PROJECT PERFORMANCE AUDIT REPORT

ON

DHAKA URBAN INFRASTRUCTURE IMPROVEMENT PROJECT
(Loan 942-BAN[SF])

IN

THE PEOPLE'S REPUBLIC OF BANGLADESH

September 2001

CURRENCY EQUIVALENTS

Currency Unit – Taka (Tk)

At Appraisal (October 1988)			At Project Completion (February 1998)	At Operations Evaluation (March 2001)
Tk1.00	=	$0.031	$0.025	$0.018
$1.00	=	Tk31.85	Tk39.49	Tk54.10

ABBREVIATIONS

ADB	–	Asian Development Bank
BME	–	benefit monitoring and evaluation
DCC	–	Dhaka City Corporation
DOE	–	Department of Environment
DWASA	–	Dhaka Water Supply and Sewerage Authority
EA	–	Executing Agency
EIRR	–	economic internal rate of return
FIRR	–	financial internal rate of return
ha	–	hectare
HSD	–	Housing and Settlement Directorate
km	–	kilometer
m^3	–	cubic meter
NGO	–	nongovernment organization
O&M	–	operation and maintenance
OEM	–	Operations Evaluation Mission
PCR	–	project completion report
PMU	–	project management unit
PPAR	–	project performance audit report
PSC	–	Project Steering Committee
PTC	–	Project Technical Committee
PVC	–	polyvinylchloride
SDR	–	special drawing rights
TA	–	technical assistance

NOTES

(i) The fiscal year (FY) of the Government ends on 30 June.
(ii) In this report, "$" refers to US dollars.

Operations Evaluation Department, PE-573

CONTENTS

BASIC DATA

Dhaka Urban Infrastructure Improvement Project (Loan 942-BAN[SF])

Project Preparation/Institution Building

TA No.	TA Name	Type	Person-Months	Amount ($)	Approval Date
282-BAN[1]	Study of Integrated Urban Development of Dacca Metropolitan Area	PPTA	—	649,000	6 March 1979
915-BAN	Dhaka Environmental Infrastructure	SSTA	5	75,000	29 October 1987
1103-BAN[2]	Institutional Strengthening of the Housing and Settlement Directorate	ADTA	12	440,000	12 January 1989
1104-BAN[2]	National Environmental Monitoring and Pollution Control	ADTA	48	750,000	12 January 1989
1105-BAN[2]	Feasibility Study for Secondary Towns Infrastructure and Services Development	PPTA	72	350,000	12 January 1989

Key Project Data ($ million)

	As Per ADB Loan Documents	Actual
Total Project Cost	29.50	23.80
Foreign Exchange Cost	7.46	6.40
Local Cost	22.04	17.40
ADB Loan	24.20[3]	22.14
Cancellation	0.00	3.73

Key Dates	Expected	Actual
Fact-Finding		6-23 April 1988
Appraisal		21 June-7 July 1988
Loan Negotiations		16-19 November 1988
Board Approval		12 January 1989
Loan Agreement		20 February 1989
Loan Effectiveness	21 May 1989	8 December 1989
First Disbursement		1 July 1990
Project Completion	31 December 1993	30 June 1996
Loan Closing	30 June 1994	20 February 1997
Months (effectiveness to completion)	49	79

— = not available, ADTA = advisory technical assistance, PPTA = project preparatory technical assistance, SSTA = small-scale technical assistance.

[1] $360,132 was financed by the United Nations Development Programme.

[2] Accompanying technical assistance grant financed by the Japan Special Fund.

[3] The loan amount was SDR17.875 million. At appraisal, this amount was $24.2 million equivalent.

Key Performance Indicators (%)		**Appraisal**	**PCR**	**PPAR**
Economic Internal Rate of Return	Part A	82.0	69.0	ne[4]
	Part A1	ne	ne	negative
	A2	ne	ne	21.5
	A3	ne	ne	1.6
Financial Internal Rate of Return	Part A	14.5	9.2	negative
	Part A1	10.2	4.7	negative
	A2	16.4	4.9	4.1
	A3	50.9	13.7	2.3

Borrower	Government of Bangladesh
Executing Agencies	Housing and Settlement Directorate (lead) Dhaka City Corporation Dhaka Water Supply and Sewerage Authority Department of Environment

Mission Data

Type of Mission	**No. of Missions**	**No. of Person-Days**
Fact-Finding	1	32
Appraisal	1	85
Project Administration		
Inception	1	12
Review	12	179
Project Completion	1	30
Operations Evaluation[5]	1	33

ne = not estimated, PCR = project completion report, PPAR = project performance audit report.

[4] The Operations Evaluation Mission (OEM) did not estimate the economic internal rate of return for the entire Project. The OEM does not endorse the methodology adopted in the appraisal and project completion reports in which economic benefits were valued using increases in land prices. In the OEM's view, increases in land values are not robust indicators of economic benefits. See explanation in para. 44 in the main text.

[5] The OEM comprised K.E. Seetharam (Evaluation Specialist and Mission Leader), E. Ouano (Senior Environment Specialist), and R. Islam (Bangladesh Resident Mission staff). C. Vaitheeswaran and Syed Shafique Ahmed (consultants) assisted the OEM.

EXECUTIVE SUMMARY

The Project was the first urban infrastructure development supported by the Asian Development Bank (ADB) in Bangladesh. It was identified in the strategic planning study for the Dhaka metropolitan area, which was financed jointly by the United Nations Development Programme and ADB, and further refined under an ADB small-scale technical assistance (TA) to give more emphasis on integrated environmental improvements.

The Project intended to improve the urban environment and living conditions of the urban poor. The main objectives were to improve urban infrastructure and services, and provide, in a cost-effective manner, serviced and secure land for residential, commercial, and industrial purposes, targeting a 520 hectare area of Mirpur town in northwest Dhaka. The Project also aimed to strengthen (i) the institutional capabilities of agencies responsible for maintaining the new infrastructure to serve the substantial urban population in Dhaka, and (ii) the capacity of the Department of Environment (DOE) for national environmental monitoring and pollution control.

At appraisal, the project cost was estimated at $29.50 million equivalent. On 12 January 1989, ADB approved Loan 942[SF]-BAN for the Project for $24.20 million equivalent (SDR17.875 million) from the Asian Development Fund to finance the entire foreign exchange cost of $7.46 million, and $16.74 million equivalent of local currency costs. The Housing and Settlement Directorate (HSD) was the lead Executing Agency (EA), and the Dhaka City Corporation (DCC), Dhaka Water Supply and Sewerage Authority (DWASA), and DOE were the other EAs. The Government and the EAs agreed to finance, from their own resources, the remaining local currency costs of $5.30 million equivalent. Three grants from the Japan Special Fund—two advisory TAs and one project preparatory TA—accompanied the Project: TA 1103-BAN: *Institutional Strengthening of the Housing and Settlement Directorate* (for $440,000) for HSD; TA 1104-BAN: *National Environmental Monitoring and Pollution Control* (for $750,000) for DOE; and TA 1105-BAN: *Feasibility Study for Secondary Towns Infrastructure and Services Development* (for $350,000) for the Local Government Engineering Department of the Ministry of Local Government, Rural Development and Cooperatives.

The Project comprised the following components: (i) municipal services upgrading, implemented by DCC; (ii) water supply and sanitation services, implemented by DWASA; (iii) infill development, implemented by HSD; (iv) implementation assistance, also under HSD; and (v) environmental capacity building, implemented by DOE.

The Operations Evaluation Mission (OEM) visited Bangladesh between 21 March and 2 April 2001 and assessed the Project's overall performance in terms of achievement of objectives, generation of benefits, particularly to the poor, and sustainability of the project facilities.

The Project was consistent with the Government's priorities at the time of appraisal, and remains consistent with the Government's current priorities. In terms of ADB's current strategic priorities, the Project continues to be highly relevant; it had a poverty reduction dimension, although the appraisal report did not adequately define the low-income beneficiaries, nor did it elaborate on how the Project's development impact would be monitored. While the Project was generally well designed from a technical perspective, the institutional aspects were insufficiently addressed. In addition, the Project had no initial environmental examination, as it was approved before ADB's environmental impact assessment guidelines were developed. The OEM identified potential environmental concerns that could have been addressed at project design.

With regard to the physical outputs planned at appraisal, the Project generally achieved the targets for components implemented by DCC, DWASA, and DOE. The targets for the HSD

component were only partly achieved. Overall, project implementation was sluggish. While no cost overruns occurred, there were significant delays, and the Project was completed more than 30 months behind appraisal schedule. The consultants for construction supervision and the advisory TAs produced timely and professional quality work. The civil works were divided into numerous small packages and awarded to many domestic contractors who generally performed poorly. The most extreme case was the substandard work and intentional falsification of concrete strength test results for the community center. DCC required the contractor to demolish all substandard work and replace it at the contractor's own expense, and eventually disqualified the contractor from future work under the Project. Suppliers varied greatly in performance. A notable supplier problem involved procurement of water supply chlorination equipment, for which the supplier contended that the contract specified one unit, while DWASA intended to procure two units.

The Project only partly achieved its main purpose. The facilities completed under the municipal services upgrading component implemented by DCC are not well operated and maintained, and the benefits—in terms of improved solid waste and garbage collection, and health improvements—are delivered to less than 20 percent of the originally intended 19,000 households. By contrast, the water supply and sanitation component, implemented by DWASA, has fully benefited a total population of 9,000 households. This component was highly efficient and will most likely be sustainable.

As for the infill development component implemented by HSD, 4,371 infill plots were developed, but only 70 percent have been handed over. A significant number of illegal occupants and unauthorized shelters adversely affected the financial and economic performance of this component. Some middle-income households, accounting for 10 percent of the 3,039 legal plot recipients, have fully benefited from the Project. Moreover, these households basically took their own initiatives to build proper houses and maintain the basic municipal infrastructure (drains, footpaths, and water supply facilities). In contrast, about 70 percent of plot recipients, comprising low-income households, built only modest houses. These households did not organize themselves to operate and maintain the basic municipal infrastructure and have not realized the anticipated benefits. In the OEM's view, many might have lost the value of their original investment, as the overall environment in these plots has deteriorated. Finally, the remaining 20 percent of the plot recipients, comprising mainly poor households, built only temporary huts on the plots, as they lacked the funds to build proper houses. OEM interviews revealed that a significant number of these households illegally sold the plots and moved elsewhere, some to squatter settlements (also illegal) outside the project area. The implementation quality and performance of other subcomponents under HSD were generally less satisfactory, as HSD concentrated more on the infill plots.

