



Report and Recommendation of the President to the Board of Directors

Project Number: 32254-02
September 2008

Proposed Supplementary Loan India: Urban Water Supply and Environmental Improvement in Madhya Pradesh Project

CURRENCY EQUIVALENTS

(as of 1 September 2008)

Currency Unit	–	Indian rupee/s (Re/Rs)
Re1.00	=	\$0.0228
\$1.00	=	Rs43.95

ABBREVIATIONS

ADB	–	Asian Development Bank
DSC	–	design and construction supervision consultant
EA	–	executing agency
EIRR	–	economic internal rate of return
EOCC	–	economic opportunity cost of capital
FIAP	–	financial improvement action plan
FIRR	–	financial internal rate of return
GDP	–	gross domestic product
JNNURM	–	Jawaharlal Nehru National Urban Renewal Mission
LIBOR	–	London interbank offered rate
MPUSP	–	Madhya Pradesh Urban Service for the Poor
NGO	–	nongovernment organization
OCR	–	ordinary capital resources
O&M	–	operation and maintenance
PIU	–	project implementation unit
PMIS	–	project management information system
PMU	–	project management unit
PVC	–	polyvinyl chloride
WAC	–	Water for Asian Cities
PPTA	–	project preparatory technical assistance
SRP	–	short resettlement plan
WACC	–	weighted average cost of capital
UADD	–	Urban Administration and Development Department
UIDSSMT	–	Urban Infrastructure Development Scheme for Small and Medium Towns
ULB	–	urban local body
UN-HABITAT	–	United Nations Human Settlements Programme

WEIGHTS AND MEASURES

lpcd	–	liters per capita per day
mld	–	million liters per day

NOTES

- (i) The fiscal year (FY) of the Government of India ends on 31 March. FY before a calendar year denotes the year in which the fiscal year ends, e.g., FY2008 ends on 31 March 2008.
- (ii) In this project, “\$” refers to US dollars.

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LOAN AND PROJECT SUMMARY

Borrower	India
Classification	Targeting classification: Targeted intervention-M Sector: Water supply, sanitation, and waste management (integrated) Subsector: Water supply and sanitation Themes: Sustainable economic growth, environmental sustainability, inclusive social development Subthemes: Developing urban areas, urban environmental improvement, human development
Rationale for the Supplementary Loan	<p>The initial loan for the Urban Water Supply and Environmental Improvement in Madhya Pradesh Project was approved in December 2003. Despite the initial slow start-up, the project is progressing well. In 2007 alone, contracts worth \$156 million were awarded out of the Asian Development Bank (ADB) loan proceeds of \$181 million. The cumulative contract awards reached \$173 million, with a loan balance of \$8 million for further contract awards. There is, however, about \$82 million worth of contracts that remain to be awarded. In other words, the project faces a cost overrun.</p> <p>The reason for the cost overrun is an increase in the original cost estimates, caused mainly by (i) rupee appreciation, and (ii) price increases between the initial loan appraisal in 2003 and 2007. The recent steep appreciation of the rupee resulted in the reduction of the initial loan amount in rupee terms by approximately Rs2.0 billion (\$50.6 million equivalent). The high demand for construction materials in the booming Indian economy and a worldwide increase in oil prices have led to large cost increases for construction materials—the price index of steel increased by 12% per year on average, cement increased by 10%, and fuel increased by 9%. The impact of the price escalation on the total project cost was estimated at Rs1.2 billion (\$31 million equivalent), or 9%.</p> <p>Without additional financing, the project in its original scope cannot be completed, and the system integrity of the urban infrastructure for water supply, sewerage, and waste disposal will be severely undermined. Consequently, not only will there be about a 35% reduction in the number of potential beneficiaries of the project, but the beneficiaries will also be connected to incomplete systems of urban infrastructure. Being a high priority project, these pending works will eventually have to be carried out by the government of Madhya Pradesh and the municipal corporations. However, due to the limited availability of long-term financial resources, it is uncertain when the government of Madhya Pradesh and the municipal corporations can secure the full amount to complete the original project scope. The economic</p>

and financial analyses of the initial loan indicate that the extent of reduction in the internal rate of returns is greater for a 1-year delay in benefit than for a 10% capital cost increase. In other words, there is a clear indication that completion of the full scope of the project is more financially sustainable and economically viable than leaving the project incomplete for an unknown period.

There are about 30 contracts under the proposed supplementary financing. Out of the 30 contracts, nine are ready to be awarded, and are expecting to receive ADB retroactive financing. Detailed engineering design will be completed for eight contracts before September 2008 and for all remaining contracts before January 2009.

Revised Investment Plan	Revised costs for the project, including those to be financed under the proposed supplementary loan, are estimated at \$383 million including taxes and duties, physical and price contingencies, and financing charges during implementation. The proposed supplementary loan from ADB financing is \$71 million, which consists of \$50.6 million for recuperating from the impact of rupee appreciation and \$20.4 million for meeting the price escalation.
Revised Financing Plan	Under the revised financing arrangements, the two ADB loans will cover 65.8% of the total investment costs. Of the total investment cost, the government of Madhya Pradesh and municipal corporations will finance 34.1%, and the United Nations Human Settlements Programme (UN-HABITAT) will finance 0.1% through parallel grant cofinancing. The Government of India will pass the proposed supplementary loan on to the government of Madhya Pradesh on the same terms as the ADB loan. The government of Madhya Pradesh will then onlend the loan to the municipal corporations on similar terms and conditions as that for the initial loan to be synchronous with the initial loan repayment period.
Supplementary Loan Amount and Terms	A loan of \$71 million from ADB's ordinary capital resources will be provided under ADB's London interbank offered rate (LIBOR)-based lending facility. The repayments of the supplementary loan will be fully synchronized with that of the initial loan. Consequently, the loan will have a term of 20 years, no grace period, an interest rate determined in accordance with ADB's LIBOR-based lending facility, a commitment charge of 0.15% per annum and such other terms and conditions set forth in the draft loan and project agreements.
Period of Utilization	30 September 2011
Implementation Arrangements	Implementation arrangements for the proposed supplementary loan will remain the same as for the initial project loan, except for (i) the use of advance contracting and retroactive financing, (ii) a revised implementation period, and (iii) continuous engagement of consultants.

Environmental and social safeguards assessments were conducted prior to approval of the initial loan. Since there is no physical change within the original scope and/or design, or modified or incremental activities or components, no additional environmental and social safeguards assessments are necessary.

(MAP)

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed supplementary loan to India for the Urban Water Supply and Environmental Improvement in Madhya Pradesh Project.¹

II. THE APPROVED PROJECT

A. Project Rationale

2. The state of Madhya Pradesh (which translates to "central province") is located in the geographic heart of India. It was created in 1956 by merging three states,² and until 2000 was the largest state in India.³ Its capital is Bhopal. Madhya Pradesh inherited its poor economic, social and physical infrastructure from the original three states.

3. About 50% of the gross domestic product (GDP) in India is generated in urban areas, where 28% of the population lives. The estimated per capita productivity ratio between the urban and rural populations is 7:3. This suggests that economic growth is dependent on urban areas and their ability to attract investment and increase productivity. The major cities of Madhya Pradesh have great potential for economic growth. Not only are they the centers for trading and commercial activities of the districts, but they are also becoming tourist hubs due to three World Heritage sites⁴ and several cities considered extraordinary for their architectural and scenic beauty. However, poor urban infrastructure and services are major constraints to the expansion of trade, commerce, and tourism, leading to economic inefficiency.

4. When the initial assistance of the Asian Development Bank (ADB) was proposed in 2003 in the largest cities of Madhya Pradesh—Bhopal, Gwalior, Indore, and Jabalpur—water supply did not meet standard requirements, as it was being supplied for only a few hours a day in the wet season and less than an hour every other day in the dry season. Without urgent interventions, the average water supply would have been less than 40 liters per capita per day (lpcd) by 2010, which was well below the minimum standard of 70 lpcd set by the Government of India. In addition, in Bhopal, Gwalior, and Indore, the existing sewerage systems covered less than 10% of the population, resulting in unhygienic living conditions and public health problems. Inadequate solid-waste management was evident in the largest cities; streets, drainage channels, and open areas were littered with waste. Residents and businesses felt the situation was intolerable as it affected public health and tourist perceptions of the cities.

5. To mitigate the deteriorating urban infrastructure and services in the largest cities, the Urban Administration and Development Department of the government of Madhya Pradesh, developed the Urban Water Supply and Environmental Improvement in Madhya Pradesh Project in 2003 with the help of ADB's project preparatory technical assistance (PPTA). ADB's loan appraisal mission visited Madhya Pradesh in 2003, and assessed the financial sustainability, economic viability, and safeguards requirements of the investment for urban

¹ A revised design and monitoring framework is in Appendix 1. This design and monitoring framework was revised based on the Project Framework for the initial loan in ADB. 2003. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to India for the Urban Water Supply and Environmental Improvement in Madhya Pradesh Project*. Manila. The revision was to meet the current new format and content requirements.

² The states of Bhopal, Madhya Bharat, and Vindhya Pradesh.

³ The southern portion of the state was carved off to form the new state of Chhattisgarh in November 2000 as a result of the Madhya Pradesh Reorganization Act.

⁴ The Khajuraho Group of Monuments, including the Devi Jagadambi temple, became a World Heritage site in 1986, the Buddhist Monuments at Sanchi were listed in 1989, and the Rock Shelters of Bhimbetka were listed in 2003.

infrastructure improvement.

B. Objectives and Scope

6. To help the government of Madhya Pradesh achieve the goal of sustainable economic growth and poverty reduction in the largest cities of Madhya Pradesh, ADB approved a loan for financing the project for \$200 million in December 2003. The project⁵ would achieve the goal by (i) reducing the vulnerability of people to environmental degradation, poverty, and natural hazards; and (ii) increasing economic opportunities in the largest cities through improving (a) water supply services, (b) sewerage and sanitation services, (c) storm-water drainage, (d) solid-waste management services, and (e) slums and poor settlements.

7. The project comprises three parts:

- (i) Part A: Urban water supply and environmental improvement. This covers the improvement and expansion of the following municipal infrastructure and services: (a) urban water supply, (b) sewerage and sanitation, (c) storm-water drainage, and (d) solid-waste management.
- (ii) Part B: Public participation and awareness program. This consists of (a) two community funds that will be the basis for participatory planning between the municipal authorities and the poor communities of the neighborhood to integrate slum improvements with citywide infrastructure, and (b) the Water for Asian Cities Program in India covering urban water conservation and demand management to be financed through parallel cofinancing by the United Nations Human Settlements Programme (UN-HABITAT). These activities were designed to strengthen the capacities of the project cities to plan and manage urban development in a more effective, transparent, and sustainable manner.
- (iii) Part C: Project implementation assistance. This consists of support to the state project management unit (PMU) and the city project implementation units (PIUs) with activities immediately related to the implementation of the project.

C. Cost Estimates and Financing Plan

8. The total cost of the project was initially estimated at \$303.5 million equivalent (including taxes and duties of \$17.4 million equivalent). To meet the estimated project cost, the Government initially requested ADB to provide a loan of \$200.0 million, which represented 65.9% of the total cost of the project, from its ordinary capital resources (OCR). The loan had a 25-year term, including a grace period of 5 years, an interest rate determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility, a 0.75% per annum commitment charge, a 0.5% front-end fee, conversion options in accordance with ADB's *Conversion Guidelines*,⁶ and such other terms and conditions set forth in the loan and project agreements. UN-HABITAT provided and administered parallel grant cofinancing of \$0.5 million.

⁵ As a result of the Staff Instructions on Project Classification on 7 December 2004, the targeting classification of the initial loan was revised from "poverty intervention" to "targeted intervention-M." The project benefits from (i) improvements in water supply, sanitation, and garbage collection and disposal within the project cities; and (ii) the construction of a tertiary water distribution network, and community latrines inside the slum settlements. It will also contribute to achieving Millennium Development Goal 7: Ensure environmental sustainability in an inclusive manner.

⁶ ADB. 2008. *Guidelines for Conversion of Loan Terms for ADB LIBOR-Based Loans*. Manila

9. The Borrower was India and the foreign exchange risk was borne by the Government. The Government was to pass the initial loan to the government of Madhya Pradesh as 70% debt and 30% grant. The government of Madhya Pradesh was to onlend the full amount of the loan portion to the municipal corporations in rupees equivalent at 10.5% per annum with repayments over 25 years including a grace period of 5 years. The grant portion was passed on to the government of Madhya Pradesh as a grant.

10. In September 2004 before the loan signing, however, the Government requested ADB to cancel \$19 million of the loan amount. This was because two out of the six municipal corporations, namely Ujjain and Ratlam, decided to opt out of such onlending arrangements. As a result of the withdrawal, the total project cost was reduced by 9% to \$275.0 million. After thorough assessment, ADB approved a reduction in the project scope and cancellation of the loan amount by \$19 million. The loan and project agreements were signed in March 2005 for \$181.0 million. Table 1 summarizes the original cost estimates; Table 2 summarizes the original financing plan.

Table 1: Summary of Original Project Cost Estimates
(\$ million)

Item	Foreign Currency	Local Currency	Total Cost
A. Base Cost^a			
Part A. Urban Water Supply and Environmental Improvement	41.4	146.3	187.7
Part B. Public Participation and Awareness Program ^b	0.5	5.9	6.4
Part C. Implementation Assistance	2.1	17.2	19.3
Subtotal (A)	44.0	169.4	213.4
B. Contingencies			
1. Physical ^c	3.1	11.8	14.9
2. Price ^d	4.5	17.0	21.5
Subtotal (B)	7.6	28.8	36.4
C. Taxes and Duties	0.0	10.8	10.8
D. Interest During Construction and Other Charges			
1. Interest during Construction	11.0	0.0	11.0
2. Commitment Charges	2.6	0.0	2.6
3. Front-End Fees	0.8	0.0	0.8
Subtotal (D)	14.4	0.0	14.4
Total (A+B+C+D)	66.0	209.0	275.0

Notes: The table represents the project cost estimates after cancellation of \$19 million.

^a In April 2003 prices.

^b Includes \$0.5 million proposed for UN-HABITAT support under parallel financing arrangements.

^c 7.5% for civil works, 5.0% for equipment and vehicles, and 5.0% for consulting services.

^d 2.4% per annum for foreign costs and 5% per annum for local costs throughout the implementation period.

Source: Asian Development Bank estimates.

Table 2: Original Financing Plan

(\$ million)

Source	Foreign Exchange	Local Currency	Total Cost	Percentage Total
Asian Development Bank	51.0	130.0	181.0	65.8
Government of Madhya Pradesh and Municipal Corporations	14.4	79.1	93.5	34.0
UN-HABITAT	0.5	0.0	0.5	0.2
Total	65.9	209.1	275.0	100.0

Notes: The table represents the project cost estimates after cancellation of \$19 million.

Source: Asian Development Bank estimates.

D. Status and Progress of Project Implementation

11. **Overview.** Despite initial slow progress of project implementation, the executing agency (EA) is strongly committed and project implementation is now progressing rapidly, as seen in the expeditious tendering and implementation of contracts since 2007. This was a result of a major business process reengineering undertaken by the government of Madhya Pradesh from late 2006 to streamline business procedures. The new business process became the strength of the project, and it provided lessons to other projects in India. The effectiveness of the reform was reflected in the record of contract awards. By 2006, only \$16.7 million worth of contracts were awarded out of the \$181.0 million loan proceeds.⁷ However, by December 2007, the contracts awarded out of the loan proceeds reached approximately \$172.5 million. In other words, the EA awarded contracts worth \$155.8 million out of the loan proceeds in 2007 alone. The social and environmental safeguards and the gender action plan are being complied with. (Appendix 2 provides the midterm review of implementation status.) Notwithstanding this achievement, there is still \$81.7 million worth of works and supply contract packages that remain to be awarded in order to complete the original scope of the project. Thus, there is a serious financing shortfall.

12. **Initial Weaknesses.** The project was the first large-scale investment for the government of Madhya Pradesh and the municipal corporations. At the beginning of project implementation, the government of Madhya Pradesh and the municipal corporations had no option but to use the existing project implementation procedures, which were designed for locally financed projects involving works and supply contracts worth less than \$100,000 each; the project, however, involved contracts worth at least \$2 million. This resulted in a lengthy decision-making process within the government of Madhya Pradesh and the municipal corporations. Also, the use of the government of Madhya Pradesh's schedule of rates (state-imposed ceilings on prices that were periodically updated but did not necessarily reflect market rates) has led to substantial variation in bid prices from the cost estimate of larger contract packages. A substantial difference between the cost estimate and the bid price called for rebidding. Some contractors became very cautious about the larger contracts with the municipal corporations, as the impact of payment delay on their cash flow would become bigger if the amount of each payment was larger.

13. All of the weaknesses (lengthy decision making and inaccurate cost estimates) were interconnected, and put project implementation into a vicious cycle of uncertainty and risk. Slow decision making not only caused delay in contract awards but also late payment to contractors. When contractors wanted to tender despite various risks, they had to hedge their future risk by

⁷ The contract award figures represent the value of the contracts which will be financed out of the loan proceeds in accordance with Schedule 3 of the loan agreement, and does not include the remaining portion to be financed by the government of Madhya Pradesh and municipal corporations.

asking for a higher return. In other words, the risk premium pushed the bid price even higher. Higher bid prices resulted in the increased likelihood of rejection of all bids. Uncertainty in the timing of contract award undermined business confidence, which further discouraged contractors' interest in the business opportunities. As a result, it was October 2006 before the major works contract was awarded. The cumulative contract award amount for the initial 20 months—from the loan effectiveness in May 2005 to December 2006—was virtually stagnant at approximately \$16.7 million.

14. **Business Process Reengineering.** Collaborative and continuous efforts of the EA's PMU and ADB since 2005 started to bear fruit in 2007. The PMU realized it was imperative to break the vicious cycle in project implementation, and reformed its business procedures and customs in early 2007 on its own initiative. It introduced major reforms in three areas:

- (i) **Quick decision making.** Initially, the decision on contract approval by municipal corporations was made through a municipal corporation's official meeting attended by more than 50 elected local representatives every 2 months. After the reform, decision-making authority was delegated to the mayor-in-council of each municipal corporation.⁸ Also, before issuance of official correspondence to the PMU, the concerned officers of the PIUs and municipal corporations held preliminary dialogue to reach consensus. Once consensus was reached, official letters were sent to seek official approval from the respective PIUs, the PMU, and the municipal corporations. This has substantially reduced the decision-making time.
- (ii) **Reliable costing during detailed engineering design.** In the early project implementation period, the government of Madhya Pradesh used a schedule of rates for the purpose of cost estimates and evaluation of bids which did not reflect market prices. Moreover, factors which would raise the construction costs—such as locations, climates, soil conditions, and availability of construction materials—were not taken into consideration. As a result, bid prices were substantially higher than the estimates. To minimize underestimation and/or overestimation errors, adequate steps have been taken, including (a) the use of an updated schedule of rates and market rates where applicable, and (b) consideration for factors which would vary the construction costs. Increased accuracy in costing has given the empowered committee (the highest approving authority under the project) more confidence in the PMU's estimates and decisions, and has resulted in faster approval, even though there was variance between the government of Madhya Pradesh's schedule of rates and the PMU's estimates.
- (iii) **Confidence building.** In the beginning of the project, there was a general perception among suppliers and contractors that the municipal corporations would require longer to process payment claims, which might potentially affect the contractors' cash flow. When coupled with increasing business opportunities in the private sector in the booming Indian economy, such risks discouraged contractors from seeking business under government-financed projects and resulted in no bids to initial tenders under the project. To change the perception,

⁸ The mayor-in-council is made up of the mayor, deputy mayor, and up to 10 elected members of the council named by the mayor. The mayor-in-council collectively has executive powers of the corporation and functions as a cabinet. The mayor allocates work of the corporation's departments to different council members in the same way that the chief minister of the state government allocates different portfolios to his cabinet ministers.

ADB and the PMU jointly organized a series of workshops in the project cities to raise the awareness of potential contractors. This helped the contractors to understand that the municipal corporations had a secure fund source to make immediate payment to contractors, even though the contract sizes were larger. Also, the PMU made a commitment to pay 80% of the claimed payment in 3 days.

III. THE PROPOSED SUPPLEMENTARY LOAN

A. The Cost Overrun

15. The reason for the cost overrun is an increase in original cost estimates, caused mainly by two factors: (i) the appreciation of the rupee against the dollar, and (ii) price escalation of construction materials in India. Initial slow startup of project implementation also had an adverse effect on the two factors. Out of the financing gap estimated at \$108 million, rupee appreciation accounts for \$77 million and the price escalation for about \$31 million.

