all of which were awarded to local companies in Malaysia. Except in two cases, the performance of the contractors was satisfactory and the standard of work was high. The contractor selected for Contract No. 1: Water Intake and Treatment Works, commenced work in January 1987, but later he encountered serious financial problems, and terminated his contract in October 1988 with only 26 percent of the work completed. The work was retendered and awarded to another contractor in June 1989.[1] In the other case, the contractor, who was responsible for the supply and installation of pumping plant and electrical equipment (Contract No. 9), was delayed in completing the work. Apart from the implementation delays caused by these two contractors, the physical targets of the Project, as originally appraised, were achieved or exceeded.

C. Organization and Management

22. The performance of the Borrower, the Executing Agency, and the Bank, in coordinating and supervising the Project, was satisfactory.

23. The Bank monitored the implementation closely and administration of the Project was satisfactory. During the implementation of the Project, the Bank fielded six Review Missions with a staff input of about 46 person-days. In terms of number of missions, this was considered adequate. The review missions fielded averaged eight days duration and concentrated mainly on the technical aspects, financial disbursements, and physical progress.

D. Actual Cost and Financing

24. The actual cost of the Project was $24.3 million compared with the estimate at appraisal of $38.8 million (base cost was $24.9 million). About $12.9 million or 53 percent of the Bank loan was utilized. The Borrower financed the balance of $11.4 million equivalent in local currency cost. The details on the expenditures under the Project are in Appendix 2. The Bank approved a total of three partial cancellations that amounted to $11.6 million. The substantial cost underrun was mainly attributed to (i) higher estimate of civil and equipment costs at appraisal because of the energy crisis at that time (1983), (ii) the bids of the contractors and the

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[1] Although the contract provided a penalty clause, JKR did not demand compensation because (i) the long legal procedures could have aggravated the delay in implementation of the Project; and (ii) the contractor was not expected to be able to pay any compensation in view of his financial problem.

suppliers for civil works were significantly lower than the engineer's estimates because of the recession in 1983-1985, and, (iii) the contingencies estimated at appraisal were too high (35 percent of base cost).

25. The loan became effective in June 1984. The first disbursement was in September 1984. The final disbursement from the loan was in December 1990, compared with the original date of December 1988.

E. Implementation Schedule

26. The Project was completed on 31 October 1991 compared with the estimate at appraisal of June 1988. There was a significant delay of about 40 months. The initial protracted delay was caused by disagreement between the Government and the Bank regarding the use of materials and labor from Malaysia in the civil works contracts. The retendering of the civil contract for the water intake and treatment works, and the poor planning and coordination by the contractor responsible for the supply and installation of pumping plant and electrical equipment contributed to the delay (see para. 21).

F. Compliance with Loan Covenants

27. The Borrower and the Executing Agency have complied with most loan covenants. However, there were some partial or noncompliance. The major uncomplied covenants and PEM's comments are given below:

(i) **NRW**. JKR at Kedah was required to reduce NRW from 45 percent of production at appraisal to 25 percent of production by 1990. The level of NRW actually increased to 62 percent upon completion of the Project, but was reduced to about 50 percent during PEM. In retrospect, the covenant that required NRW be 25 percent upon completion of the Project (1990) appears to have been an unrealistic requirement without a detailed analysis of its feasibility. To achieve a reduction in NRW, there is need for longer timeframe and capital resources to overcome the deficiencies in the existing old distribution system (see also paras. 19 and 32).

(ii) **Commercial Accounting System**. The covenant that required a commercial accounting system be installed by JKR at Kedah has not been complied with. While the state government has been considering making WSD an independent commercial entity and introducing a commercial accounting system, it would entail changing the organizational structure within the JKR administration at Kedah, which is a major exercise and involves substantial costs. It appears that the requirement at appraisal was made without a detailed study of the structure of JKR or a policy dialogue with the Government. Thus, it was unreasonable in view of the complex Government structure and the procedures that apply to all state JKRs in Malaysia. Bank-assisted water supply projects in other states faced a similar problem.[1]

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[1] *Impact Evaluation Study of the Water Supply and Sanitation Sector in Malaysia — Survey and Related Studies*, funded under TA No. 2055-MAL, May 1994.