The financial internal rate of return for the entire Project is negative compared with the project completion report (PCR) estimate of 9.2 percent, as the projected revenues from municipal taxes, in the case of the DCC component, and from the sale of plots, in the case of the HSD component were not realized. In the appraisal report and PCR, the economic internal rate of return (EIRR) for the Project was estimated at 82 percent and 69 percent, respectively. In the OEM's view, these estimates are unreliable, as incremental economic benefits were based on increase in land value, which is not a robust indicator of economic benefits. In the project performance audit report (PPAR), individual EIRRs estimated for the DCC, DWASA, and HSD components are negative, 21.5 percent, and 1.6 percent, respectively. The health benefits assumed in the PCR were not fully realized. The PPAR has not estimated the EIRR for the entire Project.

The Project's institutional development impact was negligible. The two advisory TAs were only partly successful. Their outputs were poorly utilized by the concerned agencies (DOE and HSD). No TA was provided for DWASA and DCC. DWASA has adequate technical and institutional capacities, while DCC does not. In addition, the Project did not include any community awareness campaigns. The institutional-strengthening component and TA 1104-

BAN, both implemented by DOE, were not closely linked to the other project components. The loan component consisted of the construction of a four-story office building and procurement of laboratory equipment for environmental monitoring and enforcement. Generally, the building is in good condition. Adjacent to this building, DOE constructed another four-story building using its own funds, as the space was inadequate for headquarters staff. The laboratory and equipment are generally underutilized, as DOE has failed to allocate adequate funds to support recurrent expenses on chemicals and other consumables. In the OEM's view, these project inputs would have been more effective if they had been a separate project. TA 1104-BAN could have been more effectively provided on a standalone basis.

The DWASA component is generally sustainable, although DWASA cannot maintain good levels of services in the lower-income plots where unauthorized users have broken water supply pipes. The HSD component is partly sustainable, and may become unsustainable unless the necessary steps are taken to hand over the illegally occupied and vacant plots. The DCC component is unsustainable because of poor operation and maintenance. It also adversely affects the long-term sustainability of the DWASA and HSD components. Overall, the Project's sustainability is rated unlikely, and there is a serious risk that the Project will not reach its full useful life, estimated at 25 years in the appraisal report and PCR.

Overall, the Project is rated partly successful. The complementary project funded by the World Bank in the inner city areas of Dhaka was also rated partly successful in the related implementation completion report. The OEM is concerned that there are no ongoing projects supported by ADB, the World Bank, or other funding agencies in this sector in Dhaka. The excessive buildup of solid wastes in the project area (and in general in Dhaka) has a negative impact on public health, which in turn, adversely affects the economy.

The Government and the external funding agencies should be more proactive in addressing the compelling need for good housing and urban services in Dhaka. Considering that the delivery of urban services in Dhaka, especially garbage collection and sanitation, has seriously deteriorated in the last five years, the economic costs of delays in future investments for rehabilitating the deteriorating infrastructure and improving the delivery of services could be substantial. Although the economic benefits outweigh the costs, the Government will be unable to make these investments without external assistance.

It was probably assumed that the ultimate benefits of the Project, such as delivery of urban services and improvement in the living environment, would be automatically achieved once the physical infrastructure was improved. However, community participation is the critical factor in the proper operation and maintenance of these facilities and delivery of services. The Government and the EAs, with assistance from ADB's Agriculture and Social Sectors Department (West) and the Bangladesh Resident Mission, should consider immediately implementing specific actions for mobilizing the community. The PPAR presents for consideration a draft proposal for $200,000 grant assistance from the Japan Fund for Poverty Reduction for implementing these actions.

I. BACKGROUND

A. Rationale

1. The Project was the first urban infrastructure development operation supported by the Asian Development Bank (ADB) in Bangladesh. The 520-hectare (ha) project area is located in the 4,300 ha of Mirpur town in northwest Dhaka. Mirpur was planned and developed by the Housing and Settlement Directorate (HSD), with a reasonably complete infrastructure system, in the early 1960s. However, development in the 1970s proceeded without significant addition to the infrastructure. In 1988, when Mirpur came under the jurisdiction of Dhaka City Corporation (DCC) and Dhaka Water Supply and Sewerage Authority (DWASA), the urban infrastructure in Mirpur had significantly deteriorated to the extent that both DCC and DWASA were reluctant to assume the responsibility for operation and maintenance (O&M). The Government recognized the need to upgrade infrastructure and services for a fast-growing and mainly low-income population in the town. The need for the Project also arose from the rapid pace of urbanization in the Dhaka metropolitan area.

B. Formulation

2. The Project was first identified in the strategic planning study for the Dhaka metropolitan area, which was financed jointly by the United Nations Development Programme and ADB.[6] The study recommended the improvement and development of land and related facilities for low-income groups in the project area. This feasibility study was supplemented by a study under a small-scale technical assistance (TA),[7] to further refine the project scope with more emphasis on integrated environmental improvements.

3. From these studies, two specific sets of proposals emerged: (i) the upgrading of long-established residential and commercial areas within the inner city (the old Dhaka area); and (ii) the development of what was then a partially planned, uncoordinated growth area on the fringe of the city (the Mirpur area). The Government considered both proposals as mutually reinforcing for the development of the Dhaka metropolitan area and adopted them in a priority program. The first proposal, which was taken up in a World Bank project, related to the needs of the inner city areas in Dhaka. The second proposal was the Project.

4. Based on a desk review, the Operations Evaluation Mission (OEM) found that the two studies were generally sound except for three deficiencies:

(i) the population growth and the future demand for drainage, water supply, sanitation, and solid waste were underestimated;

(ii) rather than developing new tracts of land, “infill” pockets of land were proposed (see project component Part A.3 in para. 7 [iii]), assuming that this would create immediate opportunities for development, both at less cost and to low-income groups. But the legal issues involved in allotting the infill plots were overlooked (nearly 30 percent of infill areas are still illegally occupied); and

(iii) no capacity-building activities for mobilizing the community to operate and maintain the facilities were included.

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[6] TA 282-BAN: *Study of Integrated Urban Development of Dacca Metropolitan Area*, for $649,000 (of which the United Nations Development Programme financed $360,132), approved on 6 March 1979.

[7] TA 915-BAN: *Dhaka Environmental Infrastructure*, for $75,000, approved on 29 October 1987.

5. The Project was appraised from 21 June to 7 July 1988. ADB's Board of Directors approved a loan for the Project on 12 January 1989, together with three grants from the Japan Special Fund for two advisory TAs and one project preparatory TA.[8]

C. Purpose and Outputs

6. The Project intended to enhance the urban environment and living conditions of the urban poor. The main objectives were to improve urban infrastructure and services, and provide, in a cost-effective manner, serviced and secure land for residential, commercial, and industrial purposes, targeting in total a 520 ha area of Mirpur town. The Project also aimed to strengthen (i) the institutional capabilities of the agencies responsible for maintaining the new infrastructure to serve the substantial urban population in Dhaka, and (ii) the capacity of the Department of Environment (DOE) for environmental monitoring and pollution control in a national perspective, and developing appropriate guidelines and action plans for improving the urban environment.

7. The Project comprised two parts, the first having four components. The individual parts, their respective executing agencies (EAs), and their primary activities are described below.

(i) **Part A.1: Municipal Services Upgrading (DCC).** Basic infrastructure was improved through (a) construction and rehabilitation of main drainage, (b) construction and rehabilitation of roads and footpaths, (c) expansion of solid waste collection services through provision of eight waste disposal trucks and new waste disposal bins, (d) installation of street lights and electricity supply, (e) construction of two new community centers and a new market, and (f) construction of small drains.

(ii) **Part A.2: Water Supply and Sanitation (DWASA).** Water supply and sanitation systems were rehabilitated and expanded through (a) supply and installation of two tubewells and pumps, (b) construction of two 900 cubic meter (m^3) overhead storage tanks, (c) installation of primary water reticulation pipes, (d) installation of additional secondary water reticulation pipes, (e) installation and rehabilitation of existing sewer pipes, (f) installation of a force main and three pump stations, and (g) provision of three septic tank desludging trucks.

(iii) **Part A.3: Infill Development (HSD).** Low-lying, vacant, or underutilized land (40 ha) was provided with (a) earth infill of 25 ha; (b) infrastructure and services to all plots, including piped water supply, drains, septic tanks, and electricity; (c) rehabilitation of existing septic tanks, pipes, and squat plates; and (d) improvement of 2,580 government-owned units for poor families (*bastuhara* houses) from rental to home-ownership status[9] through installation of water supply and sanitation services, electricity supply, and road access.

(iv) **Part A.4: Implementation Assistance (HSD).** Consulting services were provided for detailed design, construction supervision, implementation assistance, project management, preparation of project progress reports, preparation of benefit monitoring and evaluation (BME) reports, and preparation and evaluation of tender documents.

[8] TA 1103-BAN*: Institutional Strengthening of the Housing and Settlement Directorate*, for $440,000, was implemented by HSD. TA 1104-BAN: *National Environmental Monitoring and Pollution Control*, for $750,000, was implemented by the Department of Environment (DOE). TA 1105-BAN: *Feasibility Study for Secondary Towns Infrastructure and Services Development*, for $350,000, was implemented by the Local Government Engineering Department.

[9] This assisted an ongoing government program to convert government-owned rental stock to home ownership.

(v) **Part B: Institutional Strengthening of DOE.** National environmental monitoring and pollution control capacity was improved by (a) reorganizing DOE; (b) increasing DOE staff strength; (c) providing additional laboratory equipment and support for the laboratory unit; and (d) constructing a new DOE headquarters building, including a laboratory and library.