- (i) **Appreciation of the rupee.** The project cost was estimated in rupees and converted to dollars using the exchange rates forecast at the time of the loan appraisal in 2003. The value of \$1 throughout project implementation was estimated at Rs50 during the appraisal of the initial loan. However, it sharply reduced to Rs40 by May 2007, and has remained close to that level throughout the appraisal of the supplementary loan. In other words, the original project cost in dollars increased by \$77 million, from \$275 million to \$352 million. Accordingly, to maintain the ADB financing amount in rupees, the loan amount in dollars needs to be increased by \$50.6 million, from \$181.0 million to \$231.6 million. Appendix 3 provides a detailed analysis of the impact of foreign exchange fluctuation.
- (ii) **Escalation of construction material prices.** By the time of the major contract awards in 2007, the unit costs of goods and materials had risen significantly since the original cost estimates for the project were prepared in 2003.⁹ High demand for construction materials in the booming Indian economy¹⁰ and a worldwide increase in oil prices have led to high price escalation of construction materials. Based on the revised cost estimates, the overall increase in the project cost in rupees is Rs1.2 billion (a 9% increase), equivalent to \$31 million. While the average annual inflation rate, based on India's wholesale price index, was around 5.5% during 2003–2007, there was a significant price increase in construction materials—the price index of steel increased by 11.6%, cement increased by 9.8%, and fuel increased 9.3% per year on average. The government of Madhya Pradesh requested ADB through the Government to finance the increment at the same proportional rate as it had the initial loan (i.e.,

⁹ An assessment was also made to identify whether the cost overrun was also caused by underestimations of the input cost. In urban projects there are generally some variations in contract price estimates between the PPTA detailed engineering design stages. This is because more detailed engineering and market data after the PPTA improve the accuracy of unit price estimates. Under this project, the impact of the unit price adjustment on the total cost after detailed engineering design was not significant and, if it had been the only change, could have been accommodated through the physical contingencies provision. Appendix 4 provides a comparison between contract price estimates at the PPTA stage and the bid results.

¹⁰ The construction component of the gross domestic product (GDP) in India increased by 10.7% to 14.2% per year between 2003 and 2007, while the manufacturing component increased by 6.6% to 12.3%, and the services component increased by 8.9% to 11.9%.

\$20.4 million, which is 65.8% of \$31 million). Appendix 3 provides a detailed analysis of the impact of price escalation.

B. Impact on the Project

16. **Undermining System Integrity.** There were approximately 120 major contracts under the original scope of the project. From the total number of contracts, the PMU allotted the initial loan to finance about 80 of the contracts. The government of Madhya Pradesh has to search for additional resources to finance the remaining 40 contracts. Without implementation of the remaining contracts, system integrity of the urban infrastructure will be severely undermined. For example, the augmented water production system of Indore and Jabalpur cannot be fully utilized in the absence of a reliable water distribution system in the existing and new areas. Sewage collected from the new sewerage network system in Gwalior will have no option but to flow into the river without treatment if there is no sewage treatment system. Conversely, there will be no sewage to be treated in the sewage treatment plant in Bhopal without the new sewerage networks system. Similarly, while more urban waste will be collected using new equipment, such collected waste will not be properly and safely disposed of in the absence of sanitary landfill sites. Supplementary Appendix A presents the existing and pending works in a graphical way to illustrate systemic integrity.

17. **Reduction in Beneficiaries.** An incomplete system of urban infrastructure will result in a reduction in the number of beneficiaries (Table 3). Across the sector, not only will there be about a 35% reduction in the number of beneficiaries, but also beneficiaries will be connected to incomplete systems of urban infrastructure. In particular, the number of beneficiaries of water supply optimization will be reduced by 46%, and the number of beneficiaries of water supply expansion will be reduced by 38%.

Table 3: Estimated Number of Project Beneficiaries by Scenario
(million)

Item	Complete Scope	Incomplete Scope
Water supply optimization	5.6	3.0
Water supply expansion	1.3	0.8
Sewerage and drainage	1.6	1.2
Solid waste management	4.7	3.6

Source: Project management unit estimates based on baseline report by benefit monitoring and evaluation consultants, April 2007

C. Rationale

18. **Implications for Economic Viability and Financial Sustainability.** According to the initial economic and financial analyses undertaken during the loan appraisal in 2003,¹¹ there are serious implications of the reduction in the beneficiaries on economic viability and financial sustainability. Being a high priority project, these pending works will have to be carried out by the municipal corporations in any case, but it is not clear when the government of Madhya Pradesh and the municipal corporations can secure the full funds. Therefore, there will be a delay in the realization of the full benefit for an unknown period. The sensitivity analysis of the initial economic analysis shows that, although the economic internal rates of return (EIRRs) of most of the subprojects in adverse conditions were higher than the economic opportunity cost of

¹¹ ADB. 2003. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to India for the Urban Water Supply and Environmental Improvement in Madhya Pradesh Project*. Manila (Appendixes 11 and 13).

capital (EOCC),¹² the extent of reduction in the EIRR is higher for a 1-year delay in benefit (19%–45%) than for a 10% capital cost increase (7%–22%). Similarly, the sensitivity analysis of the initial financial analysis shows that, while most of the subprojects earned a financial internal rate of return (FIRR) higher than the weighted average cost of capital (WACC),¹³ the extent of reduction in the FIRR is higher for a 1-year delay in benefit (13%–68%) than for a 10% capital cost increase (3%–68%). If the realization of benefit is delayed for more than 1 year, the extent of benefit reduction will become greater. In other words, there is a clear indication that completion of the full scope of the project is more financially sustainable and economically viable than leaving the project incomplete for an unknown period until the government of Madhya Pradesh and the municipal corporations identify new funding sources to complete the project.

19. **Search for Financial Resources.** ADB officially warned of the possible risk of a cost overrun in mid-2007 and the PMU was already aware that it would not be able to award new contracts from early 2008 due to exhaustion of loan proceeds, and that this would result in a delay to project implementation. The government of Madhya Pradesh did not have enough financial capacity to finance the remaining scope in a short period, as it had been in a fiscally weak position for several years. The municipal corporations had cash surpluses, but these were too small to meet the investment cost. As the project is a priority of the government of Madhya Pradesh and in order to complete the original project scope, the municipal corporations in association with the PMU actively looked for additional financial resources in 2007. They consequently identified three financial sources for the works related to about 10 contracts:

- (i) Government grants under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) to finance a large portion of works for the sewerage networks in Indore,
- (ii) Government grants under the Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT) to finance a large portion of works for the sewerage network and the sewage treatment plant in Gwalior, and
- (iii) the municipal corporations' own budget to finance some contracts for water supply optimization in Gwalior and a large portion of works related to sanitary landfill development in Bhopal.

20. **Financial Position of the Government of Madhya Pradesh and Municipal Corporations.** Since mid-2007, the government of Madhya Pradesh has assessed various borrowing options to secure financial resources for the remaining 30 contracts. The municipal corporations' financial capacity has been improving, yet is still weak; high costs of borrowing might jeopardize the municipal corporations' efforts to improve their financial position. The government of Madhya Pradesh and the municipal corporations compared the cost of borrowing between ADB loans and other development loans in India, and found that while the development loans were as competitive as ADB loans in pricing, ADB loans had the advantage of a longer repayment period with a grace period. Further, the government of Madhya Pradesh and the municipal corporations recognized value-additions of ADB's financial assistance, especially ADB's emphasis on collaborative capacity building through sharing of successful experiences in other projects in India and the region, and exposure to urban services management in advanced economies in Asia. The PMU decided to finance the remaining 30

¹² In the original economic analysis, water supply in Indore, sewerage and sanitation in Gwalior and Jabalpur, and solid-waste management in Gwalior were lower than the economic opportunity cost of capital in adverse conditions.

¹³ In the original financial analysis, water supply in Indore; sewerage and sanitation in Gwalior, Indore, and Jabalpur; and solid-waste management in Bhopal and Jabalpur were lower than the weighted average cost of capital in adverse conditions.

contracts from an additional ADB loan, and the government of Madhya Pradesh made an official request for supplementary financing to ADB through the Government in early 2008.

21. **Implementation Readiness.** Out of the remaining contracts (of which there are about 30), nine are ready to be awarded¹⁴ expecting ADB's retroactive financing. Detailed engineering design will be completed for eight contracts before September 2008 and for all remaining contracts before January 2009.

D. Revised Cost Estimates

22. Revised costs for the project, including those to be financed under the proposed supplementary loan, are estimated at \$383 million including taxes and duties, physical and price contingencies, and financing charges during implementation. Table 4 summarizes the revised cost estimates for the project. Details of revised cost estimates are in Appendix 5.

Table 4: Revised Project Investment Plan
(\$ million)

Item	Revised Cost ^a
A. Base Cost^b	
Part A: Urban Water Supply and Environmental Improvement	279.3
Part B: Public Participation and Awareness Program	12.2
Part C: Implementation Assistance	27.4
Subtotal (A)	318.9
B. Contingencies^{c, d}	46.8
C. Financing Charges During Implementation^e	17.3
Total (A+B+C)	383.0

^a In mid-2008 prices.

^b Includes taxes and duties of \$21 million.

^c Computed at 5% for civil works, equipment, consulting services, and project administration cost.

^d Computed at 5.0% for domestic inflation and 0.8% in all years for foreign inflation.

^e Includes interest and commitment charges. Financing charges are estimated, assuming an interest rate computed at the 6-month London interbank offered rate and a spread of 20 basis points, and a commitment fee of 0.15%.

Sources: Asian Development Bank's current applicable policies and the project management unit estimates.

E. Revised Financing Plan

23. The initial loan of \$181 million was allocated from ADB's ordinary capital resources (OCR). With an additional \$71 million proposed under the supplementary loan from ADB's OCR, the total available ADB loan amount will be \$252 million. The repayments of the supplementary OCR loan will be fully synchronized with the repayments of the initial loan. Consequently, the supplementary OCR loan will have a term of 20 years, no grace period, an interest rate determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility, a commitment charge of 0.15% per annum, and such other terms and conditions set forth in the draft loan and project agreements. The Government has provided ADB with (i) the reasons for its decision to borrow under ADB's LIBOR-based lending facility on the basis of

¹⁴ Procurements are being carried out in accordance with ADB's *Procurement Guidelines* (2007, as amended from time to time).

these terms and conditions, and (ii) an undertaking that these choices were the Government's own independent decision and not in reliance on any communication or advice from ADB.

24. Under the revised financing arrangements, the two ADB loans will cover 65.8% (\$252 million) of the total investment costs of \$383 million. The proposed supplementary loan will cover 65.7% (\$71 million) of the additional financing requirement of \$108 million, which will finance a portion of civil works, equipment, consulting services, and funds for municipal action planning for poverty reduction. The financing charges during implementation will not be capitalized in the ADB loans. Of the total investment costs, the government of Madhya Pradesh and municipal corporations will finance 34.1%, which will include incremental administration, financial charges, taxes and duties, land, and a portion of civil works, equipment, consulting services, and funds for municipal action planning for poverty reduction. The UN-HABITAT will continue financing 0.1% (\$0.5 million) of the total investment cost through parallel grant cofinancing for implementation of the Water for Asian Cities Program. The proposed financing plan is summarized in Table 5.

Table 5: Revised Financing Plan

Source	\$ Million	Percent
Asian Development Bank		
Ordinary Capital Resources: Initial financing	181.0	47.3
Ordinary Capital Resources: Supplementary financing	71.0	18.5
Government of Madhya Pradesh and Municipal Corporations		
Initial financing	93.5	24.4
Supplementary financing	37.0	9.7
United Nations Human Settlement Programme	0.5	0.1
Total	383.0	100.0

Sources: Asian Development Bank and the project management unit estimates.

25. The Government of India will pass the proposed supplementary loan on to the government of Madhya Pradesh on the same terms as the ADB loan. The government of Madhya Pradesh will then onlend a portion of the loan to the municipal corporations on similar terms and conditions as that for the initial loan to be synchronous with the initial loan repayment period. The existing onlending agreement, signed between the government of Madhya Pradesh and the municipal corporations, will be revised, as acceptable to ADB, limited to reflect the changes arising from the proposed supplementary loan.

F. Remedial Steps

26. Various remedial measures are already in place through the collaborative effort of the PMU and ADB to achieve timely implementation and reliable costing as described earlier. The effectiveness of the remedial measures was reflected in the amount of contract awards in 2007. To prevent further cost overruns, the EA will minimize the impact of (i) further price escalation by awarding about \$39 million worth of contracts through advance contracting and retroactive financing in 2008, and the remaining contracts in 2009; and (ii) further rupee appreciation by making a provision for larger price contingency, the majority of which will be financed by the government of Madhya Pradesh.

G. Implementation Arrangements

27. Implementation arrangements for the project under the proposed supplementary loan, including project management; procurement (a procurement plan is in Appendix 6); consulting

services; anticorruption policy;¹⁵ disbursement arrangements; accounting, auditing, and reporting; project performance monitoring and evaluation; and project review remain the same as those in the initial loan, as amended to date, except three specific aspects:¹⁶

- (i) **Advance contracting and retroactive financing.** The EA requested ADB's approval of (a) advance contracting to recruit consultants and to procure goods and civil works; and (b) retroactive financing of up to 20% of the proposed supplementary loan amount for eligible expenditures, including consultants, goods, and civil works, incurred prior to loan effectiveness, but no earlier than 12 months before the signing of the Loan Agreement. Advance contracting and retroactive financing are necessary to avoid any disruption and to ensure smooth and continuous project implementation. The EA has been advised that ADB's approval of advance contracting and retroactive financing does not constitute a commitment to finance the supplementary loan. (Contracts for retroactive financing are indicated in the procurement plan.)
- (ii) **Revised implementation period.** The project was originally expected to be implemented over 5 years with a project completion date of 31 March 2009. The PMU was unable to assign the design and construction supervision consultants (DSCs) to undertake further detailed engineering design for some of the pending works contracts. It was only when the government of Madhya Pradesh approached ADB through the Government for a supplementary loan that it had good prospects for funding sources for construction activities. Considering the delay in detailed engineering design, the completion date of the project will be extended to 31 March 2011. A revised implementation schedule is included in Appendix 7. Accordingly, the project completion date in the initial loan is also proposed to be extended to 31 March 2011.
- (iii) **Continuous engagement of consultants.** Under the initial loan for the project, an international consulting firm was engaged in 2005 as the project management consultants and two national consulting firms as the DSC, and domestic firms as public relations consultants and benefit monitoring evaluation consultants, following ADB's quality-based selection procedures. Existing consultancy contracts will expire in December 2009. The EA has found the performance of all firms to be satisfactory. In order to obtain the equivalent level of consultants' assistance during the extended period of project implementation, additional consulting services under the DSC (1,417 person-months), the public relations consultancy (116 person-months) and the benefit monitoring evaluation consultancy (23 person-months) contracts will be required. The proposed additional consulting services may be provided by the respective currently engaged firms during the extended project implementation period through

¹⁵ ADB's *Anticorruption Policy* (1998, as amended to date) was explained to and discussed again with the Government and the EA. Consistent with its commitment to good governance, accountability, and transparency, ADB reserves the right to investigate, directly or through its agents, any alleged corrupt, fraudulent, collusive, or coercive practices relating to the project. To support these efforts, relevant provisions of ADB's *Anticorruption Policy* are included in the loan regulations and the bidding documents for the project. In particular, all contracts financed by ADB in connection with the project shall include provisions specifying the right of ADB to audit and examine the records and accounts of the Executing Agency and all contractors, suppliers, consultants, and other service providers as they relate to the project.

¹⁶ The three aspects are not due to, and will not result in, a change in the original scope and/or design, or modified or incremental activities or components, but will facilitate implementation of the project during the transition between the initial loan and supplementary financing.

variation orders following ADB's *Guidelines on the Use of Consultants* (2007, as amended from time to time) and the applicable provisions set forth in the respective contracts. Continuous assignment through variation orders is considered to be the most efficient and advantageous method for extended engagement of the consultants because (a) selection of new consultants will put the project on hold for at least 6 months and will cause further delay; (b) the proposed tasks represent a natural continuation of their previous work; (c) the terms of reference of respective consulting services will remain unchanged; and (d) the existing consultants' professional liabilities, technical approach, and application of the experience required and gained will be continued. When the loan proceeds allocated to consulting services under the initial loan are exhausted, loan proceeds under the supplementary loan will continue to finance the existing contracts until the end of project implementation. The estimated variation amounts for each contract are not more than 50% of the original contract value in the currency of payment.

IV. PROJECT BENEFITS, IMPACTS, AND RISKS

28. The increase in the original cost estimates was caused by rupee appreciation and price increases. There is no (i) physical change within the original scope and/or design, or modified or incremental activities or components; and (ii) change in environment and social safeguards requirements. Therefore, the project benefit, impacts, assumptions, and risks will remain the same as the initial loan, except for the project impacts on financial sustainability and economic validity.

29. **Financial Sustainability.** Financial analysis (Appendix 8) reassessed the sustainability of all revenue-generating subprojects, taking the revised cost estimates and the rescheduled indicative financial improvement action plan (FIAP) into consideration. The WACC is estimated at 3.8%. The FIRR in the base case are estimated at 3.5–12.9% for water supply subprojects, at 3.5–4.7% for the sewerage subproject, and 6.4–18.5% for solid-waste management subprojects. The FIRRs are lower than the WACC for sewerage subprojects in Bhopal and Indore. These subprojects also had comparatively lower FIRRs in the initial financial analysis. However, combined FIRRs for water supply and sewerage are all above the WACC. Despite the low level of the FIRR, the sewerage subprojects in Bhopal and Indore will generate adequate revenue to sustain operation and maintenance (O&M). Sensitivity analysis was undertaken to test the robustness of the financial sustainability to changes in subproject parameters. The results indicate that the FIRRs in all sectors are most sensitive to reduction in the incremental revenue. This suggests that, in order to realize higher financial returns, (i) the planned coverage of services needs to be achieved, and (ii) the rescheduled indicative FIAP needs to be implemented on time.

30. The initial indicative FIAP was formulated with a philosophy that people would not accept any tariff increase unless there were visible improvements in urban services. It was envisaged that major tariff increases would start from the second year of project implementation, when more people became aware (through public awareness campaigns) of the value of better urban infrastructure for maintaining public hygiene at a higher level, and some new urban infrastructure became operational. In reality, however, it was only in the second half of 2007 that the majority of contracts were awarded to the contractor. Although there has been good progress in implementation of works, major infrastructure is still under construction and will become operational after 2009. In order to implement the indicative FIAP with full understanding of the people in the cities, the implementation schedule of the indicative FIAP was revised to

synchronize with the progress of physical investment and the reform agenda under JNNURM. While the final target year will be delayed by 1 year, there is no change in the final targets for the user charges of various services from the initial indicative FIAP. The rescheduled indicative FIAP is presented in Appendix 8.

31. **Economic Viability.** All subprojects are economically viable, in spite of the cost increase, with the estimated EIRR values exceeding the EOCC in all cases. Economic analysis is presented in Appendix 9. Sensitivity analysis was undertaken to test the robustness of the economic viability to changes in subproject parameters. The results indicate that the EIRRs are sensitive to a 1-year delay in realization of the economic benefits in some subprojects and a reduction in beneficiary levels in other subprojects. This suggests that, in order to realize higher economic benefits, (i) timely completion of works and smooth transition to operation are crucial, and (ii) the planned coverage of services needs to be achieved.

32. Reassessment of financial sustainability and economic variability suggest that the integrated benefits and impacts are expected to outweigh the increased costs.

V. ASSURANCES

33. In addition to the assurances set forth in the amended and restated Loan Agreement, and the Project Agreement, dated 9 March 2005, both for the Urban Water Supply and Environmental Improvement in Madhya Pradesh Project, the Government of India and the government of Madhya Pradesh have given the following assurances, which are incorporated in the legal documents:

- (i) The Government of India will make available to the government of Madhya Pradesh the proceeds of the financing provided by ADB. The government of Madhya Pradesh commits to bear the foreign exchange risk for such proceeds of the financing provided by the Government of India.
- (ii) The government of Madhya Pradesh will ensure that the existing onlending agreement, signed between the government of Madhya Pradesh and the municipal corporations, may be revised to reflect the changes, if any, but limited to stipulating for the Loan amount arising from the proposed supplementary loan.
- (iii) The government of Madhya Pradesh will cause the Project municipal corporations to ensure that sufficient funds will be provided to meet any shortfall between the cost of and revenues for the operations and maintenance of the infrastructure assets created under the Project.
- (iv) The EA shall ensure that civil works contracts¹⁷ under the Project follow all applicable labor laws of the Government of India and the government of Madhya Pradesh, and that these further include provisions to the effect that contractors (a) carry out HIV/AIDS awareness programs for laborers, and disseminate information at worksites on risks of sexually transmitted diseases and HIV/AIDS as part of health and safety measures for those employed during construction; and (b) follow and implement all statutory provisions on labor (including not employing or using children as laborers, equal pay for equal work), health, safety, welfare, sanitation, and working conditions. Such contracts shall also include

¹⁷ The EA agreed that the requirements of this assurance will be incorporated in the contracts advertized after the fact-finding mission by modifying the standard bid documents. All contracts advertized before the fact-finding mission will incorporate the requirements of this assurance during contract negotiations.

clauses for termination by the government of Madhya Pradesh and/or EA in case of any breach of the stated provisions by the contractors.

- (v) The government of Madhya Pradesh will ensure that loan proceeds allocated for the area improvement fund and the community initiative fund will not be reallocated until each Project municipal corporation awards a contract under the area improvement fund and/or community initiative fund.

VI. RECOMMENDATION

34. I am satisfied that the proposed supplementary loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve the supplementary loan of \$71,000,000 to India for the Urban Water Supply and Environmental Improvement in Madhya Pradesh Project from ADB's ordinary capital resources, with interest to be determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility; a term of 20 years, and such other terms and conditions as are substantially in accordance with those set forth in the draft Loan and Project Agreements presented to the Board.