(iii) **Water Tariff Increase**. The covenant that tariffs be maintained at levels adequate to cover (i) all operation and maintenance (O&M) costs; (ii) depreciation or debt service charges to the extent that such charges exceed the provision for depreciation; and (iii) at least 20 percent of its capital expenditure program, was not fully complied with. The JKR at Kedah increased its first water tariffs in January 1993 (after completion of the Project) by about 30 percent for domestic consumers and by about 60 percent for industrial and commercial users, which became one of the highest water tariff rates in the country. This was a significant tariff increase for a relatively poor state (the third poorest state in Malaysia) with an incidence of poverty of about 30 percent at that time. From the limited financial information available from JKR in Kedah, it appears WSD is covering all its O&M costs. The present accounting system of JKR provides limited financial information and data. Without proper income statements, balance sheets, and cash flow statements, it is not possible to measure the actual extent of cost recovery. In addition, it must be emphasized that any further increase in water tariffs will have to follow the norms for the other states in the country.

(iv) **Benefit Monitoring and Evaluation**. BME of the Project as covenanted has not been carried out. JKR did not have the resources and manpower to carry out the BME. In addition, JKR has no idea of how to implement it. The Bank's Review Missions did not provide any assistance in helping JKR set up a BME system. Most of the officials in JKR are professional water works engineers and are not interested in BME.

28. As a consequence of partial or noncompliance with these covenants, the financial performance and management efficiency of the Project were eroded. The high level of NRW and the lower than expected water tariff level have reduced the financial return (see para. 37). In addition, management efficiency could have improved if WSD had adopted a commercial accounting system and implemented BME.

IV. PROJECT RESULTS

A. Operational Performance

29. As a result of water supply expansion program under the Project, the water treatment plant at Pinang Tunggal expanded its production by about 68,000 m^3/day as envisaged at appraisal. Five service reservoirs with a capacity of 52,500 m^3 were constructed, which is larger than the appraisal estimate of 45,000 m^3, because of the need to cope with the fluctuations in the daily demand. The length of distribution system was also increased from the originally estimated 60 km to 75.4 km because of the change in the urban development plan and the construction of a new highway that required the transmission mains be modified. It was anticipated at appraisal that the Project would serve three industrial estates: Tikam Batu, Bakar Arang, and Kulim (see Map). The needs of the Kulim Estate, however, are being met from another upgraded water treatment plant located at Kulim (funded by Government), which was recently upgraded to 36,000 m^3/day capacity. Instead, the facilities provided under the Project are supplying a larger, rapidly expanding new industrial estate, the Ria Jaya Industrial Estate, near Sungai Petani (see Map).

30. The Pinang Tunggal water treatment plant constructed under the Project is currently producing about 25 million m^3/year or about 68,000 m^3/day, and directly or indirectly serving over 300,000 people and the industrial estates in the area. With NRW at about 50 percent, only about half of the water being produced is sold to consumers (about 12.7 million m^3 in 1995). However, the number of metered connections in the area had increased markedly, from about 23,000 in 1983 to about 60,000 in 1995. The population directly served by the metered connections is estimated at about 308,000, which is about 95 percent of the total population in the area served by the Project. Based on field information collected by PEM (see para. 39), the water consumers were satisfied with the improved water supply and had only few minor complaints such as faulty meters and occasional interruptions in water supply because of broken pipes. The overall maintenance and operation of the facilities provided under the Project are satisfactory. Production is currently being achieved as planned. The current water production capacity is more than sufficient to meet the demand. The water pressure is good and consumers have not registered any major complaints about the water supply with JKR at Kedah.