D. Cost, Financing, and Executing Arrangements

8. At appraisal, the project cost was estimated at $29.50 million equivalent. ADB approved Loan 942[SF]-BAN for the Project for $24.20 million equivalent (SDR17.875 million) from the Asian Development Fund to finance the entire foreign exchange cost of $7.46 million, and $16.74 million equivalent of local currency costs. The Government and the EAs agreed to finance, from their own resources, the remaining local currency costs of $5.30 million equivalent. The EAs for the Project were HSD (lead EA), DCC, DWASA, and DOE.[10]

E. Completion and Self-Evaluation

9. The project completion report (PCR) was circulated on 25 June 1998.[11] The PCR provided detailed information on the status of completion for all the project components. The PCR also explained the underachievement of appraisal targets for each component under Part A.[12] The construction of buildings and provision of equipment for DOE under Part B were considered fully achieved. The PCR listed various reasons for delays in project implementation and completion, such as problems relating to relocating temporary settlers, slow progress of works by contractors, and delays in procurement. The performance of the Government and EAs was considered sluggish. The PCR reported that the overall environmental condition in the project area was still poor, and had worsened during the Project due to factors beyond the control of the Project. The PCR also noted some deficiencies at the time of appraisal.[13] Overall, the PCR was generally well prepared, and included analytical information on implementation.

10. The PCR rated the Project generally successful, based on the physical completion of major outputs. However, supporting evidence on the achievement of project purpose and ultimate benefits was not presented and the two accompanying advisory TAs were not rated.[14] The PCR acknowledged that the Project's accomplishments under Parts A.1-A.3 were a small contribution compared to the need for housing, water, and sanitation in Dhaka, and highlighted the compelling need to implement similar projects in other areas.

[10] DCC was originally called the Dhaka Municipal Corporation, and DOE the Department of Environmental and Pollution Control. The changes in the names did not affect the institutional relationships or project objectives.

[11] It was agreed with the EAs in December 1996 that the PCR Mission would be fielded after the occupancy rate of infill plots reached about 60 percent, and after the EAs submitted their completion reports. The infill development was the largest component of the Project and the income from the sale of plots was the main source of revenue for HSD. Consequently, the PCR Mission took place in February 1998.

[12] The water chlorination equipment could not be installed due to a dispute with a supplier. Forty percent of infill plots could not be constructed due to land disputes.

[13] The appraisal report did not attempt to quantify the economic benefits in terms of health, cost savings, etc., but limited itself to property value increases.

[14] While both were well executed, their outputs were considered ineffective as the TAs were completed well before project implementation.

F. Operations Evaluation

11. The OEM visited Bangladesh between 21 March and 2 April 2001. It interviewed officials who were involved in the Project and the associated TAs. The OEM also discussed with representatives from the World Bank, the United Nations Development Programme, the Japan International Cooperation Agency, the Japan Bank for International Cooperation, and the Swedish International Development Cooperation Agency, the performance of similar projects funded by these agencies in the urban sector in Bangladesh. The OEM inspected the project area, assessed the status of the urban environment and delivery of urban services, and conducted a survey of 150 beneficiaries, representing about 3 percent of the recipients of the plots in the infill area.

12. The project performance audit report (PPAR) presents the assessment of the Project's effectiveness in terms of achieving its objectives and generating benefits, particularly to the poor, and the sustainability of project facilities. A logical framework that the OEM constructed for the purpose of this PPAR is given in Appendix 1. The PPAR is based on a review of the PCR, the appraisal report, material in ADB files, the survey findings and reports by the consultants engaged by the OEM, as well as discussions with the Government, EAs, other aid agencies, and concerned ADB staff. Copies of the draft PPAR were provided to the Government, EAs, and concerned ADB staff for review and comments. Comments received were taken into consideration in finalizing the PPAR.[15]

[15] No comments were received from the Government, DCC, DOE, and HSD.

II. PLANNING AND IMPLEMENTATION PERFORMANCE

A. Formulation and Design

13. The primary objectives of ADB's country assistance strategy in 1988 were to strengthen and broaden the productive base of the economy; the assistance focused on the agriculture and energy sectors. The strategy also signified ADB's support for improving education, health, and the environment by upgrading water supply, health, and other urban services. The Project, which was the first ADB intervention in the urban sector in Bangladesh, was also highly relevant in terms of the Government's priorities in the third five-year plan (Appraisal Report, para. 10). In terms of ADB's current strategic priorities, the Project continues to be highly relevant. While the Project also had a poverty reduction dimension, the appraisal report did not define the low-income beneficiaries nor elaborate on how the Project's development impact would be measured.

14. The Project was generally well designed from a technical perspective. However, the institutional and financial issues were insufficiently addressed.[16] The two advisory TAs associated with the Project failed to improve capacities needed in respective EAs to operate and sustain project facilities.[17] In the OEM's view, another shortcoming was that the Project did not include any community awareness campaign, which was the institution-building activity needed most.[18]

15. The Project had no initial environmental examination, as it was approved before ADB's environmental impact assessment guidelines were developed. From the field visits, the OEM observed several potential environmental concerns: (i) the impact of filling lakes and ponds on the surrounding areas in terms of surface runoff and floods,[19] (ii) the impact on the land that provided the infill material,[20] and (iii) the stability of the soil in the infill areas and safety of the houses.[21]

B. Achievement of Outputs

16. The physical targets at appraisal were mostly achieved for the DOE component, generally well achieved for the DCC and DWASA components, and partly achieved for the HSD component. However, the Project failed to achieve the capacity building and institutional

[16] At appraisal, HSD's financial condition was poor, as it was affected by government budgetary allocations, which were on a year-by-year basis and generally insufficient. DCC also experienced major problems relating to financial management. DWASA incurred a net loss in income during 1985-1988 (Appraisal Report, paras. 47 and 51).

[17] Both TAs (for HSD and DOE) were hypothetical exercises in presenting the preferred approach in that they were implemented in 1991 and 1992, and completed before the project implementation phase began. The project design did not include a TA for DCC as the World Bank was assisting DCC prior to the Project.

[18] With hindsight, the project implementation period could have been stretched by another two or three years to include a community awareness campaign.

[19] The OEM also observed that the Project filled some large lakes and natural ponds, which had originally served as natural drainage sinks.

[20] The OEM's findings on the quarry site are presented in para. 58. The OEM observed that the Project also filled land, which had been earlier excavated to fill other areas in Dhaka.

[21] While the plots were developed for constructing single-story houses, the OEM observed that high-rise (four-six story) buildings were being built in many areas. The owners, who received the plots at lower than market prices, by lottery, were not allowed to sell the plots for at least 10 years. However, the OEM received reports that a significant number of plots had been sold (illegally) to build high-rise apartments, and owners had received up to five times the amount that they had originally paid.

strengthening of EAs (included under Part A.4 and Part B, and TAs 1103-BAN and 1104-BAN). The current status of the individual components is shown in Appendix 2. The Project fully benefited nearly 10 percent of about 30,000 intended beneficiaries for the HSD component. But those who benefited comprised mainly middle-income households. Of another 70,000 anticipated beneficiaries for the DCC and DWASA components, less than half received full benefits.[22] The main reasons for the unsatisfactory delivery of urban services were the weak institutional capacities and lack of community mobilization, which resulted in poor O&M of the project facilities.

C. Cost and Scheduling

17. The actual project cost at completion was $23.80 million equivalent (81 percent of the appraisal estimate), with a foreign exchange cost of $6.40 million (27 percent of the actual total cost), and a local currency cost of $17.40 million equivalent. ADB financed the entire foreign exchange cost and $15.75 million equivalent (90 percent) of the local cost expenditure; the Government financed the remaining $1.65 million equivalent of the local cost expenditure. The actual costs of consultants and incremental costs for administration and O&M were underestimated at appraisal, especially for HSD and DWASA.[23]

18. The Project was completed on 30 June 1996, which was about 30 months behind appraisal schedule. The main causes of delay were (i) delays in consultant recruitment and commencement of works (consultant appointment was delayed by over 18 months and the Project started in December 1991, 21 months behind appraisal target); (ii) land acquisition problems (for a main drainage channel), which resulted in court cases; and (iii) resettlement of unauthorized occupants (still unresolved). Other factors were slow progress by poorly performing contractors and significant delays in the construction of community centers due to falsification of concrete and materials test results (para. 20). Nationwide political unrest and prolonged public strikes also contributed to delays.

D. Consultant Performance, Procurement, and Construction

19. The consulting services, and goods and services were procured in accordance with the *Guidelines for Procurement* and the *Guidelines on the Use of Consultants* of ADB. International and domestic consultants assisted the EAs in designing and estimating costs for the components. The EAs confirmed that both international and domestic consultants produced timely and professional work. Two domestic firms of architects also assisted DCC in preparing the designs, cost estimates, and tendering for the community centers and market. As most contracts consisted of small civil works, all tenders were divided into numerous small packages and awarded under local competitive bidding procedures. Contracts for pipes were awarded through international shopping procedures, as envisaged at appraisal. Larger construction contracts, in total amounting to Tk72.7 million, included infill works, community centers, and market; the DOE office and laboratory; and electrification. HSD gave these contracts to other line agencies, the Public Works Department, and the Dhaka Electric Supply Authority. The former in turn engaged domestic contractors for some of these works.

20. The OEM confirmed the PCR statement that the domestic contractors generally performed poorly. The splitting of roads and drainage works into very small contracts made

[22] The PCR and appraisal report did not distinguish the incremental beneficiaries who received the plots under the HSD component, nor the others who were already residents of the project area and benefited from the DCC and DWASA components.

[23] According to the PCR, because of EA staff constraints and lengthy administrative approval procedures, both EAs hired local design consultants to supplement their staff.

supervision and quality control difficult. Partly also due to late payment by DCC, the works of the local contractors progressed slowly. The most extreme case of poor performance of a domestic contractor was the substandard work and intentional falsification of concrete strength test results for the community center. The DCC required the contractor to demolish all substandard work, replace it at the contractor's own expense, and eventually disqualified the contractor from future work under the Project.

21. Suppliers varied greatly in performance. There were delays up to one year in the supply of sewage disposal trucks and pumps to DWASA. The most notable supplier problem involved procurement of chlorination equipment for water supply, for which the supplier contended that the contract specified one unit, while DWASA intended to procure two units. The OEM concurs with the PCR that responsibility for such contestable liability was shared among DWASA (for writing ambiguous specifications), the consultants, and ADB review missions (for lack of adequate checking and oversight).

E. Organization and Management

22. As the Project was ADB's first urban development operation in Bangladesh, ADB and the EAs had not worked together previously. Each EA followed slightly different procedures, making coordination difficult, slow, and cumbersome. Moreover, DCC, DWASA, and DOE assigned too few personnel to the project management unit (PMU) in HSD. Detailed design, tendering, contract approvals, and construction supervision generally proceeded sluggishly. An interministerial steering committee chaired by the Planning Commission coordinated project implementation, and was assisted by the PMU. The Project had three different project directors at HSD over the period 1991 to 1998.