Haruhiko Kuroda
President

19 September 2008

REVISED DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets and/or Indicators	Data Sources and/or Reporting Mechanisms	Assumptions and Risks
<p>Impact Economic growth enhanced in a sustainable manner, and poverty reduced in the four municipal corporations of Madhya Pradesh.</p>	<p>By end of the project period (2011):</p> <ul style="list-style-type: none"> • Per capita real income increased in the four municipal corporations by 5%. • Percentages of below poverty line households in the project towns reduced to less than 2008 level. • Employment increased in the project towns and state overall. • Perception of urban service among town residents, and particularly the poor, improved. 	<ul style="list-style-type: none"> • National and state statistics • Economic review papers • Census data • Project completion reports 	<p>Assumptions</p> <ul style="list-style-type: none"> • Improvement in urban services results in better productivity leading to economic development. • Economic growth leads to income growth. Better health leads to better productivity and saving. <p>Risk</p> <ul style="list-style-type: none"> • Economic recession cancels out economic growth from urban services improvement.
<p>Outcome The four municipal corporations reduce vulnerability of people to environmental degradation, poverty, and natural hazards, and increase economic opportunities.</p>	<p>By end of the project period (2011), the four municipal corporations have:</p> <ul style="list-style-type: none"> • Recovered operation and maintenance costs from user charges in accordance with rescheduled FIAP. • Provided 24-hour access to treated water supply at 135 lpcd to 5.6 million people (83% of the population of the project towns). • Provided access to sewerage and sanitation to 1.6 million people (24% of total population of the project towns). • Reduced the volume of waste water discharged to storm drains by 60%. • Provided flood protection to 1.1 million people (16% of total population of the project towns). • Provided solid-waste management services with sanitary disposal to 4.7 million people (70% of the total population of the project towns). • Provided basic urban services to people residing in 75 slum areas. • Provided livelihood programs and infrastructure to the poor, marginalized, and vulnerable groups. <p>By end of the project period (2011), the residents of the four municipal corporations have:</p> <ul style="list-style-type: none"> • Reduced water expense from 2003 levels. • Reduced waterborne disease 	<ul style="list-style-type: none"> • Census data • State finance commission reports • Annual reports of municipal corporations • Progress reports • ADB's loan review mission • Resettlement and environmental monitoring reports • Project completion reports 	<p>Assumptions</p> <ul style="list-style-type: none"> • Awareness of the improved urban services leads to increased willingness to pay for urban services. • The four municipal corporations implement the project on time. • Residents use piped water supply services from other water supply services. • Improvement in sewerage and sanitation services results in better health. • Improvement in urban services results in higher property values. <p>Risks</p> <ul style="list-style-type: none"> • The four municipal corporations make a political decision not to continue the project. • The four municipal corporations cannot operate the improved urban infrastructure efficiently.

Design Summary	Performance Targets and/or Indicators	Data Sources and/or Reporting Mechanisms	Assumptions and Risks
	<p>from 2003 levels</p> <ul style="list-style-type: none"> • Reduced health expense on waterborne disease from 2003 levels. • Reduced the expense of flood damage recovery from 2003 levels. • Become aware of the benefit of urban services and are more willing to pay for urban services. <p>By end of the project period (2011), property values of the improved area increased.</p>		
<p>Outputs</p> <p>1. The four municipal corporations improve their water supply service.</p>	<p>By end of the project period (2011), the four municipal corporations have:</p> <ul style="list-style-type: none"> • Revised tariff levels in accordance with the rescheduled FIAP. • Reduced nonrevenue water and unaccounted for water in accordance with the rescheduled FIAP. • Improved tariff collection efficiency in accordance with the rescheduled FIAP. • Managed water demand level. <p>Bhopal municipal corporation has:</p> <ul style="list-style-type: none"> • Completed construction and operates seven WTPs at total capacity of 198 mld. • Completed construction and provides more water to additional customers through about 200 km of new distribution networks. <p>Gwalior municipal corporation has:</p> <ul style="list-style-type: none"> • Completed rehabilitation and operates two WTPs at total capacity of 32 mld. • Completed construction and operates a new 45 mld WTP. • Supplied more volume of water through augmented pipes. • Completed construction and provides more water to additional customers through about 200 km of new distribution networks. <p>Indore municipal corporation has:</p> <ul style="list-style-type: none"> • Completed construction and operates one WTP at 360 mld, raw water intake, and pumping stations. • Completed construction and provides more water to additional 	<ul style="list-style-type: none"> • Progress reports • ADB loan review missions • ADB midterm review mission • Mainframe data on contract award and disbursement • Audit reports • Project newsletters • Benefit monitoring and evaluation reports • Resettlement and environmental monitoring reports • Project completion reports 	<p>Assumptions</p> <ul style="list-style-type: none"> • The state and the four municipal corporations are willing to charge fees. • The municipal corporations develop a system to monitor revenue demand, collection, and balance. • The municipal corporations have adequate operational staff and materials. • Civil works and equipment are of good standards to make full use of the plants and networks. • The four municipal corporations provide adequate staff for operation. • Adequate number of contractors and suppliers are interested to bid. • Project management and implementation units are functional. • The four municipal corporations develop necessary software and hardware for improvement of revenue collection. <p>Risks</p> <ul style="list-style-type: none"> • The four municipal corporations make a political decision not to continue the project. • The four municipal corporations make a

Design Summary	Performance Targets and/or Indicators	Data Sources and/or Reporting Mechanisms	Assumptions and Risks
	<p>customers through 70 km of trunk mains and about 400 km of distribution networks.</p> <p>Jabalpur municipal corporation has:</p> <ul style="list-style-type: none"> • Completed construction and operates one WTP at total capacity of 120 mld. • Completed construction and provides more water to additional customers through about 160 km of distribution networks. 		<p>political decision not to follow the rescheduled FIAP.</p> <ul style="list-style-type: none"> • The four municipal corporations cannot operate the improved urban infrastructure efficiently.
<p>2. The four municipal corporations improve their sewerage, drainage, and sanitation services.</p>	<p>By end of the project period (2011), the four municipal corporations:</p> <ul style="list-style-type: none"> • Manage the sewage generation. • Introduce sewerage tariffs in accordance with the rescheduled FIAP. <p>Bhopal municipal corporation has:</p> <ul style="list-style-type: none"> • Completed construction and collects sewage from about 190 km of new sewage lines, mostly in Old Bhopal zones. <p>Gwalior municipal corporation has:</p> <ul style="list-style-type: none"> • Completed construction and operates two STPs at total capacity of 60 mld. • Completed construction and operate storm-water drainage works of about 110 km. <p>Indore municipal corporation has:</p> <ul style="list-style-type: none"> • Completed construction and collects sewage from 9 km of new sewage lines. <p>Jabalpur municipal corporation has:</p> <ul style="list-style-type: none"> • Completed construction and operates one STP at total capacity of 50 mld. • Completed construction and collects sewage from about 200 km of new sewerage lines. 		<p>Risk</p> <ul style="list-style-type: none"> • Soil conditions make it difficult to implement works in the way the feasibility study envisaged.
<p>3. The four municipal corporations improve their SWM services.</p>	<p>By end of the project period (2011), the four municipal corporations have:</p> <ul style="list-style-type: none"> • Introduced and revised tariffs in accordance with the rescheduled FIAP. • Completed construction and operate equipment for collecting, hauling, and compacting solid waste. <p>Indore and Jabalpur municipal corporations have:</p> <ul style="list-style-type: none"> • Completed construction and operate landfill sites. 		

Design Summary	Performance Targets and/or Indicators	Data Sources and/or Reporting Mechanisms	Assumptions and Risks
4. The four municipal corporations improve slums and poor settlements.	By end of the project period (2011), the four municipal corporations: <ul style="list-style-type: none"> • Implement a Municipal Action Plan for Poverty Reduction. • Implement area improvement fund, and community initiative fund. • Improve water supply, sanitation, and drains in slums and poor settlements. 		
5. UADD and the four municipal corporations improve their project management capacity.	UADD and the four municipal corporations have: <ul style="list-style-type: none"> • Developed a project administration manual by June 2005. • Developed a project financial management manual by June 2005. • Developed standard bid documents by June 2005. By end of the project period (2011), UADD and the four municipal corporations have: <ul style="list-style-type: none"> • Reduced discrepancy in projection and results of contract awards and disbursements by 10%. • Not misprocured. • Issued quarterly progress reports to the financier on time. • Reduced the number of audit comments from external auditors. • Reduced the number of rejected disbursement requests. • Processed and produced necessary safeguards compliance documents and reports before contract awards. 		
Activities with Milestones			Inputs
1.1 Construct, rehabilitate, or upgrade water treatment plants and distribution networks of the four municipal corporations. 1.2 Conduct public awareness campaign on water conservation and demand management. 2.1 Construct sewerage and drainage networks and treatment plants of the four municipal corporations. 2.2 Conduct public awareness campaign on waste water reduction at source. 2.3 Develop demand-collection-balance software. 3.1 Construct storm-water drainage. 3.2 Procure equipment for solid-waste management. 3.3 Conduct public awareness campaign on solid-waste reduction at source. 3.4 Construct solid-waste treatment and disposal infrastructure. 3.5 Conduct survey of properties. 4.1 Issue a government order on adoption of new property tax system. 4.2 Develop and establish municipal action plan for poverty reduction. 4.3 Design and construct urban infrastructure and provide social services through community consultation. 5.1 Establish project management and implementation structures.			ADB: \$252.0 million Government of Madhya Pradesh and municipal corporations: \$130.5 million UN-HABITAT: \$0.5 million Total: \$383.0 million Assumptions <ul style="list-style-type: none"> • Counterpart fund allocation is available on a timely basis. • Project activities can be implemented without undue delay.

Activities with Milestones	Inputs
5.2 Recruit project management consultants and design and supervision consultants. 5.3 Develop a project administration manual, a project financial management manual, and standard bid documents. 5.4 Conduct regular training on use of the manuals. 5.5 Recruit project management consultants and design and supervision consultants. 5.6 Develop a project administration manual, a project financial management manual, and standard bid documents. 5.7 Conduct regular training on use of the manuals. 5.8 Conduct regular training on procurement, recruitment of consultants, and disbursement. 5.9 Submit necessary financial statements to external auditor. 5.10 Develop computerized information management system. 5.11 Conduct training on use of computerized information management system. 5.12 Conduct public campaign on use of computerized information management system.	Risks <ul style="list-style-type: none"> • The four municipal corporations make a political decision not to continue the project. • The four municipal corporations cannot operate the improved urban infrastructure efficiently. • Soil conditions make it difficult to implement works in the way the feasibility study envisaged. • Unexpected levels of price escalation increase the contract prices more than the contingency provision. • Depreciation of the currency used for the loan reduces the financial resources in local currency terms.

ADB = Asian Development Bank, FIAP = financial improvement action plan, km = kilometer, lpcd = liter per capita per day, mld = million liters per day, STP = sewage treatment plant, SWM = solid-waste management, UADD = Urban Administration and Development Department, UFW = unaccounted-for water, UN-HABITAT = United Nations Human Settlement Programme, WTP = water treatment plant.

MIDTERM REVIEW OF IMPLEMENTATION STATUS

A. Background

1. A midterm review mission visited Bhopal, Gwalior, Indore, and Jabalpur in February and March 2008 to assess the implementation progress of the Urban Water Supply and Environmental Improvement in Madhya Pradesh Project. This appendix summarizes the major findings of the midterm review.

B. Project Management

2. The highest decision-making authority of the project, the empowered committee, was formed in 2004 under the chairmanship of the chief secretary of the government of Madhya Pradesh. The project management unit (PMU) was established under the executing agency (EA), the Urban Administration and Development Department (UADD), in 2005 to manage the overall implementation of the project. A steering committee was formed in 2004 in each municipal corporation to guide each subproject, and project implementation units (PIUs) were established in each municipal corporation in 2005 to implement the project. All consultants—the project management consultants, two groups of the design and construction supervision consultants, the benefit monitoring evaluation consultants, and the public relations consultants—were fielded in 2006.

C. Part A: Urban Water Supply and Environmental Improvement

3. **Bhopal.** There were 24 works contracts under implementation, and five contracts to be awarded (Table A2.1). All designs reflected the least-cost analysis undertaken during ADB's project preparatory technical assistance (PPTA). The works were being executed as per contract conditions with good quality-control. The midterm review noted slow progress of works related to (i) the sewage treatment plant at Maholi Dhamkheda; (ii) the laying of sanitary sewers; and (iii) the laying of distribution networks in wards 1, 2, 3, and 4. Particularly, delay in production of distribution pipes requires urgent attention. The contractors will prepare a revised implementation schedule in consultation with the PIU.

Table A2.1: Status of Contract Awards in Bhopal

Item	Contracts Awarded			Bids under Process			Bids to be Invited		
	No.	Rs (million)	\$	No.	Rs (million)	\$	No.	Rs (million)	\$
Water Supply	10	526	13.5	2	110	2.8	2	165	4.2
Sewerage, Drainage, and Sanitation	3	605	15.5	1	227	5.8	0		0
Solid Waste Management	11	53	1.4	0	0	0	0		0
Total	24	1,184	30.4	3	337	8.6	2	165	4.2

Sources: Asian Development Bank and the project management unit estimates.

4. **Gwalior.** There were nine works contracts under implementation and six contracts to be awarded (Table A2.2). All designs reflected the least-cost analysis undertaken during ADB's PPTA. The works were being executed as per contract conditions with good quality-control. The midterm review noted that the performance of the works related to (i) the raw water pumping

station and the water treatment plant; (ii) the raw water pumping main and clear water pumping main; and (iii) rehabilitation of the existing water treatment plants and pumping station, need to further improve by deploying additional resources to complete the works in time. The contractors will prepare a revised implementation schedule in consultation with the PIU.

Table A2.2: Status of Contract Awards in Gwalior

Item	Contracts Awarded			Bids under Process			Bids to be Invited		
	No.	Rs (million)	\$	No.	Rs (million)	\$	No.	Rs (million)	\$
Water Supply	8	678	17.4	1	228	5.8	1	100	2.6
Sewerage, Drainage, and Sanitation	1	9	0.2	0	0	0	1	335	8.6
Solid-Waste Management	0	0	0	0	0	0	0	0	0
Total	9	687	17.6	1	228	5.8	5	435	11.2

Sources: Asian Development Bank and the project management unit estimates.

5. **Indore.** Indore had the largest financial allocation under the project. Augmentation of the water supply was the major component. Works involved construction of a raw water intake with pumping station, a water treatment plant, three new clear water pumping stations, the laying of 25 km of rising mains, 55 km of gravity mains, and distribution networks with balancing reservoirs. All designs reflected the least-cost analysis undertaken during ADB's PPTA. There were 28 works contracts under implementation and 12 contracts to be awarded (Table A2.3). Despite the number of contracts, the works were executed as per contract conditions with good quality-control. Considering efficient contract management and supervision of the PIU in Indore, there is a good prospect for completion of works on time.

Table A2.3: Status of Contract Awards in Indore

Item	Contracts Awarded			Bids under Process			Bids to be Invited		
	No.	Rs (million)	\$	No.	Rs (million)	\$	No.	Rs (million)	\$
Water Supply	17	4,453	114.2	3	284	7.3	7	1,325	34.0
Sewerage, Drainage, and Sanitation	1	14	0.4	0	0	0	1	100	2.6
Solid-Waste Management	10	72	1.8	0	0	0	1	109	2.8
Total	28	4,539	116.4	3	284	7.3	9	1,534	39.4

Sources: Asian Development Bank and the project management unit estimates.

6. **Jabalpur.** There were 21 works contracts under implementation, and five contracts to be awarded (Table A2.4). All designs reflected the least-cost analysis undertaken during ADB's PPTA. The works were executed as per contract conditions with good quality-control. The midterm review noted that the performance of the works related to (i) the trunk and outfall of sewer system, and (ii) construction of an overhead service reservoir. The contractors will prepare a revised implementation schedule in consultation with the PIU.

Table A2.4: Status of Contract Awards in Jabalpur

Item	Contracts Awarded			Bids under Process			Bids to be Invited		
	No.	Rs (million)	\$	No.	Rs (million)	\$	No.	Rs (million)	\$
Water Supply	12	2,015	51.7	0	0	0	4	313	8.1
Sewerage, Drainage, and Sanitation	3	812	20.8	0	0	0	0	0	0
Solid-Waste Management	6	128	3.3	1	75	1.9	0	0	0
Total	21	2,955	75.8	1	75	1.9	4	313	8.1

Sources: Asian Development Bank and the project management unit estimates.

D. Part B: Urban Water Supply and Environmental Improvement.

7. **Water for Asian Cities Program in India.** The Water for Asian Cities (WAC) program¹ was a joint collaboration between the Asian Development Bank (ADB) and the United Nations Human Settlements Programme (UN-HABITAT) to catalyze investments into urban water supply and sanitation for the poor. The WAC program mainly consisted of capacity-building programs, small-scale projects, and studies related to water and sanitation management. For example, it has undertaken the setting-up of water-sanitation classrooms to share knowledge on sanitation with juveniles. The WAC program particularly benefited the project through implementing pilot projects on (i) community-based water supply schemes; and (ii) community toilets schemes in slums, with participation of the local communities. These schemes are operational and are managed by community groups of local women. The WAC program has also organized a workshop on water demand-management strategies to raise awareness among the people and the municipal corporation staff on metering, leak detection and repair, rationalization of tariffs, and accounting and billing reforms.

8. **Funds for Municipal Action Planning for Poverty Reduction.** The EA initially deferred activities of the area improvement fund and community initiatives fund as similar work was to be undertaken by the Madhya Pradesh Urban Services Program, funded by the Government of the United Kingdom. In April 2007, however, the EA decided to implement the area improvement fund and the community initiatives fund, using the methodology established by the WAC program. The PMU has proposed to implement 10 community toilets schemes in Bhopal, Gwalior, Indore, and Jabalpur, and has identified slums for implementation. Community groups of local women would oversee operation and maintenance of these toilets based on user charges. During the site visits to the proposed slums, all the women members of registered groups showed their keenness to be associated with the project. The engineering design would be developed with assistance of the respective PIUs. Works would be executed by contractors under supervision of the local women resident committees. The PMU would submit the concept report by the end of April 2008 to ADB for clearance. Due to paucity of funds, these works were proposed to be taken up under the supplementary loan.

E. Part C: Implementation Assistance

9. **Public Relations and Awareness Program.** In each project city, the PIU conducted public awareness campaigns and participatory programs in compliance with loan covenants. As part of the scope of the project, an awareness campaign was undertaken through various

¹ UN-Habitat. 2003. *Memorandum of Understanding between the Asian Development Bank and the United Nations Human Settlements Programme*. Osaka.

media—such as local television, radio, newsletters, websites, and community meetings—to raise public awareness of the ongoing works and long-term benefits of the project. Beneficiaries have also been made aware of citizens' responsibilities to avoid wasting water, user charges for water and sewerage services, and property tax reform for achieving the goals of the project. The feedback and concerns received from the people during the campaign were reviewed by the PMU, and were reflected in project implementation.

F. Loan Covenants

10. The general covenants related to project implementation, financial audits, statutory compliances, and safeguards are being complied with. There were some minor delays (mostly related to institutional reforms) in meeting compliance date targets. For example, implementation of the financial improvement action plan (FIAP) has been slow due to delay in works. All cities have agreed to the water tariff increase, but some cities found it difficult to increase tariffs with the full understanding of the people without visible improvements in urban infrastructure. Fortunately, Jabalpur and Indore have successfully implemented the increase. During the midterm review wrap-up meeting in Bhopal, the principal secretary of the UADD emphasized the importance of tariff increases, and urged the commissioner of each city to take immediate action to successfully implement the FIAP.

G. Environmental and Social Safeguards

11. **Land Acquisition and Involuntary Resettlement.** The land acquisition and resettlement requirement remained unchanged as there was no physical change within the original scope and design. The social safeguard requirements therefore remain the same. The midterm review confirmed that social safeguards addressed under the project were in accordance with ADB's *Involuntary Resettlement Policy* (1995), and *Policy on Indigenous Peoples* (1998), and the National Land Acquisition Act, 1894 (amended 1984) and applicable state policies. As was originally envisaged, the land acquisition requirements have been minimized. The proposed works would be carried out on available government land free of structures and not used for cultivation or grazing. At the time of loan appraisal, a short resettlement plan² (SRP) was prepared for a site for construction of an integrated sewage treatment plant and sanitary landfill in Jabalpur. The SPR was updated by the EA in August 2007, and was reviewed and approved by ADB in September 2007.

12. The updated SRP set out the procedure for the acquisition of 78.3 hectares (ha) of land in Kathonda. Out of the 78.3 ha, 47.5 ha was vacant government land and the remaining 30.8 ha was private land. A total of 17 titleholders (99 persons) and eight nontitled families (54 persons) were affected by either full or partial loss of property. The nongovernment organization (NGO) appointed for the implementation of the SRP will be responsible for conducting meetings and consultation with the nontitled affected families. All affected persons will be compensated in accordance with the entitlement matrix of the approved SRP. The EA agreed that the social development officer of the PIU will monitor the implementation of the SRP and provide regular reports to ADB as part of the quarterly progress reports.