31. The operation of the water intakes and the treatment plant, and the distribution to the service reservoirs at Pinang Tunggal have been contracted to a private firm since the treatment plant started operating in 1991. The treatment plant is currently well maintained and efficiently operated by the private company. The management of water intake and treatment plant by a company in the private sector was a significant step taken by the state government of Kedah in improving the operation efficiency of water supply. The PEM was informed that compared with other treatment plants operated by JKR in Kedah, the treatment plant provided under the Project and managed by a private company experienced significantly less breakdowns and the equipment is better maintained. The JKR in Kedah manages the distribution and sales of water from service reservoirs to the consumers. The state government of Kedah has initiated action to install a commercial accounting system in the WSD that will eventually contribute to commercialization of the distribution and sales of water to the consumers.

32. The level of NRW increased to 62 percent of water production in 1991 upon completion of the Project. The higher water pressure in the old distribution lines appears to be the cause of the higher NRW. The establishment of a leakage program control unit within WSD in 1993 has lowered the NRW to about 50 percent at the time of PEM. The consultants' report on NRW confirmed that most of the NRW resulted from physical losses rather than from administrative inefficiencies. With the benefit of hindsight, it is noted that the completion of Project aggravated the physical losses by increasing the water pressure in the system. Under normal circumstances, it would take time and capital resources to bring about significant reduction of NRW. The PEM, however, considers that the expectation to reduce NRW to 25 percent upon completion of the Project was unrealistic. Given time and financial resources to rehabilitate the old system, JKR should be able to gradually bring down the NRW to about 25 percent by year 2019 (see also para. 37).

B. Institutional Development

33. The institutional performance of JKR in Kedah has been improved by the experience gained from the implementation and operation of the Project during the last 10 years. It is more efficient in tendering civil works, organizing work schedules, and managing private contractors. The consultancy on reduction of NRW provided under the Project has enabled JKR at Kedah to implement a program on leakage control for the whole state. However, the finance

and management of JKR are still weak. It has not introduced the commercial accounting system to control the financial performance of the WSD. Data relating to consumption, losses, revenues, and arrears were not adequately recorded for efficient control and planning. However, the introduction of computerized management information system in 1994 has significantly improved the information available for management decision making.

C. Financial Performance

34. The JKR at Kedah has no commercial accounts such as income statements, balance sheets, and cash flow statements. Records are maintained for cash expenses, and minor items (office assets, consumables), but records of major assets, depreciation, debt servicing, and financing charges are not available. There were also no separate records for the Projects and financial analysis of the water supply enterprise is not possible.

35. The cost of O&M per unit of water produced appears to be improving. An examination of data provided by JKR at Kedah indicated that the cost of O&M per unit of water produced is about RM0.25 per m^3 including the water distribution cost of RM0.08 per m^3 and the payment incurred by JKR to a private management company of RM0.17 per m^3 for operating the water intake and treatment plant at Pinang Tunggal. The current cost of O&M is considered adequate for ongoing maintenance and operation works, but an increase is needed to finance the replacement of the old distribution pipes to reduce the level of NRW (see also para. 44). In 1994, the total incremental cost of O&M amounted to about RM5.3 million. The revenue per m^3 of water produced has improved, from RM0.29 in 1991 to about RM0.31 in 1994. However, the overall revenue continues to be affected by the high level of water losses. Total incremental revenue amounted to about RM6.5 million in 1994.

36. The past inadequacies in the revenue collection and management information systems appear to have contributed to the significant increase in accumulated arrears. In 1993, the year of the last tariff adjustment, accumulated arrears increased from about RM6 million to RM20 million, with a further increase of about RM3 million in 1994. The change to computerized meter reading and recording systems in 1994 apparently uncovered a large backlog of shortfalls in collections. Unfortunately, this coincided with the tariff increase in 1993, and aggravated the consumers. It also contributed to accumulation of further arrears in 1994 as many consumers were reluctant to pay pending the verification of their charges in 1993.