23. DWASA received assistance from the World Bank, and has improved service provision and financial sustainability. In the OEM's view, the Project would have benefited from a TA to DCC. DCC still lags far behind other agencies in terms of capacity to implement projects, operate and maintain project facilities, or generate sufficient revenue. In the case of HSD, the capacity was not significantly strengthened despite TA 1103-BAN (para. 62). DOE was a newly created and inexperienced department at appraisal. It received prominent focus with the enactment of the 1995 Environmental Conservation Act. The Act specified DOE as the nodal agency in tackling the nation's pollution problems, including air pollution control, water pollution monitoring, solid waste management, and enforcing industrial effluent standards and environmental impact assessment procedures. DOE at present focuses on increasing public awareness, although its capacity for regulation and enforcement remains weak in spite of TA 1104-BAN.

24. Fourteen of the 18 covenants under the Project were fully complied with. An analysis of the relevance of the four unmet or only partly met covenants and their impact on project performance is given in Appendix 3. The originally envisaged project technical committees would have been redundant as the interministerial steering committee performed many of their functions and interagency coordination was taken care of by the PMU. By contrast, the two partly met covenants relating to financial efficiency of DCC and DWASA affected the Project as political pressure hindered the two agencies in implementing the necessary tariff increases. The fact that the Government did not implement a parallel program of complementary social and community facilities also diminished the Project's developmental impacts.

25. The ADB appraisal was generally satisfactory, although the need for Part B (the DOE component), and the related TA 1104-BAN could have been more carefully assessed (para. 37). The OEM concurs with the PCR that the BME should have been designed to continue for 5-10 years after project completion, and should have been formulated to measure impacts rather than physical achievements. Community-oriented monitoring of delivery of services would have benefited people significantly. ADB maintained a supportive and helpful role in project supervision by mounting an average of two review missions per year.

III. ACHIEVEMENT OF PROJECT PURPOSE

A. Operational Performance

26. The OEM observed that the current population in the project area is six times higher than the appraisal estimate (Supplementary Appendix A). As a result, the project facilities have become generally inadequate to deliver the anticipated services. A large portion of the solid waste generated in the project area is dumped in the septic tank service pits, drains, and alleys, resulting in serious environmental and health problems. Potable water supply is rationed and the water pressure is below the design values for most of the time. The roads are congested and emissions from idling vehicles are significant contributors of air pollutants in the project area. The OEM agrees with the PCR that in spite of the Project, the overall environmental conditions in the project area remain poor, due to factors beyond the control of the Project.[24]

27. **Part A.1: Municipal Services Upgrading by DCC.** This component was directed at about 19,000 households, including 3,000 new households. Generally, the OEM observed that the project facilities are not fully utilized, well operated, or properly maintained. Consequently, the benefits, in terms of improved municipal services, have not been realized as envisaged at appraisal. The 70.6 kilometers (km) of small drains and 43 km of roads and footpaths are inadequately maintained due to lack of funds. The main drains are clogged in many places. Garbage and solid waste collection services are inefficient. The eight trucks and 140 waste disposal bins provided under the Project are insufficient.[25] The two community centers are not fully utilized and the office occupancy rate at the market is below 50 percent. Electricity supply is generally intermittent.

28. **Part A.2: Water Supply and Sanitation by DWASA.** This component benefited a total population of 9,000 households with new water supply. The Project provided additional quantities of water, although there is still no 24-hour water supply envisaged at appraisal.[26] The two tubewells and two storage tanks are well operated. All water connections have been operating well since installation. In the infill areas, DWASA provided the water meters and the water connections only to plots with legal occupants. Individual plot owners also extended DWASA pipelines within the plots after occupation.[27] Illegal occupants did not receive water connections. The 95 km of sewers are fully connected and operating as a network. Due to clogged drains, wastewater often remains stagnant and flooding is common in many areas.

29. One major problem is the frequent disruption to supplies and sometimes scarcity of drinking water in the project area. DWASA suffers about 41 percent loss, including theft from broken pipes. Numerous leaks in the distribution system degrade the quality of the water. Water quality is not tested regularly at the distribution points.[28] Consumers do not adequately maintain

[24] Dhaka, like other major cities in many developing member countries, has inadequate basic infrastructure such as roads, water supply, sanitation, and drainage. Consequently, development in any area attracts migrants, even from middle- and upper-income groups, living in other areas that have poorer infrastructure. Although perhaps not easy to enforce, the Government needs to prepare land use policies to avoid such uncontrolled migration of people into areas where new infrastructure is provided.

[25] The OEM observed that the volume of garbage generated is about four times higher than the appraisal estimate.

[26] The Project increased the volume of water supplied (estimated at 102 million liters per day in 2001) by about 17 percent. Due to the significant growth in population, the water quantities produced are inadequate to meet the entire demand.

[27] Since occupation, more than 50 percent of owners modified the intermediate pipeline to suit the location of washing and squat plates.

[28] In Dhaka, many households heated tap water before drinking it, because gas was available almost free of charge. Most residential users paid a lump sum for each connection or gas burner, and the gas was not metered.

the underground, overground, and overhead reservoirs.[29] Leaching from solid waste dumping sites also pollutes the water extracted from shallow wells.

30. **Part A.3: Infill Development by HSD.** Of the 40 ha envisaged at appraisal, HSD developed 27.74 ha; it was unable to develop the remaining area due to unresolved land disputes. The earth-filling work was of good quality. No settlement and erosion were observed in the filling area.[30] The significant number of illegal occupants and unauthorized shelters have adversely affected the development impact of this component. Of the 4,371 plots developed, the OEM's survey revealed that legal owners occupied at most 70 percent (Appendix 2, Table A2.4).[31] Some middle-income households, accounting for 10 percent of the 3,039 legal plot recipients, have fully benefited from the Project. Moreover, these households frequently took their own initiatives to build proper houses and maintain the basic municipal infrastructure (drains, footpaths, and water supply facilities). In contrast, about 70 percent of plot recipients, comprising low-income households, built modest houses. However, these households did not organize themselves to operate and maintain the basic municipal infrastructure and have not realized the anticipated benefits. In the OEM's view, many might have lost the value of their original investment, as the overall environment around these plots has deteriorated. Finally, the remaining 20 percent of the plot recipients, comprising mainly poor households, built only temporary huts on the plots, as they lacked the funds to build proper houses. OEM interviews revealed that a significant number of these households illegally sold the plots and moved elsewhere, some to squatter settlements (also illegal) outside the project area.

31. The implementation and performance of other subcomponents were generally less satisfactory, as HSD concentrated more on the infill plots. Nearly 90 percent of core-concreting work was nonfunctional, as it was inconsistent with the floor plans. In most cases, plot owners demolished the core concreting during house construction. In hindsight, the core-concreting work would have been better if HSD had considered the floor plans for the houses and ensured that plot owners constructed houses according to these plans.

32. The newly constructed septic tanks are functioning satisfactorily.[32] In contrast, the existing septic tanks, which were rehabilitated under the Project, are operating well only in cases where the community has taken the initiative to maintain the tanks properly.[33] Unauthorized dwellers have built temporary shelters above 15 percent of these septic tanks.

33. The Project provided pipe connections to 347 septic tanks (63 percent of the appraisal target). All these pipe connections are operating reasonably well. The planning, design, and construction were appropriate, and plot owners did not change the pipe connections while building their houses.

34. The reinforced concrete tops of the septic tanks repaired under the Project are also generally in good condition. The tops of the tanks are usually located away from the road and

[29] DWASA regularly advises consumers through public media campaigns to clean water reservoirs.

[30] During filling, proper compaction by mechanical equipment was carried out. The filling level was determined carefully, given the undulating topography of Mirpur.

[31] HSD conducted a lottery with more than 50,000 applications to award the residential plots. A local nongovernment organization registered the applicants and ADB review missions monitored the process closely. Commercial plots were allotted by public auction. By February 1998, 60 percent of the plots had been handed over to legal occupants. As of March 2001, 3,039 plots (70 percent) had been handed over. HSD does not recover dues for the plots that are illegally occupied.

[32] The main reasons for the good operation of the septic tanks are: (i) actual flow has not exceeded the design flow, (ii) retention time is within the design limit, (iii) effluent line is connected to DWASA's main sewer line, (iv) construction of the concrete structure had no deficiency, (v) structural design was good, and (vi) vehicle movements over the top of the tanks are minimal.

[33] The effluent from all existing septic tanks is released into DWASA's storm drainage lines. The OEM is concerned that the quality of effluent from these septic tanks is unacceptable in nearly 70 percent of cases. The main reason is that the present sewage flow is more than the design flow. Consequently, retention time in the tanks is insufficient.

are not damaged by vehicle movements.[34] The Project also replaced previously built 6-inch diameter reinforced concrete pipes, which had been corroded, with polyvinylchloride (PVC) pipes of the same diameter (para. 60). Almost all these PVC pipes are functioning well.

35. The Project provided pipe connections to 2,580 service pits (84 percent of the number envisaged at appraisal). One service pit was connected to four families. Eighty percent of the pits are operating well.[35] The rest are not functioning well for the following reasons: (i) concrete covers of the pits are either damaged or lost; (ii) pipe connections are clogged as some users dump solid waste and garbage into the pits; and (iii) users do not properly maintain the pits. In about 40 percent of cases, plot owners modified the pipe connections to the service pits to be more convenient for the squat plates (also provided by the Project).

36. The Project repaired about 2,100 existing squat plates (both the pan and concrete platform), and provided another 3,000 new plates. Only about half the squat plates are in good condition. In about 30 percent of cases, either the pan or the platform is damaged. Twenty percent of squat plates are nonfunctional and need immediate replacement. Of the 3,000 newly constructed squat plates, 40 percent were modified after construction.[36]

37. **Part B: Institutional Strengthening of DOE.** The four-story headquarters building and laboratory constructed under this component are in good condition. As the space was not adequate for the staff, DOE constructed another four-story office building, using its own funds. The objective of this component, the strengthening of capacity within DOE for national environmental monitoring and regulation, was partly achieved. The equipment for environmental monitoring and enforcement that was procured is generally underutilized, as DOE has not allocated enough funds to support recurrent expenses on chemicals and other consumables. The outputs from TA 1104-BAN were also not fully utilized (para. 62). Both Part B and TA 1104-BAN were not closely linked to other project components. In the OEM's view, to effectively achieve institutional strengthening of DOE, Part B and TA 1104-BAN could have been provided under a separate project.