13. For the ongoing works, there was no relocation of roadside kiosks during pipe laying in road corridors and other works. For the pending works on pipe laying in road corridors, the

² ADB. 2003. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to India for the Urban Water Supply and Environmental Improvement in Madhya Pradesh Project*. Manila (Supplementary Appendix G).

detailed engineering design would minimize the relocation of roadside kiosks, and where relocation is unavoidable, the midterm review reminded the PMU of the need for (i) formulating a resettlement document based on the resettlement framework³ for review and approval by ADB, and (ii) all compensation and assistance to be provided prior to award of works contracts. The PMU was fully aware of the requirements. During the mission, a focused refresher workshop on social safeguards was provided to the project managers, social and community development officers of all PIUs and PMU staff, consultants, and NGOs.

14. **Environmental Clearances.** The mitigation measures proposed in the original initial environmental examination have been incorporated into the design and initial construction activities. Bidding documents address environmental requirements and the design of packages has been conducted to minimize and/or prevent any impacts. Environmental checklists have been prepared to aid monitoring activities and extensive training has been provided in relation to monitoring of potential environmental impacts relating to construction activities. Requests to obtain environmental clearances from the Madhya Pradesh Pollution Control Board have been initiated in most instances. The EA agreed on the time-bound action plan to urgently obtain necessary clearances.

15. **Environmental Management and Monitoring.** An adequate level of care has been taken in implementing required environmental mitigation measures and monitoring plans. The midterm review made the following recommendations to ensure and further improve environmental management and monitoring: (i) additional resources to be allocated for environmental monitoring under the project, such as (a) an additional overall planning and management expert under the project management consultancy, and (b) an environment expert as part of the design and supervision consultancy in each PIU; (ii) a groundwater quality testing program to be put in place to set baselines for all new and existing sewage treatment plants and sanitary landfill sites; (iii) sludge handling and disposal plants to be put in place for all cities with existing and new water treatment plants and sewage treatment plants; and (iv) the PIUs and the contractors to continue training on occupational health and safety and environmental monitoring checklists.

16. **Gender Action Plan.** The gender action plan has been updated by the EA and translated into the local language. A training program for the project staff and the municipal corporations was scheduled to be conducted from June 2008.

H. Audit and Monitoring

17. **Project Accounts and Audit.** Project accounts has been maintained both manually and using computerized accounting software (named Tally) at the PMU and the PIUs. Accounting records have been maintained and updated regularly. Bank reconciliations have been carried out regularly and outstanding items have been regularly followed up. A project accounting manual was developed and has been adopted by the PMU and the PIUs. The municipal corporations were subject to internal audit and pre-audit by the local fund auditor appointed by the government of Madhya Pradesh. In addition, the project accounts were subject to audit by an independent auditor appointed by the UADD, and audit has been completed for the period up to 31 March 2007. Reimbursement claims have been properly prepared and submitted to ADB, through the Borrower, for reimbursement.

³ ADB and Government of Madhya Pradesh. 2004. *Project Administration Memorandum for the Loan to India for Loan 2046-Ind: The Urban Water Supply and Environmental Improvement in Madhya Pradesh Project*. Manila.

18. **Project Management Information System.** The project management information system (PMIS) has been established, and the PMU is preparing a specification for modification. Further refinement includes contract data tracking, in which contracts were classified by the nature of activities, the type of infrastructure, and input requirements. The PMIS User Manual would be revised in line with the expected refinements. The midterm review suggested that the PMIS also be used for tracking statutory clearances as well as social and environmental safeguards monitoring.

COST OVERRUN ANALYSIS

1. **Summary.** There is a cost overrun of \$108 million for the Urban Water Supply and Environmental Improvement in Madhya Pradesh Project. There are two major reasons for this: (i) appreciation of the rupee against the dollar, and (ii) price escalation of construction materials in India. The appreciation of the rupee accounts for about \$77 million (the first row of Table A3.1) of the overrun, and the price escalation for about \$31 million (the fourth column of Table A3.1). This appendix provides further details.

Table A3.1: Summary Table of Cost Overrun Analysis
(million)

Item	Indian Rupees	US Dollar Assumptions during Loan Appraisal in 2003 (\$1 = Rs49.9)	US Dollar Assumptions during Loan Appraisal in 2008 (\$1 = Rs39.0)	US Dollar Cost Overrun due to Exchange Rate
Original Project Cost	13,700	275.0	352.0	77.0
Revised Project Cost	14,900	n/c	383.0	
Cost Overrun due to Price Escalation	1,200	n/c	31.0	

n/c = not converted.

Sources: Asian Development Bank and the project management unit estimates.

2. **Appreciation of the Rupee.** Project costs were computed in rupees, with foreign exchange costs translated into rupees at the projected exchange rate for the year of expenditure. Project costs were prepared in nominal terms, taking into account the effects of inflation and foreign currency fluctuations. Purchasing power parity was the base assumption with exchange rates expected to fluctuate, and is embedded in cost estimation software, Costab 32, which has been distributed via the Asian Development Bank (ADB) website. The concept of purchasing power parity implies that, when domestic inflation is higher than international inflation, the value of local currency is reduced in the following year. At the time of the loan appraisal of the project in 2003, international inflation was estimated at 2.4% and domestic inflation was estimated at 5.0%. It was forecast that the rupee would depreciate and the exchange rate would become Rs49.9 per \$1 on average during project implementation.

Table A3.2: ADB Financing Amount in Indian Rupees and US Dollars
(million)

Item	Indian Rupees	US Dollar Assumptions during Loan Appraisal in 2003 (\$1 = Rs49.9)	US Dollar Assumptions during Loan Appraisal in 2008 (\$1 = Rs39.0)	US Dollar Financing Gap due to Exchange Rate
Original total financing	13,700	275.0	352.0	77.0
Original ADB financing	9,000	181.0	231.6	50.6
Original GMP and municipal corporations financing	4,700	n/c	n/c	n/c

ADB = Asian Development Bank, GMP = government of Madhya Pradesh, n/c = not converted, US = United States.

^a The cost incurred in rupees was financed by rupees. In other words, Rs4.7 billion was not affected by the exchange rate fluctuation.

Sources: ADB and the project management unit estimates.

3. In reality, however, and contrary to the forecast, the rupee appreciated by the time the project started awarding the major contracts. Figure A3.1 on page 29 shows a large volume of contracts awarded in the second half of 2007 (Supplementary Appendix B). The progress payments under these contracts use the foreign exchange rate of the date of payment, and these progress payments will continue until 2010. The value of \$1 had substantially reduced to around Rs39 by November 2007. Consequently, in order to maintain the ADB financing amount of Rs9 billion to pay for the contracts, the loan amount requirement in dollar terms has increased from \$181 million to \$232 million in 2008. In other words, there is a financing gap of \$51 million (Table A3.2).

4. **Price Escalation of Construction Materials.** The project cost in Indian rupee terms increased by Rs1.2 billion (or by 8.8%) from Rs13.7 billion to Rs14.9 billion (Table A3.3). While some cost items were reduced due to revisions of the input requirements during detailed engineering design, the major cause of the project cost increase was the price escalation in civil works, which increased by 11.0%.

Table A3.3: Changes in Project Cost in Indian Rupee Terms
(Rs million)

Cost Items	Original	Revised	Change	
	Cost Estimates	Cost Estimates	Rs Million	%
Civil Works	8,300	9,200	900	11.0
Equipment	1,300	1,400	100	7.7
Consulting Services	800	800	0	0.0
Project Administration	200	200	0	0.0
Others	2,600	2,500	(100)	(4.0)
Tax and Duties	500	800	300	60.0
Total	13,700	14,900	1,200	8.8

() = negative.

Notes: Contingencies were not able to cover the shortfall, as there was no financing source for contingencies due to rupee appreciation.

Sources: Asian Development Bank and the project management unit estimates.

5. The price of a civil works contract comprises labor, construction materials, fuel, and contractor's profit. There was a gradual increase in the cost of construction materials between 2003 and 2007. In an urban development project, civil works generally requires steel for reinforced concrete and large pipes, cement for construction and pipes, plastic for pipes, and fuel for operation of heavy machinery and freight. All these materials experienced price escalation, yet the extent of the increase varies from one material to another (Figure A3.2, page 30).

6. A large volume of contracts were awarded in the second half of 2007. These contracts reflected the materials' prices at that time. The cost of materials constitutes about 65–75% of a typical civil works contract in the urban development sector. Based on an estimate of a typical composition of the material required in works, the weighted average increase in construction material cost between 2003 and 2007 is estimated at 39–48% (Table A3.4). The labor cost, which generally constitutes 10–20% of contract values, also increased about 22% between 2003 and 2007. Overall, there was escalation of contract prices of about 29–31% between the original estimates and the contract award prices. Nevertheless, the extent of increase varies in relation to the nature of works. For example, works requiring heavy use of steel and cement might have increased the contract price by as much as 45%, whereas waterworks laying polyvinyl chloride (PVC) pipes might have experienced a moderate increase of around 30% between 2003 and 2007.

Table A3.4: Price Index^a of Major Construction Materials in 2003 and 2007

Price Index Item	Average in 2003	Average in 2007	Percentage Change	Weight (%)	Average (%)
Water Supply					
Steel	176	268	52.4	27	14.0
Cement	146	212	45.0	40	18.0
Plastic Products	132	152	15.2	27	4.0
Fuel	270	382	41.7	7	2.8
Weighted Average				100	38.8
Sewerage					
Steel	176	268	52.4	38	20.1
Cement	146	212	45.0	54	24.2
Plastic Products	132	152	15.2	0	0.0
Fuel	270	382	41.7	8	3.2
Weighted Average				100	47.6

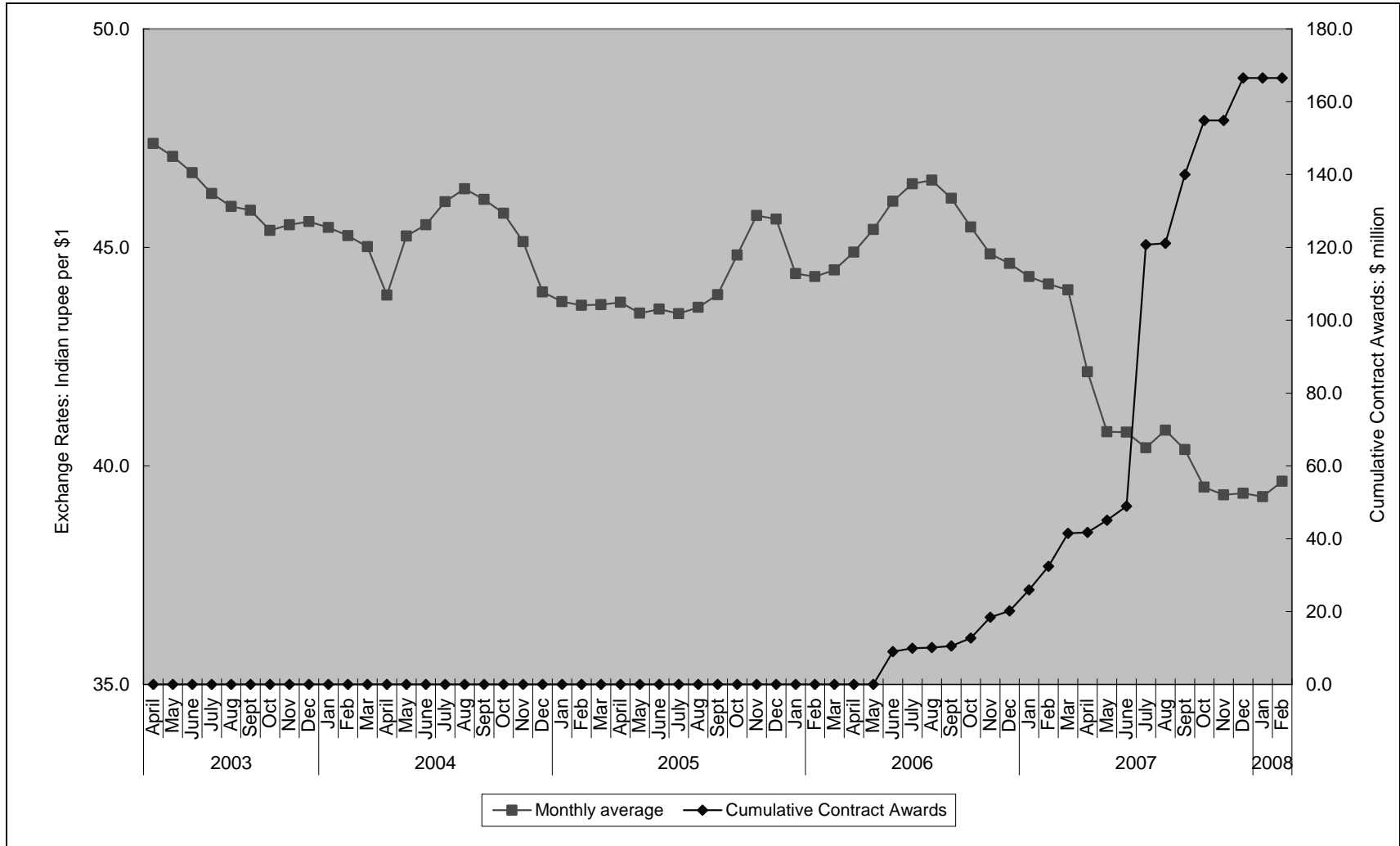
^aBase year 1993–1994 = 100

Sources: Reserve Bank of India and Asian Development Bank estimates.

7. Despite the price escalation rates of around 29–31%, the impact on the civil works cost was limited to an increase of about 11%. Minimization of the impacts of the price escalation was achieved by shifting some contracts from ADB financing to the Government of India's special grant programs and municipal corporations' own financing schemes. This reduced the total cost of civil works contracts for ADB financing. For example, the municipal corporations, in association with the project management unit, establish three financial sources for about 10 contracts:

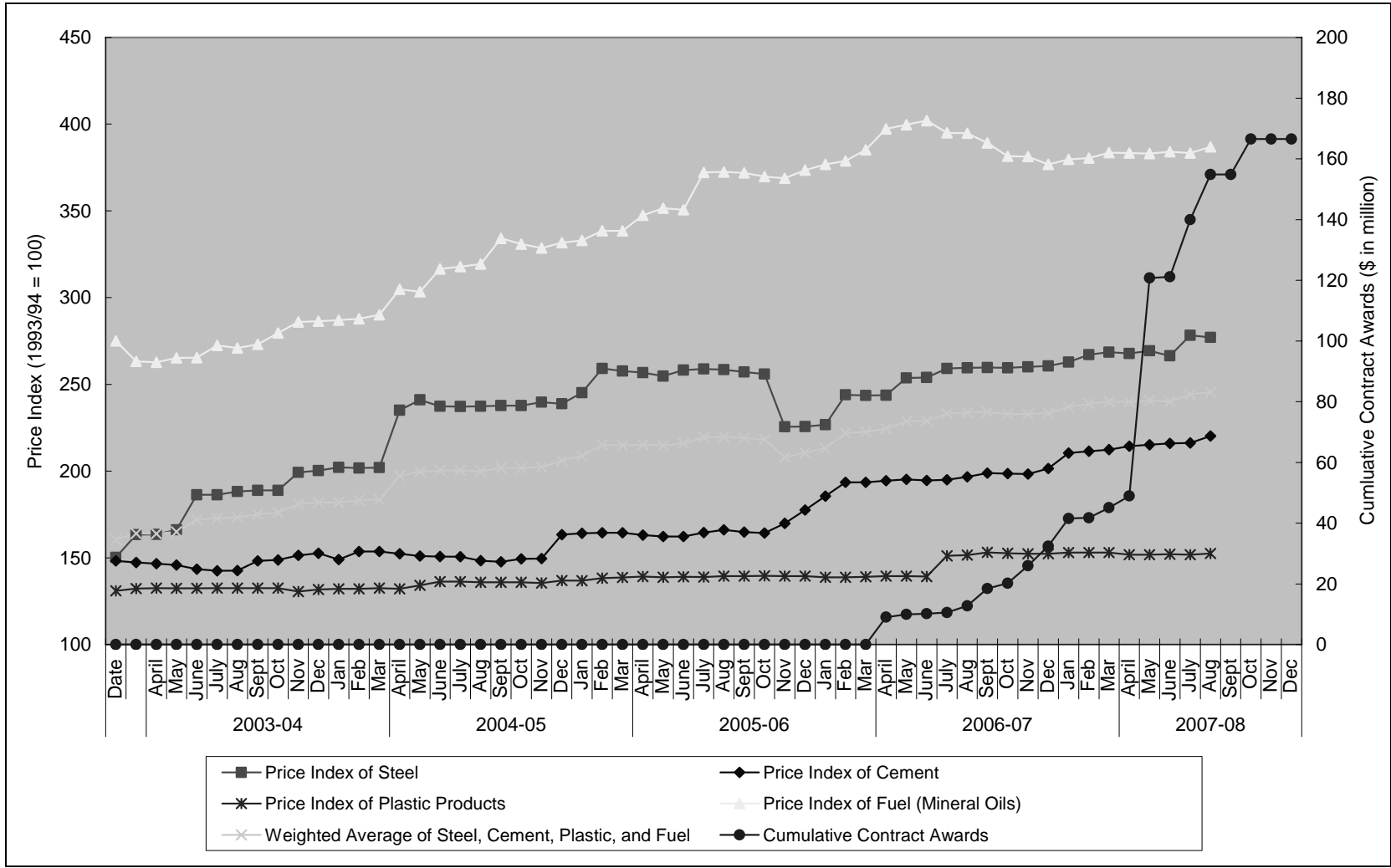
- (i) Government grants under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) to finance a large portion of works for the sewerage networks in Indore,
- (ii) Government grants under the Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT) to finance a large portion of works for the sewerage network and the sewage treatment plant in Gwalior, and
- (iii) the municipal corporations' own budgets to finance some contracts for water supply optimization in Gwalior and a large portion of works related to sanitary landfill development in Bhopal.

Figure A3.1: Exchange Rates and Cumulative Contract Award Amount



Sources: Reserve Bank of India and Yahoo Finance.
 Contract awards source data is in the attachment to this appendix.

Figure A3.2: Price Indexes and Cumulative Contract Award Amount



Sources: Reserve Bank of India.
Asian Development Bank estimates.