37. The PEM has undertaken financial reevaluation based on the estimated incremental production and consumption from the Project, similar to the financial evaluations carried out at appraisal and in the PCR. The PCR estimated the FIRR at about 5.6 percent compared with the estimate at appraisal of about 5.1 percent, assuming the tariffs are increased regularly, NRW is reduced to 25 percent by year 2004, and cost of O&M is about RM0.10 per m^3 of water produced. The model used by the PEM is more conservative about how quickly NRW can be brought under control. The model projects NRW will be reduced from the current 50 percent to about 40 percent by the year 2004 and to 25 percent by the year 2019. To provide adequate fund to replace old pipes to reduce NRW, the current cost of O&M of RM0.25 per m^3 of water produced (which is adequate) will need to be increased further in real terms by about 3 percent annually. This will ensure that sufficient funds are available for the replacement of old pipes in the future. The model also assumed that water tariffs will increase in real terms by about 20 percent every five years. To realistically achieve these parameters, it is assumed that the WSD

will become a commercial entity in the next two years. The PEM's estimate of the FIRR of the Project is about 4 percent (see Appendix 3), which is slightly lower than the estimates made at appraisal and in the PCR. Although the FIRR appears lower than expected, the current level of revenue is expected to increase gradually because of the reduction in NRW and the increases in the future water tariff. These increases will ensure adequate funds are available for O&M to maintain the sustainability of the Project. In addition, the Project has generated significant indirect economic benefits in terms of its contribution to improvements in health and rapid industrialization in the area.

D. Sociocultural and Socioeconomic Results

38. The PEM conducted a rapid socioeconomic survey, which included interviews with 30 domestic consumers, and 8 industrial consumers in the area served by the Project. A general observation is that the facilities provided under the Project in the late 1980s have been a major support to the state government in Kedah in inducing industrial investment in the area, especially in Sungei Petani area. The area is now experiencing significant economic growth.

39. The majority of the respondents were young (30-40 years old) with families of about five persons. The consumers interviewed were mostly satisfied with the quality and pressure of the water supply, and the majority of them indicated that the water supply had improved in the last five years. No major health problem could be recalled by any respondents during the last five years. Many households interviewed had flush toilets and washing machines; about half had a shower in the bathroom; and most of the houses disposed the grey water in the open drainage system.

40. All domestic respondents, and most of the industrial respondents, indicated that they would be prepared to pay more for the water consumed. About 60 percent of domestic users said they could accept increases of more than 50 percent; however, the industrial respondents were more reluctant. Three industrial respondents indicated they would seek alternative sources of water if the tariffs were increased significantly. Many domestic and industrial users indicated that if charges increased they would exercise more constraint and use less water. Overall, the water consumers are satisfied with the quality and improved services provided by the JKR in Kedah.

E. Women in Development

41. The rapid socioeconomic survey indicated that more than half of the women are concerned and responsible for the household water supply. The women also expressed satisfaction with the improvements in the water supply in terms of potability and reliability over the last five years, which has helped improve the health of their children. The increased availability of piped water supply through more direct house connections and public standpipes has benefited women by reducing the time and energy spent on fetching water from alternative sources.

F. Environmental Impacts and Control

42. There were no significant adverse effects on the environment. Minor soil erosion occurred during construction of the facilities at the intake work site but the effect was minimal and temporary. In general, environmental impact of the Project has been positive.

43. There has been an increase in the coverage of population served by piped water supply, and the water quality has improved. There has also been a significant increase in flush toilet facilities and septic disposal. In addition, the frequency of monitoring of river water conditions, which is part of normal treatment plant operations, has increased.

G. Sustainability

44. The area covered by the Project has continued to develop because of the rapid economic growth in Kedah. The facilities provided by the Project served to supplement the private investment in residents, offices, and industrial estates. To ensure the O&M of the facilities is satisfactory, the provisions for O&M expenses in real terms need to be increased. The sustainability of the benefits of the Project depend on satisfactory O&M of all water supply facilities including the older facilities (such as old distribution pipelines and water treatment works), which are now integrated with the facilities provided under the Project. The O&M of these older facilities is difficult and expensive. Capital investment is needed to upgrade these older facilities in order to reduce NRW. The Government has committed to continue allocating sufficient funds for O&M of the existing facilities and future expansion. Making WSD an autonomous body could also enhance the efficiency of the system.