38. **Dhaka Urban Development Project.**[37] This complementary project funded by the World Bank was rated partly successful in the related implementation completion report. There are no ongoing projects supported by ADB, the World Bank, or other funding agencies in the urban sector in Dhaka. Considering that the delivery of basic urban services (especially garbage collection and sanitation) has seriously deteriorated in Dhaka in the last five years, the economic costs of delaying future investments could be substantial. The excessive buildup of solid wastes in the project area (and in general in Dhaka) has a negative impact on public health, which in turn adversely affects the economy.

[34] About 50 percent of the old septic tanks were already directly under the road, although they have not been damaged. In future, when the road is widened, the tops of all the old septic tanks will be on the road and there is a potential risk of damage.

[35] Connections were in good condition and generally well maintained. Users took initiatives for minor repairs to restore clogged pipes.

[36] A quarter of this (i.e., 10 percent of the total) was totally demolished and newly built by the owners, while one half (i.e., 20 percent of the total) was moved from the original location during the construction of houses, and the owners made minor improvements. These modified plates are generally substandard in construction, incurred subsoil settlement, and are not maintained properly.

[37] See para. 3. The Dhaka Urban Development Project funded by the World Bank was approved in 1988 for $47 million and completed in 1998.

B. Performance of the Operating Entity

39. The PCR contained a financial reevaluation for the three physical components under Part A. The PPAR analysis generally followed this methodology and updated the assumptions on income induced by the Project. The incremental revenues were estimated for each component in terms of increased local tax revenues, water tariffs, and payments for the plots allotted. Financial management is generally weak in DCC and HSD. Only DWASA submitted audited financial statements (Appendix 4).[38] The financial internal rate of return (FIRR) for the entire Project is negative. The details are presented in Appendix 5.

40. **DCC.** As stated in para. 27, DCC has been unable to provide adequate customer service. In 2000, there were 18,500 holdings in the project area and the tax collection efficiency was 75 percent. The PCR assumed that the average tax rate would increase by 10 percent every five years, but DCC has not increased the tax rate since 1994.[39] DCC also suffers from a lack of skilled staff. The FIRR for this component is negative.

41. **DWASA.** DWASA has been earning net profits during the period 1998-2000 (Appendix 4). Total revenues in 2000 were Tk1,173.8 million, while expenses were Tk982.3 million. Technical losses were still at 41 percent compared to 30 percent assumed in the PCR. The PCR also assumed 5 percent annual increase in water tariffs, as required to comply with the loan covenant. The actual tariffs are Tk4.30 per m^3 for residential use and Tk14.00 per m^3 for both industrial and commercial use in 2001, representing a 3 percent annual increase since 1998. As more than 30 percent of DWASA connections are without a meter, DWASA normally charges an average bill for such connections based on the type of use. The tariff collection efficiency is 95 percent. Only 20 percent of the houses in the project area are connected to the sewerage system compared to 50 percent assumed in the PCR. The FIRR for this component is 4.1 percent.

42. **HSD.** The PCR assumed that all 4,371 plots would be legally handed over by 2002. Since 1998, when the PCR was prepared, the total number of plots handed over has increased by 426 (from 2,613 to 3,039); another 1,323 plots are yet to be handed over. The number of unresolved court cases has fallen from 611 to 163, but the number of illegally occupied plots has increased from 414 to 593. In the OEM's view, HSD should take the necessary action to legally hand over these plots by 2005. The OEM observed that a significant proportion (48 percent for middle-income group plots, and 38 percent for industrial plots) of the plots remained vacant. Another major concern was that the ownership of a significant number of low-income plots (nearly 20 percent in the surveyed areas) changed, in violation of the law, which disallowed the transfer of ownership for these plots until 2008. Overall, HSD has been unable to collect payment and implement parallel programs, as envisaged at appraisal. The total amount collected as of February 2001 was Tk321 million.[40] The OEM also received information that 22 HSD officials, and several PMU staff, had not received their salaries since January 1997. The FIRR for this component is 2.3 percent.

43. **DOE.** The FIRR for Part B (DOE institutional strengthening) is not estimated as there is no income arising. DOE's role in encouraging environmental awareness and reducing pollution has been positive, but it does not have the capacity to monitor or enforce environmental standards on a regular basis.

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[38] DCC submitted statements until 1998, but many were incomplete. HSD did not provide any financial statements.

[39] The mayor did not increase taxes during his tenure, as he promised before his 1994 mayoral election. In 2000, the mayor announced that taxes would not be increased for another year.

[40] Unlike the Capital Development Authority (RAJUK), which is allowed to keep the revenue from the sale of plots, HSD (like other government agencies) is required to remit the payments from plot owners to the Government, and is dependent on budgetary allocations for its expenses.

C. Economic Reevaluation

44. At appraisal, the economic internal rate of return (EIRR) of the entire Project was estimated at 82 percent; increases in land values were considered as economic benefits, with a 100 percent increase for new infill plots. In the PCR's economic reevaluation, the EIRR was estimated assuming lower annual increases in the value of land: 3 percent for existing housing and 17 percent for newly created infill plots; the EIRR was estimated at 69 percent. In the OEM's view, increase in land value is not a robust estimator of economic benefits. In the PPAR, EIRRs have, therefore, been estimated separately for the three components, under Part A. All incremental costs and benefits have been expressed in year 2000 constant prices in local currency and the analysis has been undertaken using a domestic price numeraire. The assumptions and details of the reevaluation are given in Appendix 5. The DCC component has benefited some 16,000 existing households and another 3,000 new households (the plot recipients). The nonincremental economic benefits have been estimated using increases in the value of assets (for the existing households), and incremental economic benefits have been estimated using savings in rent (for the plot recipients). It has also been assumed that these benefits fully accrue only to those households living in areas where the delivery of urban services is adequate. The EIRR is negative for this component. The DWASA component has benefited about 9,000 households with new water supply. The economic benefits have been valued in terms of resource cost savings (for the nonincremental water quantity displaced). The EIRR is 21.5 percent for this component. For the HSD component, the economic benefits have been valued using the savings in rent for the 30,000 legal occupants, including tenants.[41] The EIRR is 1.6 percent for this component. The health benefits assumed in the PCR have not been fully realized (para. 54).

D. Sustainability

45. The DCC component and parts of the HSD component are clearly unsustainable because of poor O&M of facilities by the executing agencies. Consequently, in the OEM's view, the end of the useful life of the Project may come much earlier than in the year 2022 assumed in the appraisal report and the PCR. The sustainability of the DWASA component is more likely. However, in the lower-income plots, the need for frequent maintenance of broken water supply pipes has resulted in low levels of service and coverage. Unless an immediate action plan is implemented to promote community cooperation, the project benefits will not be sustainable (paras. 74-75).

[41] The economic benefits for the vacant and illegally occupied plots could not be estimated reliably. The OEM has assumed that all plots would be legally handed over by 2005. Annual payments for the plots have been calculated using HSD projections (Table A5.1).

IV. ACHIEVEMENT OF OTHER DEVELOPMENT IMPACTS

A. Socioeconomic and Sociocultural Impacts

46. Although poverty reduction was not ADB's overarching goal at the time of appraisal, the project objectives nevertheless had a poverty reduction dimension. The OEM conducted a poverty impact assessment covering 3 percent of the residential plot occupants, comprising mainly poor beneficiaries. In addition to semi-structured individual interviews with 113 households, two focus group discussions, nine in-depth interviews, and three on-site observations were undertaken, and secondary data was collected from HSD.[42] The highlights of the Project's impact on poverty are discussed below. The details are in Supplementary Appendix B.

47. The assumption, that once the plots were distributed, low-income people would find their own money to construct housing, did not materialize for two reasons: (i) about 20 percent of them have already sold their plots (mostly through illegal transactions) and have gone back to squatter settlements outside the project area, and (ii) the majority of them did not construct houses using the entire plot of 400 square feet for their own purposes—many have built two or three small one-room temporary houses and have rented these out. Consequently, the goal of the Project—to improve the urban environmental and living conditions for the urban poor—has not been fully achieved.

48. Overcrowding in the plots also poses a great strain on urban facilities and impairs their sustainability. In addition, a few high-rise buildings have appeared in the allotted areas. Given that the Project developed the infill plots assuming single-story houses, there are concerns about the consequences, such as land subsidence.

49. Nonetheless, a majority of the respondents (especially those who had earlier lived in slums with the constant fear of eviction) expressed high satisfaction with plot ownership. They made their feelings of security and pride of ownership clear.

50. On-site observations provide a sense of strong community organization among some of the low- and middle-income owners. For example, in Section 1, the low-income owners run a cooperative society called Nabagraha Samabai Samity, or the New Planet Cooperative Society, registered in 1997 with the Government's Cooperative Department. The members pay a monthly subscription of Tk25 of which Tk20 go as saving. The Society has already saved over Tk100,000 and the executives plan to invest the savings in the transport business. The Society also collects Tk10 every month from members for cleaning operations. A security guard and a cleaner have been employed. There is a need for building such community activities in the entire project area as cleaning operations are generally inefficient and garbage is visible in many places.

51. In another case, a middle-income group enclave in Section 11, the plot owners comprising mostly government, semi-government, and other officials have set up a cooperative society and run a small community store. The members, who contributed Tk5,000 each, are allowed to purchase goods on credit from the store. There are steel gates and impressive hedges at the entrance, all at the society's cost. The members' houses are linked to an intercom

[42] The 113 households comprised 93 low-income and 20 middle-income owners. In addition, individual interviews were conducted also with some shop and commercial plot owners (details in Supplementary Appendix B). The in-depth interviews did not include owners of industrial, commercial, and shop plots as no benefit monitoring and evaluation data were collected for these owners.

system. All houses have gas connections. The security and cleaning arrangements are also very good. However, such benefits do not accrue to low-income groups. The in-depth interviews revealed two of several possible reasons for this.