CONTRACT VALUE VARIATION ANALYSIS

Scope	Activities	Bid Prices/Revised Contract Values (Rs million)	Analysis of Cost Variation																									
Bhopal																												
24-hour water supply to 12 wards of Bhopal	Water Supply Optimization <ul style="list-style-type: none"> • Leak detection and rectification • Supply and installation of bulk water meters • Renovation of the seven existing water treatment plants. Original estimates: Rs89 million	Water Supply Optimization	In addition to substantial price escalation of construction materials, the PMU adjusted the unit cost of rehabilitation works upwards, based on the findings made during detailed engineering design that the level of the mechanical damage was more severe than assessed during the feasibility study. The two factors caused cost increases in contracts BPL/WS/02 and BPL/WS/03, and resulted in a cost overrun of 67%.																									
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Contract Packages</th> <th style="text-align: center;">Financing Sources</th> <th style="text-align: center;">Contract Value</th> </tr> </thead> <tbody> <tr> <td>BPL/WS/01</td> <td>Original Loan</td> <td style="text-align: right;">9.2</td> </tr> <tr> <td>BPL/WS/02</td> <td>Original Loan</td> <td style="text-align: right;">64.5</td> </tr> <tr> <td>BPL/WS/03</td> <td>Original Loan</td> <td style="text-align: right;">41.1</td> </tr> <tr> <td>BPL/WS/05</td> <td>Original Loan</td> <td style="text-align: right;">22.0</td> </tr> <tr> <td>BPL/WS/12</td> <td>Sup. Financing</td> <td style="text-align: right;">11.2</td> </tr> <tr> <td colspan="2" style="text-align: center;">Total</td> <td style="text-align: right;">148.0</td> </tr> </tbody> </table>		Contract Packages	Financing Sources	Contract Value	BPL/WS/01	Original Loan	9.2	BPL/WS/02	Original Loan	64.5	BPL/WS/03	Original Loan	41.1	BPL/WS/05	Original Loan	22.0	BPL/WS/12	Sup. Financing	11.2	Total		148.0				
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BPL/WS/12	Sup. Financing	11.2																										
Total		148.0																										
	Water Supply Distribution Expansion <ul style="list-style-type: none"> • Construction of reinforced cement concrete overhead service reservoirs of approximately 15 million liter capacity • Supply, laying, and testing of 240 km of PVC or cast-iron distribution mains pipelines of 80–450 mm diameter • Supply, laying, and testing of 14 km of cast-iron feeder mains of 300–450 mm diameter • Supply, installation, testing and commissioning of 100,000 water meters in houses and standpost connections Original estimates:Rs544.2 million	Water Supply Distribution	No major price variation.																									
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Contract Packages</th> <th style="text-align: center;">Financing Sources</th> <th style="text-align: center;">Contract Value</th> </tr> </thead> <tbody> <tr> <td>BPL/WS/07</td> <td>Original Loan</td> <td style="text-align: right;">93.5</td> </tr> <tr> <td>BPL/WS/08</td> <td>Sup. Financing</td> <td style="text-align: right;">99.2</td> </tr> <tr> <td>BPL/WS/09</td> <td>Original Loan</td> <td style="text-align: right;">35.1</td> </tr> <tr> <td>BPL/WS/10</td> <td>Original Loan</td> <td style="text-align: right;">24.3</td> </tr> <tr> <td>BPL/WS/11</td> <td>Original Loan</td> <td style="text-align: right;">35.6</td> </tr> <tr> <td>BPL/WS/13</td> <td>Sup. Financing</td> <td style="text-align: right;">40.0</td> </tr> <tr> <td>BPL/WS/14</td> <td>Sup. Financing</td> <td style="text-align: right;">125.0</td> </tr> <tr> <td colspan="2" style="text-align: center;">Total</td> <td style="text-align: right;">554.0</td> </tr> </tbody> </table>	Contract Packages		Financing Sources	Contract Value	BPL/WS/07	Original Loan	93.5	BPL/WS/08	Sup. Financing	99.2	BPL/WS/09	Original Loan	35.1	BPL/WS/10	Original Loan	24.3	BPL/WS/11	Original Loan	35.6	BPL/WS/13	Sup. Financing	40.0	BPL/WS/14	Sup. Financing	125.0	Total	
Contract Packages	Financing Sources	Contract Value																										
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Scope	Activities	Bid Prices/Revised Contract Values (Rs million)	Analysis of Cost Variation															
Sewerage service in 25 wards of Bhopal	<p>Sewerage Network Expansion</p> <ul style="list-style-type: none"> Supply, laying, and testing of 400 km of salt-glazed stoneware or reinforced cement concrete sewer of 150–1,200 mm diameter Supply, delivery, testing and commissioning of two diesel-driven truck-mounted septic tank vacuum cleaning machines Supply, delivery, testing, and commissioning of one diesel-driven truck-mounted sewer jetting cum vacuum cleaning machine <p>Original estimates: Rs282.1 million</p>	<p style="text-align: center;">Sewerage Network</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Contract Packages</th> <th style="text-align: left;">Financing Sources</th> <th style="text-align: right;">Contract Value</th> </tr> </thead> <tbody> <tr> <td>BPL/WW/01</td> <td>Original Loan</td> <td style="text-align: right;">9.8</td> </tr> <tr> <td>BPL/WW/01-02</td> <td>Original Loan</td> <td style="text-align: right;">215.5</td> </tr> <tr> <td>BPL/WW/03</td> <td>Original Loan</td> <td style="text-align: right;">354.3</td> </tr> <tr> <td colspan="2" style="text-align: center;">Total</td> <td style="text-align: right;">579.6</td> </tr> </tbody> </table>	Contract Packages	Financing Sources	Contract Value	BPL/WW/01	Original Loan	9.8	BPL/WW/01-02	Original Loan	215.5	BPL/WW/03	Original Loan	354.3	Total		579.6	<p>In addition to substantial price escalation of construction materials, the PMU adjusted the unit cost of pipe laying works upwards, based on the findings made during detailed engineering design that further excavation was required considering the soil conditions. The bid prices of BPL/WW/01-02 and BPL/WW/03 became higher, due to the risk premium for the depth of excavation, soil conditions, and availability of construction materials from vicinities. This resulted in a cost overrun of 106%.</p>
Contract Packages	Financing Sources	Contract Value																
BPL/WW/01	Original Loan	9.8																
BPL/WW/01-02	Original Loan	215.5																
BPL/WW/03	Original Loan	354.3																
Total		579.6																
	<p>Sewage Treatment Plant Construction</p> <ul style="list-style-type: none"> Design, supply, construction, installation, testing, and commissioning of a 75 mld capacity sewage treatment plant and pumping stations including all civil, mechanical, and electrical works <p>Original estimates: Rs185.9 million</p>	<p style="text-align: center;">Sewerage Treatment Plant</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Contract Packages</th> <th style="text-align: left;">Financing Sources</th> <th style="text-align: right;">Contract Value</th> </tr> </thead> <tbody> <tr> <td>BPL/WW/04</td> <td>Original Loan</td> <td style="text-align: right;">24.5</td> </tr> <tr> <td>BPL/WW/05</td> <td>Sup. Financing</td> <td style="text-align: right;">227.1</td> </tr> <tr> <td colspan="2" style="text-align: center;">Total</td> <td style="text-align: right;">251.6</td> </tr> </tbody> </table>	Contract Packages	Financing Sources	Contract Value	BPL/WW/04	Original Loan	24.5	BPL/WW/05	Sup. Financing	227.1	Total		251.6	<p>In the light of the cost overrun, the Bhopal Municipal Corporation decided to finance construction of the sewage treatment plant from its budget, and pumping station from the loan proceeds. Detailed engineering design identified that the construction cost of pumping stations became higher due to price escalation of iron and cement. This resulted in a cost overrun of 36%.</p>			
Contract Packages	Financing Sources	Contract Value																
BPL/WW/04	Original Loan	24.5																
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Scope	Activities	Bid Prices/Revised Contract Values (Rs million)	Analysis of Cost Variation																																										
Efficient solid-waste collection from Bhopal municipal corporation areas and safe disposal of the solid waste	Collection Equipment and Sanitary Landfill Construction <ul style="list-style-type: none"> Supply, delivery, and testing of about 1,300 wheelbarrows, 740 steel containers of 1 m³ capacity and 250 steel containers 4.5 m³ Supply, delivery and testing of material handling machines, including 16 solid-waste compactors mounted over diesel-driven automobile chassis, 50 dumper placers mounted over diesel-driven automobile chassis, 4 dump trucks, 1 bulldozer, 3 front-end loaders, and 2 excavators Original estimates: Rs118.3 million	<table border="1"> <thead> <tr> <th colspan="3" data-bbox="978 256 1503 282">Collection and Sanitary Landfill</th> </tr> <tr> <th data-bbox="978 289 1188 337">Contract Packages</th> <th data-bbox="1188 289 1398 337">Financing Sources</th> <th data-bbox="1398 289 1503 337">Contract Value</th> </tr> </thead> <tbody> <tr><td>BPL/SWM/01-L1</td><td>Original Loan</td><td>4.4</td></tr> <tr><td>BPL SWM/01-L2</td><td>Original Loan</td><td>2.6</td></tr> <tr><td>BPL SWM/01-L3</td><td>Original Loan</td><td>1.0</td></tr> <tr><td>BPL SWM/01-L4</td><td>Original Loan</td><td>6.5</td></tr> <tr><td>BPL SWM/02-L1</td><td>Original Loan</td><td>18.1</td></tr> <tr><td>BPL SWM/02-L4</td><td>Original Loan</td><td>9.9</td></tr> <tr><td>BPL SWM/03-L1</td><td>Original Loan</td><td>3.9</td></tr> <tr><td>BPL SWM/03-L4</td><td>Original Loan</td><td>3.2</td></tr> <tr><td>BPL SWM/03-L5</td><td>Original Loan</td><td>3.3</td></tr> <tr><td>BPL SWM/03-L6</td><td>Original Loan</td><td>1.8</td></tr> <tr><td>BPL SWM/03-L7</td><td>Original Loan</td><td>7.4</td></tr> <tr> <td>Total</td> <td></td> <td>62.1</td> </tr> </tbody> </table>	Collection and Sanitary Landfill			Contract Packages	Financing Sources	Contract Value	BPL/SWM/01-L1	Original Loan	4.4	BPL SWM/01-L2	Original Loan	2.6	BPL SWM/01-L3	Original Loan	1.0	BPL SWM/01-L4	Original Loan	6.5	BPL SWM/02-L1	Original Loan	18.1	BPL SWM/02-L4	Original Loan	9.9	BPL SWM/03-L1	Original Loan	3.9	BPL SWM/03-L4	Original Loan	3.2	BPL SWM/03-L5	Original Loan	3.3	BPL SWM/03-L6	Original Loan	1.8	BPL SWM/03-L7	Original Loan	7.4	Total		62.1	In the light of the cost overrun, the Bhopal Municipal Corporation decided to finance development of the sanitary landfill from its own budget. This results in a cost reduction of 47%.
		Collection and Sanitary Landfill																																											
Contract Packages	Financing Sources	Contract Value																																											
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Gwalior																																													
24-hour water supply to 36 wards of Gwalior	Water Supply Optimization <ul style="list-style-type: none"> Leak detection, rectification, and supply and installation of bulk water meters Rehabilitation of the existing water treatment plant Original estimates: Rs118.3 million	<table border="1"> <thead> <tr> <th colspan="3" data-bbox="978 815 1503 841">Water Supply Optimization</th> </tr> <tr> <th data-bbox="978 847 1188 896">Contract Packages</th> <th data-bbox="1188 847 1398 896">Financing Sources</th> <th data-bbox="1398 847 1503 896">Contract Value</th> </tr> </thead> <tbody> <tr><td>GWL/WS/01</td><td>Original Loan</td><td>11.9</td></tr> <tr><td>GWL/WS/02</td><td>Original Loan</td><td>86.5</td></tr> <tr><td>GWL/WS/03</td><td>Sup. Financing</td><td>30.0</td></tr> <tr><td>GWL/WS/05</td><td>Original Loan</td><td>4.3</td></tr> <tr><td>GWL/WS/07</td><td>Original Loan</td><td>57.8</td></tr> <tr><td>GWL/WS/09</td><td>Sup. Financing</td><td>20.0</td></tr> <tr> <td>Total</td> <td></td> <td>210.5</td> </tr> </tbody> </table>	Water Supply Optimization			Contract Packages	Financing Sources	Contract Value	GWL/WS/01	Original Loan	11.9	GWL/WS/02	Original Loan	86.5	GWL/WS/03	Sup. Financing	30.0	GWL/WS/05	Original Loan	4.3	GWL/WS/07	Original Loan	57.8	GWL/WS/09	Sup. Financing	20.0	Total		210.5	In addition to a substantial price escalation of construction materials, the PMU adjusted the unit cost of rehabilitation works upward for the water treatment plant and transmission pipelines based on the findings made during detailed engineering design that the extent of the actual damage and dysfunction of existing equipment in the water treatment plant was greater than the estimates made during the feasibility study. These resulted in cost increases in contracts GWL/WS/02 and GWL/WS/07. This resulted in a cost overrun of 78%.															
Water Supply Optimization																																													
Contract Packages	Financing Sources	Contract Value																																											
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Scope	Activities	Bid Prices/Revised Contract Values (Rs million)	Analysis of Cost Variation																		
	<p>Water Supply Distribution Expansion</p> <ul style="list-style-type: none"> • Construction of reinforced cement concrete overhead service reservoirs of 20 million liter capacity • Supply and laying of 20 km of cast-iron feeder mains of 150–300 mm diameter • Supply and laying of 210 km of PVC distribution mains of 80–250 mm diameter • Supply, installation, testing, and commissioning of 80,000 water meters in houses and standpost connections <p>Original estimates: Rs386.0 million</p>	<p style="text-align: center;">Water Supply Distribution</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Contract Packages</th> <th style="text-align: left;">Financing Sources</th> <th style="text-align: right;">Contract Value</th> </tr> </thead> <tbody> <tr> <td>GWL/WS/04</td> <td>Original Loan</td> <td style="text-align: right;">138.6</td> </tr> <tr> <td>GWL/WS/06</td> <td>Sup. Financing</td> <td style="text-align: right;">227.5</td> </tr> <tr> <td>GWL/WS/08</td> <td>Original Loan</td> <td style="text-align: right;">127.5</td> </tr> <tr> <td>GWL/WS/10</td> <td>Sup. Financing</td> <td style="text-align: right;">100.0</td> </tr> <tr> <td colspan="2" style="text-align: center;">Total</td> <td style="text-align: right;">593.6</td> </tr> </tbody> </table>	Contract Packages	Financing Sources	Contract Value	GWL/WS/04	Original Loan	138.6	GWL/WS/06	Sup. Financing	227.5	GWL/WS/08	Original Loan	127.5	GWL/WS/10	Sup. Financing	100.0	Total		593.6	<p>Detailed engineering design identified that the material cost was higher due to price escalation of iron and cement in GWL/WS/04 and GWL/WS/06. GWL/WS/06 is for third rebidding. This resulted in a cost overrun of 54%.</p>
Contract Packages	Financing Sources	Contract Value																			
GWL/WS/04	Original Loan	138.6																			
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Total		593.6																			
	<p>Water Supply Augmentation</p> <ul style="list-style-type: none"> • Development of raw water intake arrangement • Design, supply, installation, testing, and commissioning of a 45 mld capacity water treatment plant, pumping stations, pumping machinery, substation, including all civil, mechanical, and electrical works • Design, supply, laying, testing, and commissioning of about 13 km of raw water cast-iron rising mains of 800 mm diameter and 15 km of cast-iron feeder main of 200–450 mm diameter including all civil works, intermediate reservoir, and cross-drainage <p>Original estimates: Rs 236.0 million</p>	<p style="text-align: center;">Water Supply Augmentation</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Contract Packages</th> <th style="text-align: left;">Financing Sources</th> <th style="text-align: right;">Contract Value</th> </tr> </thead> <tbody> <tr> <td>GWL/WS/11</td> <td>Original Loan</td> <td style="text-align: right;">124.3</td> </tr> <tr> <td>GWL/WS/12</td> <td>Original Loan</td> <td style="text-align: right;">126.8</td> </tr> <tr> <td colspan="2" style="text-align: center;">Total</td> <td style="text-align: right;">251.1</td> </tr> </tbody> </table>	Contract Packages	Financing Sources	Contract Value	GWL/WS/11	Original Loan	124.3	GWL/WS/12	Original Loan	126.8	Total		251.1	<p>No major price variation.</p>						
Contract Packages	Financing Sources	Contract Value																			
GWL/WS/11	Original Loan	124.3																			
GWL/WS/12	Original Loan	126.8																			
Total		251.1																			
<p>Sewerage service in 27 wards of Gwalior</p>	<p>Sewerage and Drainage Network Expansion</p> <ul style="list-style-type: none"> • Supply, laying, and testing of 223 km of salt-glazed stoneware or reinforced cement concrete sewer of 150–1,800 mm diameter • Construction of brick masonry manholes on the sewer lines • Construction of 100 km of new brick masonry drains and reinforced cement 	<p style="text-align: center;">Sewerage and Drainage Network</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Contract Packages</th> <th style="text-align: left;">Financing Sources</th> <th style="text-align: right;">Contract Value</th> </tr> </thead> <tbody> <tr> <td>GWL/WW/01</td> <td>Original Loan</td> <td style="text-align: right;">4.4</td> </tr> <tr> <td>GWL/DR/01</td> <td>Sup. Financing</td> <td style="text-align: right;">110.0</td> </tr> <tr> <td>GWL/DR/02</td> <td>Sup. Financing</td> <td style="text-align: right;">75.0</td> </tr> <tr> <td>GWL/DR/03</td> <td>Sup. Financing</td> <td style="text-align: right;">30.0</td> </tr> <tr> <td colspan="2" style="text-align: center;">Total</td> <td style="text-align: right;">219.4</td> </tr> </tbody> </table>	Contract Packages	Financing Sources	Contract Value	GWL/WW/01	Original Loan	4.4	GWL/DR/01	Sup. Financing	110.0	GWL/DR/02	Sup. Financing	75.0	GWL/DR/03	Sup. Financing	30.0	Total		219.4	<p>In the light of the cost overrun, a portion of the sewerage network development was fully financed by the Government of India's special fund. This resulted in savings of 42%.</p>
Contract Packages	Financing Sources	Contract Value																			
GWL/WW/01	Original Loan	4.4																			
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Scope	Activities	Bid Prices/Revised Contract Values (Rs million)	Analysis of Cost Variation												
	concrete slab culverts on brick masonry abutments <ul style="list-style-type: none"> • Renovation of 10 km of existing primary and secondary drains • Supply, delivery, testing, and commissioning of one diesel-driven truck-mounted septic tank vacuum cleaning machine • Supply, delivery, testing, and commissioning of one diesel-driven truck-mounted sewer jetting cum vacuum cleaning machine Original estimates: Rs377.5 million														
	Sewage Treatment Plant Construction <ul style="list-style-type: none"> • Design, supply, installation, testing, and commissioning of sewage treatment plant of 88 million liter capacity, pumping station, pumping machinery, substation, conveyance main, including all civil, mechanical, and electrical works • Supply, installation, testing, and commissioning of diesel-driven electric power generator for sewage pumping stations including all civil, mechanical, and electrical works Original estimates: Rs314.5 million	<table border="1"> <thead> <tr> <th colspan="3" data-bbox="978 691 1499 716">Sewage Treatment Plant</th> </tr> <tr> <th data-bbox="978 724 1150 773">Contract Packages</th> <th data-bbox="1150 724 1373 773">Financing Sources</th> <th data-bbox="1373 724 1499 773">Contract Value</th> </tr> </thead> <tbody> <tr> <td data-bbox="978 773 1150 805">GWL/WW/04</td> <td data-bbox="1150 773 1373 805">Sup. Financing</td> <td data-bbox="1373 773 1499 805">105.0</td> </tr> <tr> <td colspan="2" data-bbox="978 805 1373 829">Total</td> <td data-bbox="1373 805 1499 829">105.0</td> </tr> </tbody> </table>	Sewage Treatment Plant			Contract Packages	Financing Sources	Contract Value	GWL/WW/04	Sup. Financing	105.0	Total		105.0	In the light of the cost overrun, equipment for the sewage pumping station was fully financed by the Government of India's special fund. This resulted in savings of 69%.
Sewage Treatment Plant															
Contract Packages	Financing Sources	Contract Value													
GWL/WW/04	Sup. Financing	105.0													
Total		105.0													
Efficient solid-waste collection from Gwalior municipal corporation areas and safe disposal of the solid waste	Collection Equipment and Sanitary Landfill Construction <ul style="list-style-type: none"> • Design, supply, construction, installation, testing, and commissioning of a sanitary landfill of 350 tons (t) per day capacity including all civil, mechanical, and electrical works • Supply, delivery, testing, trial run, and performance guarantee of 730 	<table border="1"> <thead> <tr> <th colspan="3" data-bbox="978 1154 1499 1179">Collection and Sanitary Landfill</th> </tr> <tr> <th data-bbox="978 1187 1150 1235">Contract Packages</th> <th data-bbox="1150 1187 1373 1235">Financing Sources</th> <th data-bbox="1373 1187 1499 1235">Contract Value</th> </tr> </thead> <tbody> <tr> <td colspan="2" data-bbox="978 1235 1373 1260">Total</td> <td data-bbox="1373 1235 1499 1260">0.0</td> </tr> <tr> <td colspan="2" data-bbox="978 1260 1373 1284"></td> <td data-bbox="1373 1260 1499 1284">0.0</td> </tr> </tbody> </table>	Collection and Sanitary Landfill			Contract Packages	Financing Sources	Contract Value	Total		0.0			0.0	In the light of the cost overrun, solid waste management activities were fully financed by the Government of India's special fund. This resulted in 100% savings.
Collection and Sanitary Landfill															
Contract Packages	Financing Sources	Contract Value													
Total		0.0													
		0.0													