45. The water intakes, treatment plant, and the distribution system to the service reservoirs are currently well maintained by the private company. The Government signed a contract with the private company for 20 years for a fixed fee of RM0.17 per m^3 of water produced. The fee is subject to revision based on inflation factor. The company informed the PEM that the fee is adequate to cover all their expenses plus a profit margin. This arrangement ensures the sustainability of the water intakes and treatment plant financed under the Project. Water production has reached the capacity of 68,000 m^3/day, as targeted at appraisal. This level of water production is expected to be maintained in future under the present contract with the private company. Although the reestimated FIRR at 4.0 percent is slightly lower than the appraisal estimate of 5.1 percent, the net positive cashflow (see Appendix 3) and Government's existing policy[1] that JKR will continue to receive budget from both the state and Federal Government to maintain and upgrade water supply operations in Kedah, ensure that the Project will be sustainable. The current efforts of JKR at Kedah in upgrading its institutional capabilities and maintaining an efficient O&M system should enable it to sustain and improve its current operations. However, to improve efficiency and ensure the long-term sustainability of the facilities included in the Project, concerted effort needs to be made to commercialize WSD.

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[1] The Government is also promoting privatization and commercialization of water supply entities in all the states in Malaysia. There is a possibility that the WSD of JKR in Kedah will be commercialized in the near future.

V. KEY ISSUES FOR THE FUTURE

A. Institutional Development and Corporatization

46. At the time of appraisal of the Project, the change toward autonomy of state water utilities, private contracting and, in some cases, private ownership and operation of water production facilities, was not anticipated. While in the 1990s, the trend is towards corporatization and eventual privatization of public utilities in Malaysia. This trend is a strong catalyst that encourages the adoption of commercial accounting systems, and improvements in management information systems, planning, professional staff, and quality of service. It will require substantial institutional development in the water supply sector in Malaysia. However, there is already an increase in the capital expansion of water supply entities being financed by private companies. Although the present Government policy at the federal level encourages private investment in the water supply sector, two major constraints are evident. One is the regulatory framework for water pricing that is the responsibility of the state. Water tariffs vary significantly among the states and are heavily influenced by politics within the state because of the fear of consumer protests and political disadvantage. Some states are not interested in raising the water tariffs higher which is necessary for viable private sector investments. Second, there is need to improve corporate capability and financial management of the water supply entities. In such an environment, there is need for the Bank to reassess its role, strategy, and emphasis about what it can do better. An important role would be to enhance institutional development by providing support for the restructuring of sector institutions and the environment in which they operate. This would require policy dialogue about appropriate policies such as consistent and adequate water tariffs for all states, and assistance in establishing an appropriate legal, regulatory, and administrative framework to provide better incentives to private water suppliers to meet consumers' demand. There is also need for greater autonomy to manage the entity so that more formal performance monitoring procedures and professionalism in management can be adopted.

47. Because future water supply projects in Malaysia will probably be financed by the private sector, the Bank's assistance in water supply sector should focus on establishing a sound regulatory framework and providing technical assistance to both the Government and the private sector to improve management information systems, planning, forecasting, revenue collection, commercial accounting, and quality of the service.

B. Tariffs

48. The inability to increase tariffs to achieve full cost recovery is a common failure in water supply projects. The Bank usually includes a requirement that water tariffs be increased as one of the conditions in loans for water supply projects, but rarely includes a component in the project to help achieve this increases. There are indications that consumers are prepared to pay full cost for water supply, particularly if they understand what they are paying for. There is certainly a need to raise consumer awareness about the value of water and to educate them about the cost of water supply to increase their acceptance of regular tariff increases. However, water tariff increases should not be advocated to cover the cost of inefficient operations. The Bank should consider in future water supply projects assistance in establishing and strengthening public relations and consumer education by water supply institutions to facilitate the acceptance by the public and politicians of the need to review and adjust water tariffs on regular basis to achieve full cost recovery. More importantly, consumers should be made aware

that adequate water tariffs are essential to ensure economic efficiency in the use of water and to finance the expansion of water supply system to match the increase in demand by water consumers.