52. First, the Project has not contributed significantly to creating new income-generating activities for the residential allottees in the area.[43] Consequently, unemployment is high among males. Many depend on the incomes from subletting their own houses or from separate structures built on the same premises. This has increased the number of people living in households and put additional pressure on the poorly performing municipal facilities. The number of illegal electricity connections and the risk of fire are high.

53. Second, the needs and expectations of low-income groups are related mainly to finances for constructing permanent houses, obtaining gas connections for cooking, and earning additional income. Many respondents stated their high expectations that government or nongovernment organizations would take care of their interests. However, without proper credit facilities for low-cost housing, the living environment in the project area will deteriorate sharply within a few years.[44] Microfinance schemes to obtain gas connections or invest in home-based businesses to supplement family income would ease the burden of the poor.

54. The indirect benefits of the Project, such as better health conditions (which were taken into account in the PCR), have not been fully realized.[45] As HSD could not construct the complementary social facilities (para. 24), the basic medical services have not adequately reach the poor.[46] The Project has nonetheless brought some intangible benefits for the women who are satisfied with the provision of urban facilities, especially private toilets and piped water supply in their houses.

55. The human resources of the community could be strengthened. The younger generation (age group 18-35) represents 32 percent of the sample population. This group could be properly trained and employed to assume part of the responsibilities for O&M of the facilities. Moreover, educational programs on basic human values and social responsibilities would strengthen the ownership and participation of the community in the O&M.

56. In the interest of project sustainability, community awareness campaigns are urgently needed. The OEM has proposed an action plan, called Self-Help Action Initiative, to (i) induce civic consciousness, ownership and responsibility for O&M of basic municipal infrastructure, and participation in disaster management; and (ii) transfer skills to the younger generation for starting income-generating activities (paras. 74-75).

B. Environmental Impact

57. The details of the OEM's environmental audit are in Supplementary Appendix C. The audit highlighted the need for a proper assessment of the medium- and long-term environmental impacts, especially those outside the project area as discussed below.[47] The Project filled lakes

[43] Sixty-five percent of those interviewed stated that their income has increased. Some of the beneficiaries experienced a three- or fourfold nominal increase in daily wages during 1985-2000. But given the rate of inflation over the same period, the real increase would have been close to zero. Moreover, the incremental impact of the Project on wages of low-income households is doubtful. Also, the increase in income for industrial, commercial, and shop plot allottees could not be properly analyzed as no information was collected in the BME reports.

[44] Even if some of the present beneficiaries were to keep their plots, due to the poor quality of construction many houses might not withstand natural disasters like floods and cyclones, which the city is prone to.

[45] The PCR estimated a total Tk57.6 million per year (in 1998 constant prices) for 12,000 beneficiaries (PCR, Appendix 13, para. 4).

[46] There were 52 cases of sickness over two months in the 113 families interviewed.

[47] The Project was processed in 1988 prior to the issuance of ADB's environmental impact assessment guidelines for infrastructure projects and as such no environmental impact assessment was formally undertaken.

and lagoons (up to 12 m in depth) that had served as temporary reservoirs for floodwaters. The flood control functions of these lakes and lagoons have become more important in recent years.[48] The lakes and lagoons had also served as natural biological wastewater treatment plants reducing the impact of the wastewater generated in their catchment areas on the rivers downstream.

58. The other major medium-term environmental impact of the Project is on the quarry site at Boylapur. Earth from this site was used for the filling works in the project area. The residents in the area recalled that prior to the conversion of the site to a quarry in 1990 it had been very fertile cropland. The quarry site has now become barren and infertile. However, the negative impact on the site can not be attributed to the Project alone, as the quarry has been used for several private and public projects in Dhaka.

59. The environmental audit also highlighted some immediate environmental and social concerns within the project area, which could have been effectively addressed during implementation. In the case of the HSD component (paras. 30-36), the homeowners demolished and modified 90 percent of the core-concreting works and 40 percent of the squat plates, to suit their individual needs. Public consultation is highly important in the provision of such sanitary infrastructure inside homes.

60. While established engineering techniques were followed in project construction, the local environmental conditions required expert application of appropriate materials and resources. For example, all 6-inch diameter reinforced concrete pipes used for collecting the effluent from the septic tanks corroded in less than two years in the local humid and warm conditions and had to be replaced by PVC pipes.

C. Impact on Institutions and Policy

61. The institutional development impact of the two advisory TAs for DOE and HSD was limited (Appendix 6). The outputs of these TAs were ineffective as they were both completed well before the Project started. The TA consultants did not interact with their counterparts and failed to transfer knowledge. Overall, the TAs somewhat improved the capabilities of DOE and, to a lesser extent, of HSD.

62. HSD assigned low-skilled staff on a part-time basis to TA 1103-BAN, and the project director was more concerned with the physical works under the Project (PCR, Appendix 11, para. 8). The ADB review missions could have played a greater role in reinforcing commitment from both HSD and DOE. TA 1104-BAN had an ambitious agenda to (i) formulate and enforce environmental policy, (ii) perform training, and (iii) develop manuals and guidelines. DOE focused on the office construction and did not demonstrate a high level of commitment to match the consultants' work under the TA. Both TAs are rated partly successful. In the OEM's view, TA 1104-BAN would have resulted in better utilization of inputs and outputs if it had been a standalone TA.

63. No TA was provided to DWASA and DCC. While DWASA has adequate technical and institutional capacity, DCC does not. The Project also failed to include any community awareness campaigns, the most needed institution-building activity. There are still serious shortcomings and more capacity building is needed, especially for DCC and HSD.

[48] Dhaka has been practically enclosed by dikes in recent years. While the dikes prevented external floodwaters from entering the city, the surface runoff within the city could not be freely drained along rivers downstream. Several lakes and lagoons, such as Dhanmondi Lake (outside the project area), have, therefore, been re-excavated and developed as part of the flood control system and beautification program of Dhaka.

V. OVERALL ASSESSMENT

A. Relevance

64. The Project was consistent with the Government's priorities at the time of appraisal, and remains consistent with the Government's current priorities. In addition, it had a poverty reduction dimension. The design was technically sound. However, the Project was inadequately prepared with respect to institutional aspects. The Project is rated highly relevant, as it is also consistent with ADB's present country operational strategy in Bangladesh.

B. Efficacy

65. The Project generally achieved the physical targets envisaged at appraisal. The outputs were mostly achieved for the DOE component, generally well achieved for the DCC and DWASA components, and partly achieved for the HSD component. However, the Project has not fully achieved the main purpose of improving the urban infrastructure and the delivery of services. In this respect, the DWASA component has been generally successful in meeting its objectives. However, in the DCC component, the levels of service for garbage collection and drainage cleaning, in terms of O&M, are very poor. Regarding HSD's infill component, only about 10 percent of the intended beneficiaries have received full benefits. HSD's implementation assistance component and DOE's capacity-building component did not achieve their intended institutional-strengthening objective. Overall, the Project is rated efficacious.

C. Efficiency

66. Both the EIRR and FIRR have been recalculated for the DCC, DWASA, and HSD components. Only the DWASA component has been highly efficient with an EIRR of 21.5 percent. The DCC component with a negative EIRR, and the HSD component with an EIRR of 1.6 percent, have been both inefficient.[49] The FIRR for the entire project is negative. Overall, the Project is rated less efficient.

D. Sustainability

67. The DWASA component is generally sustainable, although DWASA cannot maintain good levels of service in the lower-income plots, where unauthorized users have broken water supply pipes. The HSD component is partly sustainable, but may become unsustainable unless the necessary actions are taken to hand over the illegally occupied and vacant plots. The DCC component is unsustainable because of poor O&M. It also adversely affects the long-term sustainability of the DWASA and HSD components. Overall, the Project's sustainability is rated unlikely, and there is a serious risk that the Project will not reach its full useful life of 25 years, estimated in the appraisal report and PCR.[50]

[49] The appraisal report and PCR measured the benefits in terms of increased land values. In the PPAR, the benefits have been estimated in terms of savings in rent.

[50] In the OEM's view, the Project's useful life will only be up to 2007, unless the recommendations are implemented.

E. Institutional Development and Other Impacts

68. The Project's institutional development impact is rated negligible. The two advisory TAs were partly successful. Their outputs were poorly utilized by the concerned agencies (DOE and HSD). The Project did not include any community awareness campaigns.

F. Overall Project Rating

69. Overall, the Project is rated **partly successful**, based on the ratings for the five key performance evaluation criteria.

G. Assessment of ADB and Borrower Performance

70. ADB performance was partly satisfactory. ADB undertook 12 loan review missions, and made some positive contributions during project implementation. The Bangladesh Resident Mission also provided effective and timely support in project implementation. But there were some problems that ADB could have helped resolve. Implementation performance of the Government and EAs was partly satisfactory. The EAs were inexperienced and did not assign enough skilled staff to the Project. DOE was not closely integrated into the Project and had no interaction with the other agencies.

VI. ISSUES, LESSONS, AND FOLLOW-UP ACTIONS

A. Key Issues for the Future

71. In the OEM's view, the Government and the external funding agencies could be more proactive in addressing the compelling need for good housing and urban services in Dhaka. Opportunities for replicating the positive elements of the Project's design should be considered, as the economic costs of delays in future investments, which will be impossible without external funding, will be substantial. However, considering the poor governance and weak implementation capacities of the concerned government agencies in Dhaka, ADB should carefully review appropriate institutional alternatives before implementing future urban infrastructure improvement projects.

B. Lessons Identified

72. The ultimate benefits of urban infrastructure projects, through delivery of urban services and improvement in the living environment, cannot be automatically achieved once the physical infrastructure is improved. Community participation is the critical factor to ensure proper O&M of these facilities and ultimate delivery of services. Some lessons identified in the recent PPAR for Indonesia[51] are relevant to Bangladesh. These include (i) water of potable quality, which is required in smaller quantities, is better delivered when distributed in bottles, using public-private sector participation; and (ii) the integrated approach to urban infrastructure development is not appropriate for urban areas within megacities.

C. Follow-Up Actions

73. The following recommendations made in the PCR should be implemented as soon as possible:[52]

(i) the EAs should continue data collection and preparation of annual BME reports until 2005;

(ii) DOE should prepare a comprehensive environmental impact assessment for the Project in 2002;

(iii) ADB's Bangladesh Resident Mission should monitor the handover of lottery-awarded residential plots, which are illegally occupied, to legal beneficiaries, and compile annual financial statements from HSD on the payback of mortgages; and

[51] PPA: INO 22264, 23212, 20014: *Three Integrated Urban Infrastructure Development Projects*, November 2000.
[52] PCR: 942-BAN[SF]: *Dhaka Urban Infrastructure Improvement Project*, June 1998, para. 43.