Scope	Activities	Bid Prices/Revised Contract Values (Rs million)	Analysis of Cost Variation																														
	wheelbarrows, 398 mild-steel containers of 1 m ³ capacity and 136 mild-steel containers of 4.5 m ³ capacity <ul style="list-style-type: none"> Supply, delivery, and testing of 10 solid-waste diesel compactors, 30 diesel dumpers, 1 diesel dumper truck, 1 diesel bulldozer, 2 front-end loaders, 2 excavators Original estimates: Rs73.8 million																																
Indore																																	
24-hour water supply to 36 wards of Indore	Water Supply Optimization <ul style="list-style-type: none"> Leak detection, rectification, supply, and installation of bulk water meters Renovation of a water treatment plant Supply, installation, testing, and commissioning of 145,000 water meters in houses and standpost connections Original estimates: Rs86.5 million	<table border="1"> <thead> <tr> <th colspan="3">Water Supply Optimization</th> </tr> <tr> <th>Contract Packages</th> <th>Financing Sources</th> <th>Contract Value</th> </tr> </thead> <tbody> <tr> <td>IND/WS/01</td> <td>Original Loan</td> <td>13.1</td> </tr> <tr> <td>IND/WS/02 Lot 1</td> <td>Original Loan</td> <td>11.3</td> </tr> <tr> <td>IND/WS/02 Lot 2</td> <td>Sup. Financing</td> <td>25.1</td> </tr> <tr> <td>IND/WS/02 Lot 3</td> <td>Sup. Financing</td> <td>6.4</td> </tr> <tr> <td>IND/WS/03</td> <td>Original Loan</td> <td>11.1</td> </tr> <tr> <td>IND/WS/04</td> <td>Original Loan</td> <td>9.4</td> </tr> <tr> <td>IND/WS/05</td> <td>Original Loan</td> <td>13.4</td> </tr> <tr> <td>Total</td> <td></td> <td>89.8</td> </tr> </tbody> </table>	Water Supply Optimization			Contract Packages	Financing Sources	Contract Value	IND/WS/01	Original Loan	13.1	IND/WS/02 Lot 1	Original Loan	11.3	IND/WS/02 Lot 2	Sup. Financing	25.1	IND/WS/02 Lot 3	Sup. Financing	6.4	IND/WS/03	Original Loan	11.1	IND/WS/04	Original Loan	9.4	IND/WS/05	Original Loan	13.4	Total		89.8	No major price variation.
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Total		89.8																															
	Water Supply Distribution Expansion <ul style="list-style-type: none"> Construction of reinforced cement concrete overhead service reservoirs for 90 million liter total capacity Supply and laying of 400 km of PVC or reinforced cement concrete distribution mains of 150–600 mm diameter Original estimates: Rs1,374.5 million	<table border="1"> <thead> <tr> <th colspan="3">Water Supply Distribution</th> </tr> <tr> <th>Contract Packages</th> <th>Financing Sources</th> <th>Contract Value</th> </tr> </thead> <tbody> <tr> <td>IND/WS/08</td> <td>Sup. Financing</td> <td>252.1</td> </tr> <tr> <td>IND/WS/16</td> <td>Original Loan</td> <td>89.1</td> </tr> <tr> <td>IND/WS/18a</td> <td>Sup. Financing</td> <td>205.0</td> </tr> <tr> <td>IND/WS/18b</td> <td>Sup. Financing</td> <td>205.0</td> </tr> <tr> <td>IND/WS/19a</td> <td>Sup. Financing</td> <td>205.0</td> </tr> <tr> <td>IND/WS/21</td> <td>Sup. Financing</td> <td>125.0</td> </tr> <tr> <td>IND/WS/22</td> <td>Sup. Financing</td> <td>200.0</td> </tr> <tr> <td>Total</td> <td></td> <td>1281.2</td> </tr> </tbody> </table>	Water Supply Distribution			Contract Packages	Financing Sources	Contract Value	IND/WS/08	Sup. Financing	252.1	IND/WS/16	Original Loan	89.1	IND/WS/18a	Sup. Financing	205.0	IND/WS/18b	Sup. Financing	205.0	IND/WS/19a	Sup. Financing	205.0	IND/WS/21	Sup. Financing	125.0	IND/WS/22	Sup. Financing	200.0	Total		1281.2	No major price variation.
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Scope	Activities	Bid Prices/Revised Contract Values (Rs million)	Analysis of Cost Variation																																										
	<p>Water Supply Augmentation</p> <ul style="list-style-type: none"> Design and construction of a 900 mld capacity intake and pump house including 800 meter (m) inlet channel Design, supply, installation, testing and commissioning of a 360 mld capacity water treatment plant and intermediate pumping stations, pumping machinery, and substations Design, supply, laying, testing, and commissioning of 70 km of raw, clear rising, and gravity mains of 1,800 mm mild-steel, cement-lined, or pre-stressed concrete pipes and break pressure tank including all civil works and cross-drainage. Design, supply, laying, and commissioning of about 124 km of feeder mains of 100–1,300 mm pre-stressed concrete or cast-iron pipes including all civil works and cross-drainage <p>Original estimates: Rs2,607.5 million</p>	<p>Water Supply Augmentation</p> <table border="1"> <thead> <tr> <th>Contract Packages</th> <th>Financing Sources</th> <th>Contract Value</th> </tr> </thead> <tbody> <tr><td>IND/WS/06</td><td>Original Loan</td><td>226.1</td></tr> <tr><td>IND/WS/07</td><td>Original Loan</td><td>253.9</td></tr> <tr><td>IND/WS/09</td><td>Original Loan</td><td>677.9</td></tr> <tr><td>IND/WS/10</td><td>Original Loan</td><td>397.1</td></tr> <tr><td>IND/WS/11-L1</td><td>Original Loan</td><td>48.1</td></tr> <tr><td>IND/WS/11-L2</td><td>Original Loan</td><td>480.9</td></tr> <tr><td>IND/WS/12-L1</td><td>Original Loan</td><td>556.6</td></tr> <tr><td>IND/WS/12-L2</td><td>Original Loan</td><td>528.3</td></tr> <tr><td>IND/WS/13</td><td>Original Loan</td><td>641.7</td></tr> <tr><td>IND/WS/14</td><td>Sup. Financing</td><td>180.0</td></tr> <tr><td>IND/WS/17</td><td>Original Loan</td><td>336.1</td></tr> <tr><td>IND/WS/20</td><td>Original Loan</td><td>158.6</td></tr> <tr><td>Total</td><td></td><td>4,485.3</td></tr> </tbody> </table>	Contract Packages	Financing Sources	Contract Value	IND/WS/06	Original Loan	226.1	IND/WS/07	Original Loan	253.9	IND/WS/09	Original Loan	677.9	IND/WS/10	Original Loan	397.1	IND/WS/11-L1	Original Loan	48.1	IND/WS/11-L2	Original Loan	480.9	IND/WS/12-L1	Original Loan	556.6	IND/WS/12-L2	Original Loan	528.3	IND/WS/13	Original Loan	641.7	IND/WS/14	Sup. Financing	180.0	IND/WS/17	Original Loan	336.1	IND/WS/20	Original Loan	158.6	Total		4,485.3	<p>In addition to substantial price escalation of construction materials, bid prices were higher than estimates due to geographical risks premiums associated with hilly areas. This, coupled with the price escalation of iron and cement, resulted in a cost overrun of 72%.</p>
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Sewerage service in 25 wards of Indore	<p>Sewerage Network Expansion</p> <ul style="list-style-type: none"> Supply, laying, and testing of 315 km of salt-glazed stoneware or reinforced cement concrete sewer of 150–1,800 mm diameter. Including replacement of existing sewer, construction of brick masonry manhole chambers and roadside chambers Supply, delivery, testing, and commissioning of two diesel-driven truck-mounted septic tank vacuum cleaning machines Supply, delivery, testing, and commissioning of two diesel-driven truck-mounted sewer jetting cum vacuum cleaning machines <p>Original estimates: Rs621.5 million</p>	<table border="1"> <thead> <tr> <th>Contract Packages</th> <th>Financing Sources</th> <th>Contract Value</th> </tr> </thead> <tbody> <tr><td>IND/WW/01</td><td>Original Loan</td><td>6.0</td></tr> <tr><td>IND/WW/02</td><td>Sup. Financing</td><td>100.0</td></tr> <tr><td>Total</td><td></td><td>106.0</td></tr> </tbody> </table>	Contract Packages	Financing Sources	Contract Value	IND/WW/01	Original Loan	6.0	IND/WW/02	Sup. Financing	100.0	Total		106.0	<p>In the light of the cost overrun, a portion of the sewerage network development was fully financed by the Government of India's special fund. This resulted in a saving of 83%.</p>																														
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Scope	Activities	Bid Prices/Revised Contract Values (Rs million)	Analysis of Cost Variation																																				
Efficient solid-waste collection from Indore municipal corporation areas and safe disposal of the solid waste	<p>Collection Equipment and Sanitary Landfill Construction</p> <ul style="list-style-type: none"> Design, supply, construction, installation, testing, and commissioning of a sanitary landfill site of 800 t per day capacity including all civil, mechanical, and electrical works Supply, delivery, and testing of 1,580 wheelbarrows, 864 mild-steel containers of 1 m³ capacity, and 293 mild-steel containers of 4.5 m³ capacity <p>Original estimates: Rs118.3 million</p>	<p align="center">Collection and Sanitary Landfill</p> <table border="1"> <thead> <tr> <th>Contract Packages</th> <th>Financing Sources</th> <th>Contract Value</th> </tr> </thead> <tbody> <tr><td>IND/SWM/01-L1</td><td>Original Loan</td><td>4.4</td></tr> <tr><td>IND/SWM/01-L2</td><td>Original Loan</td><td>1.3</td></tr> <tr><td>IND/SWM/01-L3</td><td>Original Loan</td><td>2.0</td></tr> <tr><td>IND/SWM/01-L4</td><td>Original Loan</td><td>4.3</td></tr> <tr><td>IND/SWM/02-L2</td><td>Original Loan</td><td>11.0</td></tr> <tr><td>IND/SWM/02-L5</td><td>Original Loan</td><td>20.4</td></tr> <tr><td>IND/SWM/03-L1</td><td>Original Loan</td><td>2.1</td></tr> <tr><td>IND/SWM/03-L3</td><td>Original Loan</td><td>1.4</td></tr> <tr><td>IND/SWM/03-L4</td><td>Original Loan</td><td>1.6</td></tr> <tr><td>IND/SWM/05</td><td>Sup. Financing</td><td>109.4</td></tr> <tr><td>Total</td><td></td><td>157.9</td></tr> </tbody> </table>	Contract Packages	Financing Sources	Contract Value	IND/SWM/01-L1	Original Loan	4.4	IND/SWM/01-L2	Original Loan	1.3	IND/SWM/01-L3	Original Loan	2.0	IND/SWM/01-L4	Original Loan	4.3	IND/SWM/02-L2	Original Loan	11.0	IND/SWM/02-L5	Original Loan	20.4	IND/SWM/03-L1	Original Loan	2.1	IND/SWM/03-L3	Original Loan	1.4	IND/SWM/03-L4	Original Loan	1.6	IND/SWM/05	Sup. Financing	109.4	Total		157.9	Detailed engineering design identified that the construction cost of a sanitary landfill would be higher due to price escalation of plastic and cement. This resulted in a cost overrun of 34%.
Contract Packages	Financing Sources	Contract Value																																					
IND/SWM/01-L1	Original Loan	4.4																																					
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Total		157.9																																					
Jabalpur																																							
24-hour water supply to 59 wards of Jabalpur	<p>Water Supply Optimization</p> <ul style="list-style-type: none"> Leak detection, rectification, supply, and installation of bulk water meters Supply and laying of 2.5 km of cast-iron raw water gravity main of 600 mm diameter in replacement of existing old MS main Renovation of existing pumping station and water treatment plants <p>Original estimates: Rs91.0 million</p>	<p align="center">Water Supply Optimization</p> <table border="1"> <thead> <tr> <th>Contract Packages</th> <th>Financing Sources</th> <th>Contract Value</th> </tr> </thead> <tbody> <tr><td>JBP/WS/01</td><td>Original Loan</td><td>7.1</td></tr> <tr><td>JBP/WS/02</td><td>Original Loan</td><td>55.3</td></tr> <tr><td>JBP/WS/03</td><td>Sup. Financing</td><td>180.0</td></tr> <tr><td>JBP/WS/06</td><td>Sup. Financing</td><td>50.0</td></tr> <tr><td>JBP/WS/08</td><td>Original Loan</td><td>5.2</td></tr> <tr><td>JBP/WS/13</td><td>Sup. Financing</td><td>20.0</td></tr> <tr><td>JBP/WS/14</td><td>Sup. Financing</td><td>62.5</td></tr> <tr><td>Total</td><td></td><td>380.1</td></tr> </tbody> </table>	Contract Packages	Financing Sources	Contract Value	JBP/WS/01	Original Loan	7.1	JBP/WS/02	Original Loan	55.3	JBP/WS/03	Sup. Financing	180.0	JBP/WS/06	Sup. Financing	50.0	JBP/WS/08	Original Loan	5.2	JBP/WS/13	Sup. Financing	20.0	JBP/WS/14	Sup. Financing	62.5	Total		380.1	In addition to substantial price escalation of construction materials, the PMU adjusted the unit cost of rehabilitation works upwards for the water treatment plants, pumping stations, and service pipelines, based on the findings during detailed engineering design that the actual damage to pipelines and dysfunction of existing equipment in the treatment plants and pumping stations was greater than the estimates made during the feasibility study. The cost increase in contracts JBP/WS/02, JBP/WS/03 and JBP/WS/06 resulted in a cost overrun of 318%.									
Contract Packages	Financing Sources	Contract Value																																					
JBP/WS/01	Original Loan	7.1																																					
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Scope	Activities	Bid Prices/Revised Contract Values (Rs million)	Analysis of Cost Variation																					
	<p>Water Supply Distribution Expansion</p> <ul style="list-style-type: none"> • Construction of overhead service reservoirs for 35 million liter total capacity • Supply and laying of 36 km of cast-iron clear water feeder mains of 150–400 mm diameter • Supply and laying of 125 km of PVC, reinforced cement concrete, or cast-iron distribution mains of 80–450 mm diameter <p>Original estimates: Rs395.5 million</p>	<p style="text-align: center;">Water Supply Distribution</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Contract Packages</th> <th style="text-align: left;">Financing Sources</th> <th style="text-align: right;">Contract Value</th> </tr> </thead> <tbody> <tr> <td>JBP/WS/07</td> <td>Original Loan</td> <td style="text-align: right;">72.9</td> </tr> <tr> <td>JBP/WS/09</td> <td>Original Loan</td> <td style="text-align: right;">175.2</td> </tr> <tr> <td>JBP/WS/10</td> <td>Original Loan</td> <td style="text-align: right;">69.2</td> </tr> <tr> <td>JBP/WS/12</td> <td>Original Loan</td> <td style="text-align: right;">69.2</td> </tr> <tr> <td>JBP/WS/15</td> <td>Original Loan</td> <td style="text-align: right;">168.6</td> </tr> <tr> <td colspan="2" style="text-align: center;">Total</td> <td style="text-align: right;">555.1</td> </tr> </tbody> </table>	Contract Packages	Financing Sources	Contract Value	JBP/WS/07	Original Loan	72.9	JBP/WS/09	Original Loan	175.2	JBP/WS/10	Original Loan	69.2	JBP/WS/12	Original Loan	69.2	JBP/WS/15	Original Loan	168.6	Total		555.1	<p>Bid prices were higher than estimates due to price escalation of iron, cement, and plastic products. This resulted in a cost overrun of 41%.</p>
Contract Packages	Financing Sources	Contract Value																						
JBP/WS/07	Original Loan	72.9																						
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JBP/WS/12	Original Loan	69.2																						
JBP/WS/15	Original Loan	168.6																						
Total		555.1																						
	<p>Water Supply Augmentation</p> <ul style="list-style-type: none"> • Design and construction of intake well cum pump house on the Narmada River • Design, supply, installation, testing, and commissioning of a 120 mld capacity water treatment plant and pumping stations, pumping machinery, substations, including all civil, mechanical, and electrical works • Design, supply, laying, testing, and commissioning of 7 km of raw water rising mains of 800 mm ductile iron cement-lined pipes and 15 km cast-iron feeder main of 200–400 mm diameter including all civil works and cross-drainage • Design and construction of pre-settling tank at water treatment plant • Design and construction of earth blanket and toe-wall for Pariyat Dam <p>Original estimates: Rs383.0 million</p>	<p style="text-align: center;">Water Supply Augmentation</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Contract Packages</th> <th style="text-align: left;">Financing Sources</th> <th style="text-align: right;">Contract Value</th> </tr> </thead> <tbody> <tr> <td>JBP/WS/04</td> <td>Original Loan</td> <td style="text-align: right;">24.5</td> </tr> <tr> <td>JBP/WS/16</td> <td>Original Loan</td> <td style="text-align: right;">314.6</td> </tr> <tr> <td>JBP/WS/17</td> <td>Original Loan</td> <td style="text-align: right;">318.0</td> </tr> <tr> <td>JBP/WS/18</td> <td>Original Loan</td> <td style="text-align: right;">264.4</td> </tr> <tr> <td colspan="2" style="text-align: center;">Total</td> <td style="text-align: right;">921.5</td> </tr> </tbody> </table>	Contract Packages	Financing Sources	Contract Value	JBP/WS/04	Original Loan	24.5	JBP/WS/16	Original Loan	314.6	JBP/WS/17	Original Loan	318.0	JBP/WS/18	Original Loan	264.4	Total		921.5	<p>In addition to substantial price escalation of construction materials, the PMU adjusted the unit cost of works for the intake well and pump house, based on the findings made during detailed engineering design that the requirements of high technical skills for the steep and high river bank, and rock formation in the soil, would result in higher input price of works. These resulted in a cost overrun of 141%.</p>			
Contract Packages	Financing Sources	Contract Value																						
JBP/WS/04	Original Loan	24.5																						
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Sewerage service in 42 wards of Jabalpur	<p>Sewerage and Drainage Network Expansion</p> <ul style="list-style-type: none"> • Supply, laying, and testing of 176 km of salt-glazed stoneware or reinforced cement concrete sewer of 150–1,200 mm diameter. • Construction of brick masonry manhole 	<p style="text-align: center;">Sewerage and Drainage Network</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Contract Packages</th> <th style="text-align: left;">Financing Sources</th> <th style="text-align: right;">Contract Value</th> </tr> </thead> <tbody> <tr> <td>JBP/WW/02</td> <td>Original Loan</td> <td style="text-align: right;">246.7</td> </tr> <tr> <td>JBP/WW/03</td> <td>Original Loan</td> <td style="text-align: right;">485.3</td> </tr> <tr> <td colspan="2" style="text-align: center;">Total</td> <td style="text-align: right;">732.0</td> </tr> </tbody> </table>	Contract Packages	Financing Sources	Contract Value	JBP/WW/02	Original Loan	246.7	JBP/WW/03	Original Loan	485.3	Total		732.0	<p>Bid prices were higher than estimates due to price escalation of iron and cement. Unavailability of reinforced cement concrete pipes in Jabalpur further increased the cost. This resulted in a cost overrun of 47%.</p>									
Contract Packages	Financing Sources	Contract Value																						
JBP/WW/02	Original Loan	246.7																						
JBP/WW/03	Original Loan	485.3																						
Total		732.0																						

Scope	Activities	Bid Prices/Revised Contract Values (Rs million)	Analysis of Cost Variation																														
	chambers and roadside chambers along with interconnecting sewer <ul style="list-style-type: none"> Construction of 36 km of new brick masonry drains and reinforced cement concrete slab culverts on brick masonry abutments Renovation of 3 km of existing primary and secondary drains Original estimates: Rs499.0 million																																
	Sewerage Treatment Plant Construction <ul style="list-style-type: none"> Design, supply, installation, testing, and commissioning of 100 mld capacity sewerage treatment plant, pumping station, pumping machinery, substation, pumping main, including all civil, mechanical, and electrical works Supply, installation, testing, and commissioning of diesel-driven electric power generator for sewage pumping station including all civil, mechanical, and electrical works, Original estimates: Rs388.4 million	<table border="1"> <thead> <tr> <th colspan="3">Sewerage Treatment Plant</th> </tr> <tr> <th>Contract Packages</th> <th>Financing Sources</th> <th>Contract Value</th> </tr> </thead> <tbody> <tr> <td>JBP/WW/04</td> <td>Original Loan</td> <td>79.8</td> </tr> <tr> <td>Total</td> <td></td> <td>79.8</td> </tr> </tbody> </table>	Sewerage Treatment Plant			Contract Packages	Financing Sources	Contract Value	JBP/WW/04	Original Loan	79.8	Total		79.8	Detailed engineering design identified that pumping stations were not required. This resulted in a saving of 79%.																		
Sewerage Treatment Plant																																	
Contract Packages	Financing Sources	Contract Value																															
JBP/WW/04	Original Loan	79.8																															
Total		79.8																															
Efficient solid-waste collection from Jabalpur municipal corporation areas and safe disposal of the solid waste	Collection Equipment and Sanitary Landfill Construction <ul style="list-style-type: none"> Design, supply, construction, installation, testing, and commissioning of sanitary landfill of 450 t per day capacity including all civil, mechanical, and electrical works. Supply, delivery, and testing of 880 wheelbarrows, 484 mild-steel containers of 1 m³ capacity and 165 mild-steel containers of 4.5 m³ capacity as per drawing and specifications. Original estimates: Rs83.8 million	<table border="1"> <thead> <tr> <th colspan="3">Collection Equipment and Sanitary Landfill</th> </tr> <tr> <th>Contract Packages</th> <th>Financing Sources</th> <th>Contract Value</th> </tr> </thead> <tbody> <tr> <td>JBP/SWM/02-L3</td> <td>Original Loan</td> <td>3.4</td> </tr> <tr> <td>JBP/SWM/02-L6</td> <td>Original Loan</td> <td>3.7</td> </tr> <tr> <td>JBP/SWM/03-L1</td> <td>Original Loan</td> <td>1.9</td> </tr> <tr> <td>JBP/SWM/03-L2</td> <td>Original Loan</td> <td>0.5</td> </tr> <tr> <td>JBP/SWM/03-L3</td> <td>Original Loan</td> <td>1.0</td> </tr> <tr> <td>JBP/SWM/03-L4</td> <td>Original Loan</td> <td>1.6</td> </tr> <tr> <td>JBP/SWM/04</td> <td>Sup. Financing</td> <td>75.0</td> </tr> <tr> <td>Total</td> <td></td> <td>87.1</td> </tr> </tbody> </table>	Collection Equipment and Sanitary Landfill			Contract Packages	Financing Sources	Contract Value	JBP/SWM/02-L3	Original Loan	3.4	JBP/SWM/02-L6	Original Loan	3.7	JBP/SWM/03-L1	Original Loan	1.9	JBP/SWM/03-L2	Original Loan	0.5	JBP/SWM/03-L3	Original Loan	1.0	JBP/SWM/03-L4	Original Loan	1.6	JBP/SWM/04	Sup. Financing	75.0	Total		87.1	No major price variation.
Collection Equipment and Sanitary Landfill																																	
Contract Packages	Financing Sources	Contract Value																															
JBP/SWM/02-L3	Original Loan	3.4																															
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BPL = Bhopal, DR = drainage, GWL = Gwalior, IND = Indore, JBP = Jabalpur, mld = million liter per day, PMU = project management unit, PVC = poly vinyl chloride, SWM = solid waste management, WS = water supply, WW = wastewater.

Sources: ADB. 2002. *Draft Final Report on Integrated Urban Development in Madhya Pradesh*. Manila; and project management unit estimates.