C. Loan Conditions

49. Loan conditions that are not feasible or that are imposed without detailed study should not be included because they do not contribute to achieving the objectives of the Project. The imposition of such loan conditions could be handled more efficiently through other means such as policy dialogue or separate assistance packages, especially if no assistance was provided under the Project to facilitate compliance. There is a need to ensure that loan covenants are realistic, well integrated in the design of a project, and compatible with the capability of the Executing Agency.

VI. CONCLUSIONS

A. Overall Assessment

50. The Project has made a significant contribution to the high economic growth in the areas that it covered, which have become the key industrial and residential areas in the state. In the last few years, the Sungai Petani area has become the fastest growing area in Malaysia, part of this could be attributed to the improvements in the water supply that were planned more than a decade ago. The primary objective of the Project to expand water supply capacity in the area was fully achieved and it has generated considerable socioeconomic benefits by improving the quality of life by providing potable water for the local communities, including low income groups. The Project also achieved all the physical targets in the original scope. The water production facilities are being efficiently managed and operated by a private company. The Project is being well maintained and the quality of water produced is good. The population covered by the water supply provided under the Project has increased from 58 percent in 1984 to over 90 percent now. The capacity of the treatment system was fully utilized in 1995, as projected at appraisal. Consumers consider that the service has improved and it is generally satisfactory. The consumers are willing to pay more to prevent the service from deteriorating. Overall, the Project is considered generally successful.

B. Lessons Learned

51. The Project demonstrated that the least-cost approach to water supply project planning is an effective method to achieve an efficient technical design to produce and deliver goods (i.e., water) to the consumers. The overall economic efficiency could be enhanced further by adopting a well-defined approach including institutional strengthening, improvements in financial management, adequate information technology, and appropriate pricing mechanism. It is now commonly accepted that in a fast developing country such as Malaysia, water is increasingly viewed as an economic good and hence it is necessary to assess the economic efficiency of the water supply system.

52. The main concerns about implementation of the Project were the difficulties faced by JKR in Kedah in complying with the loan covenants regarding the introduction of a commercial accounting system, full cost recovery through tariff adjustments, significant reduction

of NRW, and establishment of a BME system. These covenants were apparently included in the Loan Agreement without giving much consideration as to whether they were achievable or appropriate within the context of the Project. In addition, no assistance was provided to assist JKR in complying with these covenants. Thus, the lesson is that the covenants in the Loan Agreement should be based on a detailed consideration of whether such covenants are appropriate and feasible, or whether their compliance could be achieved better through other means such as policy dialogue or technical assistance. The Bank should be careful about imposing loan conditions in an environment in which they are not feasible, or in which they are impractical, especially for a project in which resources, assistance, or guidance are not included in the design.

53. Another lesson learned is that to achieve a significant reduction in the NRW, it is not sufficient to merely specify an unrealistic target. A detailed program to achieve realistic targets must be outlined. Also, in the future, projects that double production capacity, and install new service reservoirs to improve water pressures, should include measures to prevent breakages and losses in the older parts of the system that may be caused by increased water pressures. The Project illustrated the difficulty of achieving significant improvement in NRW levels without including financing for specific components to achieve this goal in the Project.

C. Follow-up Actions

1. For the Bank

54. The JKR in Kedah informed the PEM that the state government has conducted a study to examine the feasibility of making the WSD a commercial entity and introducing a commercial accounting system. The JKR in Kedah is also receiving funding from the Federal Government to upgrade the older distribution system in an attempt to reduce NRW. There is need for the Bank to continue monitoring the status of these efforts.

2. For the Borrower

55. The Borrower should ensure that sufficient budget be provided to JKR in Kedah to enable it to upgrade the old pipeline system to reduce the level of NRW. It is also essential that JKR in Kedah continue to pursue the matter of corporatization of WSD with the state government. JKR should also continue to strengthen public education campaigning on water supply so the public will understand the importance of conserving water and its cost.