(iv) ADB's Agriculture and Social Sectors Department (West) should provide DOE with additional TA to enable it to play a more active role in environmental monitoring and enforcement.[53]

74. The OEM recommends an action plan for improving community participation. Called the Self-Help Action Initiative, this could be implemented by the Government and the EAs, with assistance from ADB, within one year. A draft proposal for grant funding of $200,000 from the Japan Fund for Poverty Reduction for this action plan is presented for consideration in Appendix 7.[54]

75. The proposed Self-Help Action Initiative would extensively use volunteers and nongovernment organizations to directly support poor beneficiaries. The main activities would be:

(i) mobilizing the community to take local initiatives for monitoring the quality of housing and basic municipal services;

(ii) encouraging local people to operate basic services, such as distribution of bottled drinking water, cleaning of septic tanks, removal of garbage, and distribution of gas in cylinders;

(iii) organizing local people into user associations, which can finance and manage such housing and basic services. An initial revolving fund would be provided. Communities would be advised to make a matching contribution to ensure the sustainability of the revolving fund;

(iv) building awareness among local communities of the self-help approach to basic services, health, and security, through an education program for children and youth for inculcating social and moral values at mosques and community centers;

(v) organizing cooperative associations for skills training and increasing income; and

(vi) training local representatives on effective communication with government representatives and elected officials regarding land titles, urban infrastructure, and future development.

[53] Although in the OEM's view, ADB's Office of Environment and Social Development would be more appropriate for implementing this action.

[54] The OEM concurs with ADB's Agriculture and Social Sectors Department (West) that the scope of the proposal may be expanded to some secondary towns that have been included in ADB's ongoing projects. The action plan may also be useful in formulating a viable model for future urban sector projects in metropolitan areas and secondary towns, in Bangladesh and other developing member countries.

APPENDIXES

LOGICAL FRAMEWORK[1]

Design Summary	Appraisal Targets	Project Achievements	Key Issues and Recommendations
Goal			
Improve living conditions for the urban poor residents.	There were no Indicators on living environment in the appraisal report.	• Benefit monitoring and evaluation (BME) data included only indicators on the physical achievements. The benefits were not monitored after project completion. • No ongoing projects/activities in the sector in Dhaka.	• BME was inappropriately designed. • Community-oriented benefit monitoring needs to be introduced immediately. • Positive elements of the project design need to be replicated urgently in other areas of Dhaka City.
Purpose			
1. Improve urban infrastructure.	• Benefit 4,000 people. • Improve water supply, sanitation, and municipal services.	• About 58,000 have benefited. • Project purpose not fully achieved, mainly due to poor operation and maintenance by Dhaka City Corporation (DCC), and lack of ownership among executing agencies (EAs) and beneficiaries.	Government needs to allocate more resources to DCC, Housing and Settlement Directorate (HSD), and Dhaka Water Supply and Sewerage Authority (DWASA) for operation and maintenance.
2. Provide additional cost-effective, serviced, secure land for residential, commercial, and industrial purposes in Mirpur.	• Benefit 4,000 households. • Provide new plots with water supply, sanitation, and municipal services.	• About 300 middle-income households (10 percent of legal recipients) have benefited fully. • 4,362 plots were developed; 3,039 have been legally handed over. Remainder (30 percent) are still vacant or illegally occupied.	HSD needs to actively follow up on the illegally occupied and vacant plots, with Asian Development Bank (ADB) assistance.

[1] There was no logical framework prepared in the appraisal or project completion report. Consequently, the standard two columns "Monitoring Mechanisms" and "Risks/Assumptions" are not presented in the logical framework. BME reports and Operations Evaluation Mission (OEM) surveys were used for estimating the project benefits and achievements. The risks that emerged and assumptions that were not valid, and OEM's suggestions are discussed in paras. 64-75 of the main text.

Design Summary	Appraisal Targets	Project Achievements	Key Issues and Recommendations
3. Strengthen institutional capabilities of EAs for maintaining new infrastructure.	• Training for three skilled staff (HSD). • Better performance of EAs.	• Poor participation by HSD. • No improvement in performance of EAs. • No assistance given to DCC (which needed it most).	• ADB should follow up with additional capacity-building activities (for all EAs). • ADB could provide assistance through grant assistance for community mobilization.
4. Strengthen national environmental monitoring and pollution control capacity.	• Three skilled staff in the Department of Environment (DOE). • One new building, with laboratory and modern equipment. • Environmental impact assessment (EIA) activities.	• Poor participation by DOE. • Building is well utilized. Laboratory and equipment underutilized. • No major EIA activities undertaken.	• Lack of skilled staff and budget is a serious concern. • ADB needs to provide additional technical assistance (TA) to DOE.
Outputs			
1. Municipal services upgrading DCC.	List of components as in para. 7 (i) of main text.	Statements on physical achievements and BME data (Appendix 1, Table 1, PCR).	• Very little community participation in design, implementation, and operation. • DCC is lacking in capacity. Major reform/reorganization is warranted.
2. Water supply and sanitation.	List of components as in para. 7 (ii) of main text.	Statements on physical achievements and BME data (Appendix 1, Table 2, PCR).	• Very little community participation in design, implementation, and operation. • DWASA is aware of this. ADB could support DWASA.
3. Infill development.	List of components as in para. 7 (iii) of main text.	Statements on physical achievements and BME data (Appendix 1, Table 3, PCR).	• Legal issues were overlooked. • HSD needs to take immediate action.

Design Summary	Appraisal Targets	Project Achievements	Key Issues and Recommendations
4. Capacity building for EAs.	Outputs of TA 1103-BAN and TA 1104-BAN (Appendix 11, PCR).	• Reports were well prepared. • The timing of TAs was inconsistent with project implementation schedule. • Both HSD and DOE showed a lack of commitment.	• ADB could have played a major role in rescheduling the timing and in encouraging HSD and DOE to participate actively. • No further action is suggested.
5. Building and equipment in DOE.	List of components as in para. 7 (v) of main text.	Statements on physical achievements and BME data (Appendix 1, Table 4, PCR).	No action suggested.
Activities/Input			
1. Construction and rehabilitation of drains, roads, footpaths, tanks, water pipes, sewer pipes, etc.	Estimate for contract amount and duration (Appraisal Report, Appendix 15).	Statements on implementation performance, implementation delays, and reasons (PCR, para. 14).	Main text, para. 19.
2. Procurement of trucks, bins, pumps, etc.	Procurement list and tentative estimate (Appraisal Report, Appendix 11).	Statements on performance of contractors, and suppliers (PCR, paras. 16-17).	Main text, paras. 20-21.
3. Installation of lighting.	Equipment list and estimate (Appraisal Report, Appendix 6).		
4. Consulting services.	Person-months and estimate (Appraisal Report, Appendixes 15-18).	Statements on performance of consultants (PCR, para. 31).	Main text, para. 19.
5. Counterpart staff and ADB review mission.	Person-months (Appraisal Report, para. 104).	Performance of EAs and ADB (PCR, paras. 27-29).	Main text, paras. 22-25.
6. ADB loan and Government counterpart funding.	Amounts (Appraisal Report, para. 97).	Cost variations (PCR, para. 12).	Main text, para. 17.

CURRENT STATUS OF COMPLETED WORKS AND BENEFITS

Table A2.1: Municipal Services, Dhaka City Corporation (Part A.1)

Work Component	Unit	Appraisal Targets	Project Achievements		Benefit Monitoring and Evaluation[b]	
			PCR 1998	OEM[a] 2001	Intended Benefits and Impacts (as recorded in PCR 1998)	Sustainability of Impacts and Benefits (OEM)
Land acquisition	ha	0.430	nr	nr	More housing available, reduced ponding and spreading of waterborne disease. Better planning of development and provision of community facilities.	S
Major drainage including associated earth work:						
Major drainage	km	7.127	6.828	I	Reduced frequency and severity of property damage and incidence of waterborne disease. Increased land value.	D
Minor drainage	km	71.070	70.585	B	Reduced frequency and severity of property damage and incidence of waterborne disease. Increased land value.	D
Secondary roads	km	5.600	5.282	I	Cost savings due to reduced travel time. Reduced vehicle maintenance and fuel costs. Increased land value.	D
Collector roads	km	11.060	11.054	G	Cost savings due to reduced travel time. Reduced vehicle maintenance and fuel costs.	P
Local access roads	km	11.500	15.627	G	Cost savings due to reduced travel time. Reduced vehicle maintenance and fuel costs.	D
Minor roads including drainage: middle-income plots	km	7.500	4.500	G	Reduced cost of treatment of waterborne disease. Time saved removing mud. Increased land value.	S
Minor roads including drainage: low-income plots	km	8.780	6.430	B	Reduced damage to household belongings. Reduced cost of treatment of waterborne disease. Time saved removing mud. Increased land value.	P
Waste disposal bins	number	140	140	N	Reduced disease treatment costs. Fewer flies and insects. Improved aesthetics. No bad smell. Improved land value.	N
Waste disposal trucks	number	8	8	N	Reduced pollution. Lower cost of handling solid waste. Increased land value.	P
Fluorescent tube lights	number	1,389	1,389	I	Reduced crime rate. Improvement in quality and quantity of leisure time for entertainment, and productive activities (crafts, etc.). Increased land value.	D
Community center	number	2	2	I	Improved community relations, more cohesive groups. Time savings due to access to essential services nearby (medical, legal, day care, etc.).	D

Work Component	Unit	Appraisal Targets	Project Achievements PCR 1998	Project Achievements OEM[a] 2001	Benefit Monitoring and Evaluation[b] Intended Benefits and Impacts (as recorded in PCR 1998)	Benefit Monitoring and Evaluation[b] Sustainability of Impacts and Benefits (OEM)
Market	number	1	1	G	Time and cost savings for travel to market, and convenience. Consumer goods availability according to local demand. Income for vendors. Rental income to Dhaka City Corporation.	D
Jeep	number		2	N	N	N
Motorcycle	number		2	N	N	N

ha = hectare, km = kilometer, nr = not reported, PCR = project completion report, OEM = Operations Evaluation Mission.
G = generally good condition, B = bad condition/beyond repair, I = needs immediate action, N = no information, S = benefits sustained, D = diminished benefits due to bad operation and maintenance, P = poor impact/benefits not realized.