DETAILED COST ESTIMATES

(\$ million)

Item	Total Cost			ADB			UN HABITAT			GoMP and MCs		
	OC	Inc	Total	IF	SL	Total	IF	SL	Total	IF	SL	Total
A. Investment Costs^a												
1. Civil Works	160.5	62.9	223.4	120.6	53.1	173.7	0.0	0.0	0.0	39.9	9.8	49.8
Bhopal	20.1	8.3	28.4	15.1	7.0	22.1	0.0	0.0	0.0	5.0	1.3	6.3
Gwalior	26.4	13.6	40.0	19.8	11.5	31.3	0.0	0.0	0.0	6.6	2.1	8.7
Indore	81.7	33.6	115.3	61.4	28.3	89.7	0.0	0.0	0.0	20.3	5.2	25.6
Jabalpur	32.3	7.4	39.7	24.3	6.2	30.5	0.0	0.0	0.0	8.0	1.2	9.2
2. Equipment	26.7	9.1	35.8	20.7	7.6	28.3	0.0	0.0	0.0	6.0	1.4	7.5
Bhopal	4.3	2.9	7.2	3.3	2.4	5.8	0.0	0.0	0.0	1.0	0.5	1.4
Gwalior	3.4	2.1	5.5	2.6	1.8	4.4	0.0	0.0	0.0	0.8	0.3	1.1
Indore	14.6	2.7	17.3	11.3	2.2	13.6	0.0	0.0	0.0	3.3	0.4	3.7
Jabalpur	4.4	1.3	5.7	3.4	1.1	4.5	0.0	0.0	0.0	1.0	0.2	1.2
3. Land Acquisition	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.7
Bhopal	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
Gwalior	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Indore	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3
Jabalpur	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3
4. Water for Asian Cities Program	0.5	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.5	0.0	0.0	0.0
5. Area Improvement Facility^b	0.0	4.1	4.1	0.0	3.3	3.3	0.0	0.0	0.0	0.0	0.8	0.8
6. Community Initiative Fund^b	0.0	1.6	1.6	0.0	1.3	1.3	0.0	0.0	0.0	0.0	0.3	0.3
7. Consultants	15.4	4.3	19.7	12.7	3.8	16.6	0.0	0.0	0.0	2.7	0.4	3.1
8. Taxes and Duties	10.8	10.2	21.0	0.0	0.0	0.0	0.0	0.0	0.0	10.8	10.2	21.0
Subtotal (A)	214.6	92.2	306.8	154.0	69.1	223.1	0.5	0.0	0.5	60.1	23.1	83.2
B. Recurrent Costs												
1. Project Administration	3.9	2.5	6.4	0.0	0.0	0.0	0.0	0.0	0.0	3.9	2.5	6.4
PMU	2.4	1.5	3.9	0.0	0.0	0.0	0.0	0.0	0.0	2.4	1.5	3.9
PIU	1.5	1.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.0	2.5
Subtotal (B)	3.9	2.5	6.4	0.0	0.0	0.0	0.0	0.0	0.0	3.9	2.5	6.4
Total Base Cost	218.5	94.7	313.2	154.0	69.1	223.1	0.5	0.0	0.5	64.0	25.6	89.6
C. Contingencies												
Physical ^c	20.6	4.2	24.8	13.7	0.8	14.5	0.0	0.0	0.0	6.8	3.5	10.3
Priced ^d	21.5	6.2	27.7	13.3	1.1	14.4	0.0	0.0	0.0	8.2	5.0	13.3
Subtotal (C)	42.1	10.4	52.5	27.0	1.9	28.9	0.0	0.0	0.0	15.0	8.5	23.6

Item	Total Cost			ADB			UN HABITAT			GoMP and MCs		
	OC	Inc	Total	IF	SL	Total	IF	SL	Total	IF	SL	Total
D. Financing Charges During Implementation^e												
Interest During Implementation	11.0	2.4	13.4	0.0	0.0	0.0	0.0	0.0	0.0	11.0	2.4	13.4
Commitment Charges	2.6	0.5	3.1	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.5	3.1
Front-end Fees	0.8	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.8
Subtotal (D)	14.4	2.9	17.3	0.0	0.0	0.0	0.0	0.0	0.0	14.4	2.9	17.3
Total Project Cost (A+B+C+D)	275.0	108.0	383.0	181.0	71.0	252.0	0.5	0.0	0.5	93.5	37.0	130.4
Percentage	71.8	28.2	100.0	47.3	18.5	65.8	0.1	0.0	0.1	24.4	9.6	34.1

ADB = Asian Development Bank, FX = foreign exchange, GoMP = government of Madhya Pradesh, IF = initial financing, Inc = increase, LC = local cost, MC = municipal corporation, OC = original costs, PIU = project implementation unit, PMU = project management unit, SL = supplementary loan.

^a Original cost is in mid-2003 prices and additional cost is in mid-2008 prices. Original cost is based on the exchange rate at Rs49.9 per \$1, and additional cost at \$39.0 per \$1.

^b The loan proceeds allocated to the area improvement facility and the community initiative fund were reallocated to works and equipment to facilitate procurement. The same amount is allocated in the supplementary loan.

^c Original cost is computed 7.5% for civil works, 5.0% for equipment and consulting services. Additional cost is computed at 5% for civil works, equipment, consulting services, and project administration cost.

^d Original cost is computed at 2.4% per annum for foreign costs and 5% per annum for local costs throughout the implementation period. Additional cost is computed at 5.0% for domestic inflation and 0.8% in all years for foreign inflation.

^e Original cost includes interest and commitment charges. Financing charges are estimated, assuming an interest rate computed at the 6-month London interbank offered rate and a spread of 60 basis points, a commitment fee of 0.75%, and a front-end fee of 0.5%. Additional cost includes interest and commitment charges. Financing charges are estimated, assuming an interest rate computed at the 6-month London interbank offered rate and a spread of 20 basis points, and a commitment fee of 0.15%.

Sources: ADB. 2003. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to India for the Urban Water Supply and Environmental Improvement in Madhya Pradesh Project*. Manila (Loan 2046-IND); and ADB and the project management unit estimates.

PROCUREMENT PLAN

Table A6.1: Project Information

Project Information	
Country	India
Name of Borrower	India
Project Name	Urban Water Supply and Environmental Improvement in Madhya Pradesh Project (Supplementary Loan)
Loan or TA Reference	TBD
Date of Effectiveness	TBD
Amount (\$)	\$71 million
Of which Committed, (\$)	–
Executing Agency	The Urban Administration and Development Department (UADD) of the government of Madhya Pradesh.
Approval Date of Original Procurement Plan	–
Approval of most recent Procurement Plan	–
Publication for Local Advertisements	–
Period Covered by this Plan	2008–2009

TA = technical assistance, TBD = to be determined.

Source: Asian Development Bank.

Table A6.2: Procurement Thresholds for Goods and Related Services, and Supply and Installation of Works

Procurement Method	Threshold
International Competitive Bidding Works	\$10,000,000 and above
International Competitive Bidding Goods	\$1,000,000 and above
National Competitive Bidding Works	Below \$10,000,000
National Competitive Bidding Goods	Below \$1,000,000
Limited International Bidding	Below \$1,000,000
Shopping	Below \$100,000

Source: Asian Development Bank.

Table A6.3: Indicative Contract Packages

No.	Contract Description and Package No.	Method	Advertisement	Contracts Value (\$ million)	Prior Review	Comments
A. Bhopal						
1.	Supply, installation, testing, and commissioning of non-domestic water meters in Bhopal (BPL/WS/12)	LIB/NCB	Completed	0.29	Required	SC under RF CA in 2008
2.	Rehabilitation of clear water pumping station Pulpukhta in Bhopal (BPL/WS/13)	NCB	August 2008	1.03		WC CA in 2008
3.	Supply, installation, testing, and commissioning of domestic water meters in Bhopal (BPL/WS/14)	ICB	September 2008	3.21	Required	SC CA in 2009
4.	Laying of distribution pipelines in wards 21, 24, 25, 36, and 37 (BPL/WS/08)	NCB	Completed	2.54		WC under RF CA in 2008
5.	Construction of sewage pumping station and pumping main (BPL/WW/05)	NCB	Completed	5.82		WC under RF CA in 2008
	Subtotal (A)			12.88		
B. Gwalior						
6.	Supply, installation, testing, and commissioning of domestic	ICB	December 2008	2.56	Required	SC CA in 2009

No.	Contract Description and Package No.	Method	Advertisement	Contracts Value (\$ million)	Prior Review	Comments
	water meters in Gwalior (GWL/WS/10)					
7.	Laying of distribution system in Gwalior (GWL/WS/06)	NCB	Completed	5.83		WC under RF CA in 2008
8.	Leak detection and rectification works in Gwalior (GWL/WS/03)	NCB	May 2008	0.77		WC CA in 2008
9.	Rehabilitation of settling tank (GWL/WS/09)	NCB	September 2008	0.51		WC CA in 2009
10.	Construction of sewerage treatment plant in Gwalior (GWL/WW/04)	ICB/NCB	January 2009	2.69	Required	WC CA in 2009
11.	Construction of new secondary drains at Gadhaipura in Gwalior (GWL/DR/01)	NCB	May 2008	2.82		WC CA in 2008
12.	Construction of new secondary drains in Gwalior (GWL/DR/02)	NCB	January 2009	1.92		WC CA in 2009
13.	Renovation of primary and secondary drains in Gwalior (GWL/DR/03)	NCB	January 2009	0.77		WC CA in 2009
	Subtotal (B)			17.88		
C. Indore						
14.	Supply, installation, testing, and commissioning of domestic water meters in Indore (IND/WS/21)	ICB	December 2008	3.21	Required	SC CA in 2009
15.	Construction of overhead storage reservoir (IND/WS/08)	NCB	Completed	6.46		WC under RF CA in 2008
16.	Providing distribution system in Indore (IND/WS/18a)	NCB	September 2008	5.13		WC CA in 2009
17.	Providing distribution system in Indore (IND/WS/18b)	NCB	September 2008	5.13		WC CA in 2009
18.	Providing distribution system in Indore (IND/WS/19a)	NCB	September 2008	5.13		WC CA in 2009
19.	Rehabilitation of electrical and mechanical works of Narmada Phases I and II (IND/WS/02 Lot 2)	NCB	Completed	0.64		WC under RF CA in 2008
20.	Rehabilitation of electrical and mechanical works of Yaswant Sagar intake (dry well) (IND/WS/02 Lot 3)	NCB	Completed	0.16		WC under RF CA in 2008
21.	Misc Works: Civil works, city and head works (IND/WS/14)	NCB	September 2008	4.62		WC CA in 2009
22.	Dedicated 132 kilovolt power transmission line from Badwah to Bakhilai (IND/WS/22)	NCB	May 2008	5.13		WC CA in 2008
23.	Rehabilitation of sewerage network connecting to existing sewage treatment plant (IND/WW/02)	NCB	May 2008	2.56		WC CA in 2008
24.	Construction of Devguradia sanitary landfill site (IND/SWM/05 Lot-1 and Lot-2)	NCB	Completed	2.80		WC under RF CA in 2008
	Subtotal (C)			40.97		
D. Jabalpur						
25.	Construction of sanitary landfill site Kathondra (JBP/SWM/04)	NCB	Completed	1.92		WC under RF CA in 2008
26.	Unaccounted for water	NCB	May 2008	0.92		WC

No.	Contract Description and Package No.	Method	Advertisement	Contracts Value (\$ million)	Prior Review	Comments
	investigation, reduction, repair, replacement of pipes in the distribution system in the pilot area including domestic meters (JBP/WS/13)					CA in 2008
27.	Storm Water Drainage for Adhartal & Cherital area (JBP/DR/02)	NCB	Completed	7.10		WC under RF CA in 2008
	Subtotal (D)			9.94		
	Total (A+B+C+D)			81.68		

CA = contract award, ICB = international competitive bidding, LIB = limited international bidding, NCB = national competitive bidding, RF = retroactive financing, PS = pumping station, SC = supply contract, RW = raw water, WC = works contract.

Notes: All internationally procured contracts require the prior review of the Asian Development Bank.

Contracts to be paid in the local currency are expressed in dollar terms at \$1= Rs 39.0.

Source: Asian Development Bank estimates.

Table A6.4: Procurement Thresholds for Consultancy Services

Procurement Method	Threshold
Quality- and Cost-Based Selection	\$200,000 and above
Consultants Qualifications Selection	Below \$200,000
Least-Cost Selection	Below \$100,000
Single Source Selection	For continuation of prior assignment

Source: Asian Development Bank estimates.

Table A6.5: Indicative Consultancy Contract Packages

Contract Description	Method	Original Contract Value ^a (\$ million)	Variation Value (\$ million)	Prior Review	Comments
Design and supervision consultants for East side	VO	5.90	2.90	Required	Continuation of prior assignment
Design and supervision consultants for West side	VO	2.81	1.37	Required	Continuation of prior assignment
Benefit monitoring and evaluation consultants	VO	0.17	0.08	Required	Continuation of prior assignment
Public relations and awareness consultants	VO	0.56	0.27	Required	Continuation of prior assignment
Total			4.62		

VO = variation order.

^a Contracts paid or to be paid in the local currency are converted at \$1 = Rs39.0.

Source: Asian Development Bank estimates.

REVISED PROJECT IMPLEMENTATION SCHEDULE

Item	2005				2006				2007				2008				2009				2010				2011			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Project Tasks																												
Loan Effectiveness	■																											
Part A : Urban Water Supply and Environmental Improvement																												
Water Supply Improvement Schemes																												
Optimization of Existing System																												
Expansion of Network and Augmentation																												
Sewerage, Drainage and Sanitation Schemes																												
Sewerage and Drainage Improvements																												
Construction of Sewage Treatment Plants																												
Improvement of Sanitation and Supply of Sanitation Equipment																												
Solid Waste Management Schemes																												
Procurement of Waste Collection Equipment																												
Development of Sanitary Landfill Waste Disposal Sites																												
Part B : Urban Governance and Institutional Development																												
Water for Asian Cities Program																												
Funds for Municipal Action Planning for Poverty Reduction																												
Part C : Implementation Assistance																												
Engagement Consultants																												
Detail Engineering Design																												
Contract Supervision																												
Public Relations and Awareness Program																												
Benefit Monitoring and Evaluation																												
Miscellaneous																												
Project Review Mission																												
Midterm Review Mission																												
Loan Closing																												

I = first quarter, II = second quarter, III = third quarter, IV = fourth quarter

Sources: Asian Development Bank and the project management unit estimates.

REVISED FINANCIAL ANALYSIS

1. **Background.** A financial analysis of the Urban Water Supply and Environmental Improvement in Madhya Pradesh Project was carried out for the revenue-generating subprojects to confirm financial sustainability during the loan appraisal, and reported in the report and recommendation of the President in 2003.¹ The project aimed to improve generation of revenues from own sources, and to ensure that the operation and maintenance (O&M) of both existing and new assets could be adequately covered. The original financial analysis assumed timely construction of urban infrastructure, and implementation of the financial improvement action plan (FIAP), which was designed mainly to increase (i) a property tax, (ii) water charges, (iii) sewerage surcharges, (iv) solid-waste management fees, and (v) property tax.

2. This revisited financial analysis will not propose any revisions in tariff and property tax rates from the original financial analysis in 2003.² Instead, it proposes to reschedule implementation of the FIAP to reflect the delay in construction of urban infrastructure. Therefore, the result of the original financial analysis remains the same, except for the financial cost–benefit analysis. This revisited financial analysis focuses on FIAP rescheduling and financial cost–benefit analysis.

3. **Progress of the Financial Improvement Action Plan.** The FIAP was formulated with a philosophy that people would not accept any tariff increase unless there were visible improvements in urban services. It was envisaged that the start of major tariff increases would start from the second year of project implementation, when some new urban infrastructure became operational. In reality, however, it was only in the second half of 2007 that the majority of contract works were awarded to the contractor. Although there has been good progress in implementation of works, major infrastructure is still under construction and will become operational during 2009–2010. Consequently, the start of FIAP implementation was also delayed, at least by 3 years.

4. Indore increased water tariffs in line with the FIAP in 2006. Jabalpur also increased water tariff in 2006, but the extent of the increase was less than the FIAP. Ironically, however, tariff collection efficiency substantially dropped in both towns (from 40% to 9% in Indore, and from 46% to 41% in Jabalpur). There have been no major water tariff increases in Bhopal and Gwalior, but tariff collection efficiency went up in Gwalior (from 25% to 61%). The introduction of sewerage surcharges and solid-waste management fees are still pending, as are revisions in the property tax rates and assets valuation. The current FIAP implementation status implies political unwillingness to charge, and consumers' unwillingness to pay, until there are visible improvements in urban services.

5. **Rescheduling the Financial Improvement Action Plan.** The implementation schedule of the FIAP was rescheduled to synchronize with the progress of physical investment and the reform agenda under Jawaharlal Nehru National Urban Renewal Mission (JNNURM), in order to implement the FIAP with the full understanding of the people of the municipal corporations. The rescheduled FIAP is presented in Table A8.4. In 2008 and 2009, while there will be no major

¹ ADB. 2003. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to India for the Urban Water Supply and Environmental Improvement in Madhya Pradesh Project*. Manila (Appendixes 12 and 13).

² The target tariff and property tax rates in the original FIAP were found to be adequate despite the project cost increase. This was because there was some reduction in operation and maintenance (O&M) costs through the municipal corporations' effort in minimizing the energy costs.

tariff increases, the tariff collection efficiency levels will be brought back to the 2005 level in Indore and Jabalpur. From 2010, while reducing the nonrevenue water and unaccounted-for water, there will be substantial increases in collection efficiency and recovery of operation and maintenance costs. Such increase will be made possible as (i) there will be visible improvement in urban services, and (ii) each municipal corporation will operate a new revenue management system, being developed under the Government of the United Kingdom's bilateral assistance.³ While the final target will be delayed by 1 year, there is no change in the final targets for the user charges of various services from the original FIAP. The rescheduled FIAP represents average values and increase in rates. This will be translated into actual tariff table by restructuring tariffs as volumetric tariffs and incorporating equity consideration, such as lifeline tariffs.

Table A8.1: Changes in Subproject Cost
(Rs million)

Item	Original Estimates ^a	Bid Prices and Revised Estimates ^a	Variation	Variation (%)
Bhopal				
Water Supply	678.8	719.4	40.6	6
Sewerage and Sanitation ^b	501.8	823.5	321.7	64
Solid Waste Management ^b	124.5	37.2	(87.3)	(70)
Gwalior				
Water Supply	767.5	995.6	228.1	30
Sewerage, Drainage, and Sanitation ^b	739.6	325.3	(414.3)	(56)
Solid Waste Management ^b	77.8	1.9	(75.9)	(97)
Indore				
Water Supply	4,357.0	6,075.0	1,718.0	39
Sewerage and Sanitation ^b	668.3	105.3	(563.0)	(84)
Solid waste Management	139.1	153.1	14.0	10
Jabalpur				
Water Supply	932.0	1,868.3	936.3	100
Sewerage, Drainage, and Sanitation	933.6	843.9	(89.7)	(10)
Solid Waste Management	88.3	88.1	(0.2)	0

^a Figures include contingencies and tax. For the cost-benefit analysis, the estimated amount of tax was reduced from the figures.

^b Due to shortage of the loan proceeds but urgent needs for the proposed urban infrastructure, some portions of works were fully financed by respective municipal corporations using their own sources and the Government of India's special funds. For the cost benefit analysis, however, the investment costs of the urban infrastructure fully financed by municipal corporations were incorporated.

Source: Asian Development Bank estimates based on the project management unit data.

6. Change in the Project Cost. The project cost in Indian rupee terms increased by Rs1.2 billion (or by 8.8%) from Rs14 billion to Rs15 billion. The major cause of the increase in the project cost was price escalation in civil works (11.5%). In an urban sector project, civil works generally require steel (for reinforced concrete and large pipes), cement (for construction and pipes), plastic products (for pipes), and fuel (for operation of heavy machinery and freight). All materials experienced price escalation, yet the extent of increase varies from one material to

³ Madhya Pradesh Urban Service for the Poor (MPUSP) is funded through a £41 million grant from the Government of the United Kingdom for 5 years from 2006 to 2011. The ultimate objective of the MPUSP is increasing the urban local bodies' (ULB) capacity to deliver better services for the poor, through (i) setting up a participatory procedure for improving slum communities, (ii) increasing the engineering capacity of the ULBs to design and implement slum improvement activities, and (iii) strengthening the ULBs' financial capacity to invest more into slum improvement activities and maintain urban services by enhancing the revenue through accounting reforms. The accounting reform will develop an accounting system which contains a revenue module linked with household data and a geographic information system. This will help increase collection efficiency of user charges and taxes.

another. While the change in the overall works cost was about 11.5%, some contract works experienced bigger price changes than others, as each work contract has different material requirements. As such, the impact of price escalation varies from one contract to another. Appendix 3 provides a detailed analysis of the impact of price escalation. Table A8.1 summarizes the changes in subproject costs.

7. **Financial Cost–Benefit Analysis.** This financial analysis reassessed the sustainability of all revenue-generating subprojects, based on the revised cost estimates and the contract prices, and rescheduled FIAP in accordance with *the Financial Management and Analysis of Projects, ADB 2005*.⁴ Financial analysis was conducted on a with-projects and without-projects basis by estimating incremental costs and revenues over a 25-year period. The life of the newly created water infrastructure is 40 years. The base case compared the estimated financial internal rate of return (FIRR) with the relevant weighted average cost of capital (WACC) to determine the financial viability of the revenue-generating subprojects.