APPENDIXES

Appendix 1

PROJECT PHYSICAL ACHIEVEMENTS

Physical Target	Appraisal	Actual Achievement	Difference	% of Appraisal Target
Treatment Plant Capacity Expansion	68,000 m^3/day	68,000 m^3/day	0	100
Year of Full Capacity Utilization	1995	1995	–	–
Reservoirs				
(i) Number	5	5	0	100
(ii) Capacity	45,000 m^3	52,000 m^3	7,000 m^3	116
Distribution System	60 km	75.4 km	15.4 km	126
Beneficiaries	250,000	308,000	58,000	123
Nonrevenue Water (%)	25	50	25	–100

Appendix 2

PROJECT COST SUMMARY
($ million)

Item	Appraisal			Actual		
	Foreign Cost	Local Cost	Total	Foreign Cost	Local Cost	Total
Civil Work	4.6	6.9	11.5	3.3	8.5	11.8
Equipment	9.9	1.4	11.3	6.3	1.8	8.1
Consulting Services	0.3	1.8	2.1	0.3	1.1	1.4
Contingencies:						
Physical	1.5	1.0	2.5	–	–	–
Price	3.9	2.2	6.1	–	–	–
IDC	4.3	1.0	5.3	3.0	0.0	3.0
Total	24.5	14.3	38.8	12.9	11.4	24.3

FINANCIAL REEVALUATION

A. Assumptions

1. The life of the Project is assumed to be 30 years, in accordance with the time frame assumed at appraisal.

2. All the figures are expressed in constant 1995 prices. Current capital investment costs are adjusted to constant 1995 prices using the relevant consumer price index for local currency costs and manufacturing unit value index for the foreign currency costs. The details are in Table 1.

3. The operating and maintenance cost (O&M) is derived from information available from the Kedah Public Works Department (JKR) office (see Table 2). An average O&M costs of RM0.25 per m^3 was used to cover JKR operating cost of RM0.08 per m^3 and the contract cost of RM0.17 for the private company to operate the water intake works and the treatment plant. The O&M cost will increase in real terms by about 3 percent annually.

4. The nonrevenue water is realistically assumed to be reduced from the current 50 percent to 40 percent by the year 2004 and to 25 percent by the year 2019. This is a more conservative and realistic assumption than the assumption in the Project Completion Report.

5. The average sale price (tariffs) is expressed in 1995 constant prices. Water tariff level is assumed to be increased by 20 percent every fifth year from 1993, similar to the assumption made in the PCR.

B. Financial Reevaluation

6. The cash flow analysis for the estimation of the financial internal rate of return (FIRR) is in Table 3. The reevaluation indicated that the FIRR is about 4 percent.

Table 1: Capital Investment Costs

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Local Cost												
Current (RM million)	0.452	0.688	2.519	2.417	5.587	3.819	7.405	5.948	1.572	2.667	–	–
CPI (Malaysia) 1990=100 [a]	90.4	90.8	91.4	92.1	94.4	97.0	100.0	104.3	109.3	113.1	117.4	121.5
Index adjustment (1995=100)	0.74	0.75	0.75	0.76	0.78	0.80	0.82	0.86	0.90	0.93	0.97	1.00
Financial cost (1995 prices)	0.607	0.920	3.348	3.189	7.192	4.784	8.997	6.929	1.748	2.865	–	–
Foreign Cost												
Current ($ million)	0.117	0.200	2.860	2.450	2.640	2.370	2.230	–	–	–	–	–
MUV index (1990=100) [b]	68.05	68.60	80.39	88.84	95.31	94.65	100.00	102.23	106.64	107.17	110.85	114.02
Index adjustment (1995=1)	0.60	0.60	0.71	0.78	0.84	0.83	0.88	0.90	0.94	0.94	0.97	1.00
Constant 1995 ($ million)	0.196	0.332	4.056	3.144	3.158	2.855	2.543	–	–	–	–	–
Exchange 1995 ($1=RM2.50)												
Constant 1995 (RM million)	0.490	0.831	10.171	7.861	7.896	7.138	6.357	–	–	–	–	–
Total (RM million)												
Financial cost (1995 prices)	1.098	1.751	13.489	11.050	15.087	11.922	15.354	6.929	1.748	2.865	–	–

[a] CPI (Malaysia) from *Key Indicators of Developing Asian and Pacific Countries* (1994), Asian Development Bank.
[b] Manufacturing Unit Value Index (MUV) from *World Bank Commodity Price Outlook Inflation Indices*, May 1995.

Table 2: Operating and Maintenance Costs (Project Districts of Kuala Muda and Sik)

	1991	1992	1993	1994
Water production (million m^3)	35.52	41.32	46.63	46.03
JKR operation cost (RM million)	0.58	2.53	6.03	3.89
JKR O&M costs (RM/m^3)	0.02	0.06	0.07	0.08
Private Company O&M costs (RM/m^3)	0.17	0.17	0.17	0.17
Total O&M costs (RM/m^3)	0.19	0.23	0.24	0.25

Table 3: Financial Internal Rate of Return Analysis
(Constant 1995 Prices)

Year	Incremental Water Production (million m^3)	Losses	Incremental Water Consumption (million m^3)	Average Water Tariff RM/m^3	Capital Cost (RM'000)	O&M Cost (RM'000)	Total Incremental Revenue (RM'000)	Net Cash Flow
1984					1,098			(1,098)
1985					1,751			(1,751)
1986					13,489			(13,489)
1987					11,050			(11,050)
1988					15,087			(15,087)
1989					11,922			(11,922)
1990					15,354			(15,354)
1991	7.40	45.0%	4.07	0.53	6,929	1,851	2,157	(6,623)
1992	16.16	50.0%	8.08	0.52	1,748	4,040	4,202	(1,586)
1993	21.75	50.0%	10.88	0.61	2,865	5,438	6,634	(1,669)
1994	21.24	50.0%	10.62	0.61		5,310	6,478	1,168
1995	24.82	49.0%	12.66	0.61		5,711	7,722	2,011
1996	24.82	48.0%	12.91	0.61		5,882	7,873	1,991
1997	24.15	47.0%	12.80	0.61		6,059	7,808	1,749
1998	24.06	46.0%	12.99	0.73		6,241	9,510	3,270
1999	24.82	45.0%	13.65	0.73		6,428	9,993	3,565
2000	24.82	44.0%	13.90	0.73		6,621	10,174	3,554
2001	24.82	43.0%	14.15	0.73		6,819	10,356	3,537
2002	24.82	42.0%	14.40	0.73		7,024	10,538	3,514
2003	24.82	41.0%	14.64	0.88		7,235	12,863	5,629
2004	24.82	40.0%	14.89	0.88		7,452	13,081	5,630
2005	24.82	39.0%	15.14	0.88		7,675	13,299	5,624
2006	24.82	38.0%	15.39	0.88		7,905	13,517	5,612
2007	24.82	37.0%	15.64	0.88		8,143	13,735	5,593
2008	24.82	36.0%	15.88	1.05		8,387	16,744	8,357
2009	24.82	35.0%	16.13	1.05		8,638	17,005	8,367
2010	24.82	34.0%	16.38	1.05		8,898	17,267	8,370
2011	24.82	33.0%	16.63	1.05		9,164	17,529	8,364
2012	24.82	32.0%	16.88	1.05		9,439	17,790	8,351
2013	24.82	31.0%	17.13	1.26		9,723	21,662	11,940
2014	24.82	30.0%	17.37	1.26		10,014	21,976	11,962
2015	24.82	29.0%	17.62	1.26		10,315	22,290	11,976
2016	24.82	28.0%	17.87	1.26		10,624	22,604	11,980
2017	24.82	27.0%	18.12	1.26		10,943	22,918	11,975
2018	24.82	26.0%	18.37	1.52		11,271	27,879	16,607
2019	24.82	25.0%	18.62	1.52		11,609	28,255	16,646
						FIRR =	**4.0%**	