8. **Weighted Average Cost of Capital.** The WACC calculation reflects the fund flow arrangement between the Government of India and the government of Madhya Pradesh. The nominal cost of the grant is considered to be 8.5% based on the Government's long-term bond rate. The nominal cost of the government of Madhya Pradesh and municipal corporations' own financing portion is, on the other hand, estimated at 10%, taking the value from the economic opportunity cost of capital (EOCC).⁵ As shown in Table A8.2, the WACC is estimated at 3.83%.

Table A8.2: Weighted Average Cost of Capital

Item	Initial Loan		Sup. Loan	Government	WACC
	Government of India Onlending	Government of India ^a Grant	Government of India Onlending	of Madhya Pradesh and MCs	
Amount (\$ million)	126.70	54.30	71.00	131.60	
Weighting (%)	33.08	14.18	18.54	34.20	
Nominal Cost (%)	10.50	8.50	3.00	10.00	
Tax Rate (%)	0.00	0.00	0.00	0.00	
Tax-Adjusted Nominal Cost (%)	10.50	8.50	3.00	10.00	
Inflation Rate (%)	5.00	5.00	5.00	5.00	
Real Cost (%)	5.24	3.33	(1.90)	4.76	
Weighted Component (%)	1.73	0.47	0.00	1.63	3.83

MC = municipal corporation, WACC = weighted average cost of capital.

^a Nominal cost of the Government of India grant is estimated at 8.5%, based on the Government's long-term bond rate.

Source: Asian Development Bank estimates.

9. **Financial Internal Rate of Return.** All analyses are conducted in real terms at 2008 domestic prices. Cost and revenue projections are made over a 25-year period, and salvage value is considered at the end of the period. The cost includes (i) capital expenditures under the project including physical contingencies, tax, and duties; and (ii) O&M expenditures. The revenue projection includes tariff and connection fees from new customers for water supply and

⁴ ADB. 2005. *Financial Management and Analysis of Projects*. Manila

⁵ As suggested in ADB's *Financial Management and Analysis of Projects*, grant funds provided to the project also have an opportunity cost. As such, it is proposed that grants be treated in a similar fashion to equity and the cost of grant be assumed to be the cost of equity. The cost of equity is assumed to be equal to the Government's economic cost of capital.

sewerage as projected in the rescheduled indicative FIAP. Table A8.3 shows the summary results of the financial analysis.

10. The financial internal rates of return (FIRRs) in the base case are estimated at 3.0%–12.9% for water supply subprojects, at 3.1%–4.7% for the sewerage subproject, and 6.4%–18.5% for solid-waste management subprojects. The FIRRs are lower than the WACC for the water supply subproject in Indore and sewerage subprojects in Bhopal and Indore. These subprojects had comparatively lower FIRRs in the original financial analysis.

11. The low FIRR for the water supply subproject in Indore is due to the higher cost of investment and operation associated with its hilly geography around the water source. The original design of the subproject was, however, the only least-cost option to supply water to Indore, and there were enormous social and political risks with the "do-nothing option". As such, the government of Madhya Pradesh has provided the Indore municipal corporations with grants to offset a portion of the cost of investment. This reduced the WACC to approximately 3.1%. The FIRR of the water supply subproject in Indore (3.5%) compares favorably with the revised WACC. Despite the low level of the FIRR, however, the water supply subproject in Indore will generate adequate revenue to sustain O&M.

12. For the sewerage subprojects in Bhopal and Indore with the low FIRR (3.4% in Bhopal and 3.5% in Indore), on the other hand, the revenue from the proposed tariffs are not sufficient to recover both capital and O&M cost, because (i) the investment cost is high due to deeper excavation than water supply works, and (ii) there is a social and political inhibition to set sewerage tariffs higher than water supply tariffs. Combined FIRRs for water supply and sewerage are, however, all above the WACC. Despite the low level of the FIRR, the sewerage subprojects in Bhopal and Indore will generate adequate revenue to sustain O&M.

13. Sensitivity analysis was undertaken to test the robustness of the financial sustainability to changes in project parameters. The results indicate that the financial internal rates of return in all sectors are most sensitive to reduction in the incremental revenue. This suggests that, in order to realize higher financial returns, (i) the planned coverage of services needs to be achieved, and (ii) the rescheduled indicative FIAP needs to be implemented on time.

Table A8.3: Revised Financial Internal Rate of Return

Item	Bhopal	Gwalior	Indore ^a	Jabalpur
Water Supply				
Base case				
FIRR (%)	9.9	12.9	3.5	8.8
NPV (Rs million)	1,559.5	1,191.3	288.4	1,119.8
Capital cost increase by 10%				
FIRR (%)	9.6	11.8	2.8	7.9
Switching value (%)	296.0	115.0	51.0	96.0
O&M costs increased by 10%				
FIRR (%)	9.6	12.7	2.4	8.5
Switching value (%)	308.0	593.0	31.0	286.0
Incremental revenue decreased by 10%				
FIRR (%)	8.6	11.5	1.8	7.5
Switching value (%)	75.0	93.0	20.0	71.0
1-year delay in service				
FIRR (%)	8.5	11.2	2.3	7.6
Sewerage				
Base case				
FIRR (%)	3.4	3.8	3.5	4.7
NPV (Rs million)	(35.9)	(4.4)	33.8	88.7

Item	Bhopal	Gwalior	Indore ^a	Jabalpur
Capital cost increase by 10%				
FIRR (%)	2.8	3.1	2.9	4.0
Switching value (%)	54.0	56.0	56.0	67.0
O&M costs increased by 10%				
FIRR (%)	3.1	3.3	3.1	4.6
Switching value (%)	94.0	80.0	77.0	323.0
Incremental revenue decreased by 10%				
FIRR (%)	2.5	2.7	2.6	3.9
Switching value (%)	38.0	36.0	36.0	61.0
1-year delay in service				
FIRR (%)	2.8	3.0	2.8	4.1
Water Supply and Sewerage				
Base case				
FIRR (%)	8.5	9.6	3.5	8.8
NPV (Rs million)	1,648.5	1,173.1	322.1	1,119.8
Capital cost increase by 10%				
FIRR (%)	8.0	8.6	2.8	7.9
Switching value (%)	182.0	103.0	51.0	96.0
O&M costs increased by 10%				
FIRR (%)	8.1	9.3	2.5	8.5
Switching value (%)	252.0	313.0	33.0	286.0
Incremental revenue decreased by 10%				
FIRR (%)	7.3	8.3	1.9	7.5
Switching value (%)	70.0	75.0	21.0	71.0
1- year delay in service				
FIRR (%)	7.3	8.3	2.4	7.6
Solid Waste Management				
Base case				
FIRR (%)	6.4	7.7	18.5	8.7
NPV (Rs million)	26.9	35.0	266.3	33.5
Capital cost increase by 10%				
FIRR (%)	4.5	6.2	16.7	7.1
Switching value (%)	33.0	53.0	105.0	53.0
O&M costs increased by 10%				
FIRR (%)	4.5	6.3	17.3	6.8
Switching value (%)	34.0	55.0	148.0	46.0
Incremental revenue decreased by 10%				
FIRR (%)	2.0	4.8	15.3	4.7
Switching value (%)	15.0	27.0	5.0	22.0
1- year delay in service				
FIRR (%)	3.6	5.5	14.2	5.7

FIRR = financial internal rate of return, NPV = net present value, NRW = nonrevenue water, O&M = operation and maintenance.

^a The government of Madhya Pradesh has provided the Indore municipal corporations with grants to offset a portion of the cost of investment. This reduced the weighted average cost of capital to approximately 3.1%.

Note: Switching value is the percentage change in a variable required for the NPV to become zero.

Source: Asian Development Bank estimates.

Table A8.4: Rescheduled Indicative Financial Improvement Action Plan

Item	FY2005–FY2008	FY2009	FY2010	FY2011
Water Supply				
OM Cost Recovery (%)			75.0	85.0
Tariff Collection Efficiency (%)				
Bhopal	80–53	60.0	70.0	80.0
Gwalior	25–61	61.0	69.0	69.0
Indore	40–49	49.0	75.0	75.0
Jabalpur	41–46	46.0	75.0	75.0
Reduction in NRW and UFW			50.0	60.0
Indicative Tariff Revision				
Domestic Unmetered (rupees per m ³)				
Bhopal	150.0	150.0	180.0	190.0
Gwalior	80.0	100.0	120.0	127.0
Indore	60.0	150.0	180.0	190.0
Jabalpur	60.0	100.0	120.0	127.0
Domestic Metered (rupees per m ³)				
Bhopal, Gwalior, Jabalpur				
0–10 m ³			6.0	6.3
10–20 m ³			9.0	9.5
> 20 m ³			12.0	12.6
Indore				
0–10 m ³			7.1	7.6
10–20 m ³			10.7	10.7
> 20 m ³			14.3	14.3
Commercial (per m ³)				
Bhopal, Jabalpur	10.0	10.6	12.0	12.6
Gwalior	15.0	15.9	18.0	12.6
Indore	12.0	12.7	14.3	15.1
Industrial (per m ³)				
Bhopal, Jabalpur	15.0	15.9	18.0	18.9
Gwalior	20.0	21.2	24.0	18.9
Indore	18.0	19.1	21.4	22.7
Bulk				
Indore	11.0	13.1	13.9	14.7
Jabalpur	3.0	4.5	4.8	5.0
Sewerage and Sanitation				
Bhopal			30% water bill	30% water bill
Gwalior and Jabalpur			40% water bill	40% water bill
Indore			25% water bill	40% water bill
Solid-Waste Management				
Tariff Collection Efficiency (%)			80.0	80.0
Domestic (rupees per month)			34.0	38.0
Nondomestic (rupees per month)			68.0	76.0
Property Tax				
Tax Collection Efficiency (%)				
Bhopal	70.0	75.0	78.0	80.0
Gwalior	25.0	33.0	69.0	69.0
Indore	40.0	55.0	75.0	75.0
Jabalpur	46.0	54.0	75.0	75.0
Coverage Ratio (%)	45.0	55.0	65.0	85.0

NRW = nonrevenue water, UFW = unaccounted-for water.

Note: The rescheduled Indicative Financial Improvement Action Plan (FIAP) represents average values and increase in rates. This will be translated into actual tariff table by the project cities by restructuring tariffs as volumetric tariffs and incorporating equity consideration, such as lifeline tariffs.

Sources: Asian Development Bank and the project management unit estimates.

REVISED ECONOMIC ANALYSIS

1. **Background.** An economic analysis of the Urban Water Supply and Environmental Improvement in Madhya Pradesh Project was carried out to confirm economic viability during the loan appraisal, and reported in the report and recommendation of the President in 2003.¹ The proposed supplementary loan is to mitigate the impact of foreign exchange fluctuation and price escalation, and there is no variation in the project scope and the benefit levels. Therefore, the result of the original economic analysis remains the same, except for the economic cost–benefit analysis. This revisited economic analysis focuses on economic cost–benefit analysis, using the same approach as was used in the original economic analysis.

2. **Change in the Project Cost.** The project cost in Indian rupee terms increased by Rs1.2 billion (or by 8.8%) from Rs14 billion to Rs15 billion. The major cause of the increase in the project cost was price escalation in civil works (11.5%). In an urban sector project, civil works generally require steel (for reinforced concrete and large pipes), cement (for construction and pipes), plastic products (for pipes), and fuel (for operation of heavy machinery and freight). All materials experienced price escalation, yet the extent of increase varies from one material to another. While the change in the overall works cost was about 11.5%, some contract works experienced bigger price changes than others. Each work contract has different material requirements. As such, the impact of price escalation varies from one contract to another. Appendix 3 provides a detailed analysis of the impact of price escalation. Table A9.1 summarizes the changes in subproject costs.

Table A9.1: Changes in Subproject Cost
(Rs million)

Item	Original Estimates ^a	Bid Prices and Revised Estimates ^a	Variation	Variation (%)
Bhopal				
Water Supply	678.8	719.4	40.6	6
Sewerage and Sanitation ^b	501.8	823.5	321.7	64
Solid-Waste Management ^b	124.5	37.2	(87.3)	(70)
Gwalior				
Water Supply	767.5	995.6	228.1	30
Sewerage, Drainage, and Sanitation ^b	739.6	325.3	(414.3)	(56)
Solid-Waste Management ^b	77.8	1.9	(75.9)	(97)
Indore				
Water Supply	4,357.0	6,075.0	1,718.0	39
Sewerage and Sanitation ^b	668.3	105.3	(563.0)	(84)
Solid-Waste Management	139.1	153.1	14.0	10
Jabalpur				
Water Supply	932.0	1,868.3	936.3	100
Sewerage, Drainage, and Sanitation	933.6	843.9	(89.7)	(10)
Solid-Waste Management	88.3	88.1	(0.2)	0

() = negative.

^a Figures include contingencies and tax. For the cost–benefit analysis, the estimated amount of tax was reduced from the figures.

^b Due to shortage of the loan proceeds but urgent needs for the proposed urban infrastructure, some portions of works were fully financed by municipal corporations using their own sources and the Government of India's special funds. For the cost–benefit analysis, however, the investment costs of the urban infrastructure fully financed by municipal corporations were incorporated.

Source: Asian Development Bank estimates based on the project management unit data.

¹ ADB. 2003. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to India for the Urban Water Supply and Environmental Improvement in Madhya Pradesh Project*. Manila (Appendix 11).

3. **Economic Cost–Benefit Analysis.** In order to assess the economic efficiency of project investments, the economic internal rate of return (EIRR) in 25 years has been estimated. The shadow exchange rate factor² was updated, but shadow wage rate³ used in the original economic analysis was applied.

4. **Economic Costs.** There are two types of costs: (i) capital investment,⁴ and (ii) operation and maintenance. The economic cost of the investment is converted from the financial cost. The operation and maintenance cost includes updated energy cost, chemicals, salaries, and repair and maintenance.

5. **Economic Benefits.** Economic benefit of water supply subprojects consist of (i) savings accrued by replacing existing water sources with piped household connections,⁵ and (ii) value of water which consumers are willing to pay⁶ for additional consumption as a result of greater availability of water. The benefits of improved sewerage and sanitation are primarily public health and environmental improvement. As these benefits are reflected in the willingness to pay, the economic benefit of sewerage and sanitation subprojects are valued using the willingness to pay of residential households and businesses.⁷ Similarly, the economic benefits of solid waste management projects were estimated using the willingness to pay of residential households and businesses.⁸ The willing to pay figures used in the revised analysis are the same as those in the original economic analysis in 2003 due to lack of updated data, and therefore the analysis is a conservative estimate.

6. **Economic Opportunity Cost of Capital.** Given the complexity of estimating country-specific economic opportunity cost of capital (EOCC), a discount rate of 12% in constant economic prices is generally used as a proxy for EOCC in the economic analysis of ADB-financed projects.⁹ The benefit is measured by willingness to pay in the original analysis. The level of benefit is most likely underestimated, because the respondents of the willingness to pay survey might not aware of the all kinds of potential benefit, and therefore were not able to reflect the value of all benefits but only the perceived immediate benefit. As significant unquantifiable net benefits are believed to be likely, all EIRRs are likely to be substantially underestimated. In

² The standard conversion factor used was 0.85, which was equal to the shadow exchange rate factor of 1.17. No background information was provided in the original economic analysis worksheets. The revised shadow exchange rate factor using the external trade data was 1.06.

³ The shadow wage rates were 0.75 for skilled labor and 0.98 for unskilled labor. No background information was provided in the original economic analysis worksheets.

⁴ For large urban infrastructure, 40 years of life was assumed and the residual values were taken into consideration in the 25th year. For equipment and landfill sites, 10 years of life is assumed, and the same amount of the cost is incurred every 10 years during the analysis period.

⁵ The resource cost saving was estimated at Rs22.6 per cubic meter in the original economic analysis in 2003 based on the findings from the project preparatory technical assistance.

⁶ Willingness to pay was estimated through a survey during the project preparatory technical assistance. According to the original economic analysis, the value was underestimated by the respondents of the survey, since the incremental benefit of providing enough water to avoid a water crisis and ensure economic survival was much higher than was reflected by the simple willingness to pay revealed by individual households.

⁷ The willingness to pay of a residential household is Rs76 per month in Bhopal, Rs61 in Gwalior, Rs69 in Indore, and Rs61 in Jabalpur; the willingness to pay of a business is Rs238 per month in Bhopal, Rs126 in Gwalior, Rs273 in Indore, and Rs85 in Jabalpur.

⁸ The willingness to pay of a residential household is Rs16 per month in Bhopal, Rs11 in Gwalior, Rs17 in Indore, and Rs13 in Jabalpur; and the willingness to pay of a business is Rs71 per month in Bhopal, Rs31 in Gwalior, Rs42 in Indore, and Rs52 in Jabalpur.

⁹ ADB. 2002. *Operations Manual*. Section G1/OP: Economic Analysis of Projects, (para. 2 [vi-b]). Manila.

case of the water supply subproject in Indore (EIRR of 10%),¹⁰ not only will there be substantial underestimation of the EIRR, but also, a "do-nothing option" will cause increasing economic cost of water supply shortage.¹¹ Considering the enormous social and political risks of the do-nothing option in Indore, and lack of alternative approaches to the problems, there are few equivalent potential investment activities for the given capital.

7. **Conclusion.** As Table A9.2 shows, all subprojects are economically viable, in spite of the cost increase, with the estimated EIRR values exceeding the EOCC in all cases. The EIRR of most of the subprojects are lower than the original estimates. However, some subprojects are higher than in the original economic analysis because the detail engineering design's cost estimates of some subprojects became less than the feasibility study estimates as the result of efforts of the municipal corporations, and the operation and maintenance cost became less than what was originally envisaged. Sensitivity analysis was undertaken to test the robustness of the economic results to changes in project parameters. The results indicate that the EIRRs are sensitive to a 1-year delay in realization of the economic benefits in some subprojects and reduction in beneficiary levels in other subprojects. This suggests that, in order to realize higher economic benefits, (i) timely completion of works and smooth transition to operation are crucial, and (ii) the planned coverage of services needs to be achieved.

¹⁰ ADB. 2002. *Operations Manual*. Section G1/OP: Economic Analysis of Projects, (para. 2 [vi-b]). Manila, allows that "where significant unquantifiable net benefits are believed to be likely, the discount rate or EIRR may be between 10% and 12%."

¹¹ The water supply shortage derived from lack of water sources. To increase the water supply, the subproject will lay 70 kilometers of trunk mains from the water sources over hilly areas. This resulted in a large capital investment.

Table A9.2: Revised Economic Internal Rate of Return

Item	Bhopal	Gwalior	Indore	Jabalpur
A. Water Supply				
1. Base case				
EIRR (%)	36.8	25.8	10.0	38.2
NPV (Rs million)	2,725.0	1,732.0	20.0	4,570.0
2. Capital cost increase by 10%				
EIRR (%)	34.8	24.3	9.2	35.5
Switching value (%)	184.5	171.4	117.5	141.6
3. O&M costs increased by 10%				
EIRR (%)	35.3	25.7	8.7	37.9
Switching value (%)	830.1	2,603.0	73.7	1,007.8
4. Benefits reduced by 20%				
EIRR (%)	31.2	22.1	4.9	31.4
Switching value (%)	131.8	141.1	39.2	111.2
5. Combined effects (2 and 4)				
EIRR (%)	28.9	20.7	2.6	28.7
6. Benefits delayed by 1 year				
EIRR (%)	30.1	22.4	7.7	30.2
B. Sewerage				
1. Base case				
EIRR (%)	15.7	12.4	32.8	10.5
NPV (Rs million)	298	90	1,077	25
2. Capital cost increase by 10%				
EIRR (%)	14.5	11.3	30.5	9.6
Switching value (%)	129.5	115.2	145.7	113.0
3. O&M costs increased by 10%				
EIRR (%)	15.3	12.1	32.6	10.3
Switching value (%)	422.2	482.7	1997.9	616.4
4. Benefits reduced 20%				
EIRR (%)	12.2	9.4	27.3	8.0
Switching value (%)	88.6	83.4	120.5	85.2
5. Combined effects (2 and 4)				
EIRR (%)	10.8	8.3	25.2	7.1
6. Benefits delayed by 1 year				
EIRR (%)	13.4	10.7	26.9	9.2
C. Solid Waste Management				
1. Base case				
EIRR (%)	39.7	19.4	44.0	32.9
NPV (Rs million)	293	44	397	122
2. Capital cost increase by 10%				
EIRR (%)	36.5	17.2	40.4	29.8
Switching value (%)	123.6	88.2	124.3	108.4
3. O&M costs increased by 10%				
EIRR (%)	39.2	18.6	43.5	32.1
Switching value (%)	797.1	268.3	891.7	452.4
4. Benefits reduced by 20%				
EIRR (%)	31.4	12.8	35.0	24.7
Switching value (%)	95.4	59.3	98.0	80.0
5. Combined effects (2 and 4)				
EIRR (%)	28.1	10.2	31.5	21.6
6. Benefits delayed by 1 year				
EIRR (%)	30.0	14.9	32.8	24.7

EIRR = economic internal rate of return, NPV = net present value, O&M = operation and maintenance.

Note: Switching value is percentage change in a variable required for the NPV to become zero.

Source: Asian Development Bank estimates.