[a] Status of operation and maintenance. Source: OEM 2001.

[b] Sources: Project appraisal report, PCR Mission, and BME reports 1992-1996.

**Table A2.2: Water Supply and Sanitation,
Dhaka Water Supply and Sewerage Authority (Part A.2)**

Work Component	Unit	Appraisal Targets	Project Achievements		Benefit Monitoring and Evaluation[b]	
			PCR 1998	OEM[a] 2001	Intended Benefits and Impacts (as recorded in PCR 1998)	Sustainability of Impacts and Benefits (OEM)
Deep tubewells	number	2	2	G	Ample sources of potable water. Increased water volume by 17 percent to project area. Increased reliability of supply by adding new sources.	S
Water line	km	18	16.11	I	Potable water to consumers without contamination. Time savings for fetching water. Cost savings as water is less costly than from vendors. Greater volumes of water and better health. Increased property values.	S
Overhead tank	number	2	2	G	Increased water supply reliability by providing a buffer if pump breaks down. Constant pressure ensured and prevented surges.	S
Sewer lines and inceptor tanks	km	96	95	I	No disease-causing fecal material released to the environment. Increased property values.	D
Sewage pump station	number	5	3	I	No ponding of contaminated sewage during flood periods. Reduced incidence of diseases. Reduced medical treatment costs and less working days lost due to illness.	P
Desludging equipment	number	3	3	I	No clogging in septic tanks and drains. Good sewage treatment capacity. Reduced environmental pollution.	P

ha = hectare, km = kilometer, nr = not reported.
G = generally good condition, I = needs immediate action, B = bad condition/beyond repair, N = no information, S = benefits sustained, D = diminished benefits due to bad operations and maintenance, P = poor impact/benefits not realized.
[a] Status of operation and maintenance. Source: OEM 2001.
[b] Sources: Project appraisal report, PCR Mission, and BME reports 1992-1996.

Table A2.3: Infill Development and Implementation Assistance, Housing and Settlement Directorate

Work Component	Appraisal Targets	Project Achievements PCR 1998[a]	Benefit Monitoring and Evaluation[b]	
			Intended Benefits and Impacts (as recorded in PCR 1998)	Sustainability of Impacts and Benefits OEM Findings[c]
1. Major earth filling (reclamation of land and tank filling)	40 ha	27.74 ha	Reduced ponding, reduced disease, creation of new developable land, environmental improvement, and increased property values.	G, sustainable
2. Water connections	5,555 plots	2,623 plots	No BME data available.	P, no comparison possible
3. Providing core concreting	7,664 plots	3,000 plots	No BME data collected.	
4. Cleaning of septic tanks	2,000 units	590 units	Time savings, increased property values.	I, less sustainable
5. Repair of reinforced concrete tops	400 units	195 units	No BME data collected.	P, no comparison possible
6. Repair of tops and cover	500 units	179 units	No BME data collected.	P, no comparison possible
7. Repair of pipe works	500 units	590 units	No BME data collected.	P, no comparison possible
8. Repair of squat plates	2,000 units	2,105 units	No BME data collected.	P, no comparison possible
9. Construction of new septic tanks 200 users/20 m^3	150 units	291 units	Reduced disease, time savings, increased property values.	I, less sustainable
10. Construction of new septic tanks 100 users/20 m^3	400 units	56 units	No BME data collected.	P, no comparison possible
11. Pipe connection to service pits	3,075 units	2,580 units	No BME data collected.	P, no comparison possible
12. Pipe connection to septic tanks	550 units	347 units	No BME data collected.	P, no comparison possible
13. New squat plates and connections	3,555 units	3,000 units	Reduced disease, time savings, increased property values.	P, unsustainable
14. Pipe connection (to *bastuhara* houses)	3,075 units	1,456 units	No BME data collected.	P, no comparison possible
15. Pipe connection (to nucleus houses)	8,000 units	0	No BME data collected.	P, no comparison possible
16. New pour/flush latrines	2,000 units	0	No BME data collected.	P, no comparison possible

ha = hectare, m^3 = cubic meter.

[a] PCR Mission. The OEM accepted PCR data.

[b] PCR Mission and BME Reports 1992-1996.

[c] Source: OEM 2001. Current status of facilities: G = in good condition, I = needing rehabilitation, P = poor condition.

Table A2.4: Present Status of Plot Allocation and Handing Over
(number of plots and percent of total plots allotted)

Category of Plots	Number of Plots Envisaged at Appraisal	Number of Plots Allotted OEM 2001 (%)	Number Handed Over		Number Not Handed Over[a]	
			February 1998 (%)	March 2001 (%)	February 1998 (%)	March 2001 (%)
Low-Income	3,316	3,316	2,322	2,626	994	690
		(100.0)	(70.0)	(79.2)	(30.0)	(20.8)
Middle-Income	668	668	166	199	502	469
		(100.0)	(24.9)	(29.8)	(75.1)	(70.2)
Industrial	118	118	68	75	50	43
		(100.0)	(57.6)	(63.6)	(42.4)	(36.4)
Shop	172	172	25	52	147	120
		(100.0)	(14.5)	(30.2)	(85.5)	(69.8)
Commercial	97	88	32	87	56	1
		(100.0)	(36.4)	(98.9)	(63.6)	(1.1)
Total	**4,371**	**4,362**	**2,613**	**3,039**	**1,750**	**1,323**
		(100.0)	**(59.9)**	**(69.7)**	**(40.1)**	**(30.3)**

[a] These plots were either illegally occupied (including those in the courts for resolving the problem), or not handed over to the allottees for other reasons.

Sources: PCR Mission and OEM 2001.

STATUS OF UNMET COVENANTS

Covenant	PCR Assessment	OEM Assessment
• Project Technical Committees (PTCs) shall be established within the Ministry of Works and Ministry of Local Government, Rural Development, and Cooperatives headed by the Joint Secretary (Development) and the Joint Secretary (Local Government Division), respectively, to coordinate project implementation at the working technical level in each Ministry/Division. The PTC established within the Ministry of Works shall have members drawn from the Housing and Settlement Directorate, Urban Development Directorate, and the Office of the Deputy Commissioner of Settlements. The membership of the PTC established within the Local Government Division shall consist of senior representatives from the Dhaka City Corporation (DCC), Dhaka Water Supply and Sewerage Authority (DWASA), and the Department of Environment. Any unresolved matters at the level of the PTCs shall be submitted to the Project Steering Committee (PSC) for resolution or guidance (Schedule 6, para. 4, LA).	• Not complied with, although the PSC (Item 6) performed many of the functions intended for the PTC.	• Considering that a PSC was formed at the interministerial level, the PTC was redundant. In fact, the PSC performed many functions of the PTC. Moreover, the Housing and Settlement Directorate (HSD) also set up a project management unit, for interagency coordination, in addition to the project implementation unit for its own components.
• DCC shall take all necessary steps to improve its financial performance. Without limiting the generality of the foregoing, this shall include (a) increasing the percentage of collection of current demand of taxes and charges, (b) reducing accumulated arrears through more vigorous collection procedures and resorting to legal remedies where appropriate, (c) revaluing properties to reflect current market rental values, (d) revising current rent levels of municipal-owned commercial properties to reflect realistic market rent levels, (e) improving the productivity of service delivery (thereby reducing costs), and (f) improving the financial accounting, budgeting and planning systems through better financial management (Schedule 6, para. 10, LA); and	• Partly complied with.	• These two unmet covenants relating to financial efficiency of DCC and DWASA directly affected the project. DWASA has improved its efficiency of tariff collection, while DCC has not. But both agencies were unable to significantly increase tariffs in keeping with the cost of services, due to political pressure. DWASA's system losses stand at 41 percent, and the collection efficiency is 95 percent; more than 30 percent of the connections are not metered. ADB should have undertaken specific policy dialogue, at the central Government level, with the concerned ministries to allow autonomy for these EAs to set tariffs and be accountable for their own operations.

Covenant	PCR Assessment	OEM Assessment
DWASA shall take all necessary measures, including but not limited to an increase in tariffs, which may be required to (a) recover fully all operational and maintenance costs, (b) recover all overhead and debt service costs, and (c) realize an annual rate of return on a consolidated basis of not less than 3 percent during financial years 1989 and 1990, and 5 percent during financial years 1991-1995 (Schedule 6, para. 13, LA).		
• During the course of project implementation, the Borrower shall implement a parallel program of complementary social and community facilities including but not necessarily limited to schools, health centers, parks and playgrounds, and improvements in public transport and other public institutional facilities in the Mirpur area. Consulting services provided under the Project shall be utilized in designing a long-term land use and development plan for the above in parallel with the anticipated increase in population (Schedule 6, para. 21, LA).	• Partly complied with.	• The Project's developmental impacts were diminished, as the Borrower did not allocate additional funds to implement any parallel program. Consulting services under the project to design a long-term land use and development plan became irrelevant. The OEM learned that the EAs (and especially the lead agency, HSD) were unaware of this covenant. With hindsight, the covenant was vague, in that it did not specify the source of revenues, such as from the sale of infill plots, generated under the Project, which should have been earmarked for implementing the parallel programs.

EA = Executing Agency, LA = Loan Agreement, OEM = Operations Evaluation Mission, PCR = project completion report.
Source: Operations Evaluation Mission.

FINANCIAL DATA

Table A4.1: Dhaka City Corporation
Balance Sheet
(Tk million)

Item	June 1998
A. Assets	
1. Fixed Assets	
Gross Fixed Assets	14,139.5
Less: Depreciation	1,197.8
Net Fixed Assets	**12,941.7**
2. Current Assets	
Cash	211.1
Accounts Receivable	1,139.9
Inventory	77.2
Prepayment and Other Receivables	36.8
Total Current Assets	**1,465.0**
Total Assets	**14,406.7**
B. Liabilities and Equity	
1. Liabilities	
Loan (various banks)	790.4
Interest Payable	0.0
Commercial Loan (overdraft)	290.3
Creditors	105.0
Accounts Payable	0.0
Other Liabilities	193.9
Total Liabilities	**1,379.6**
2. Equity/Fund	
General Fund	12,549.8
Loan Security Fund and Other Reserves	110.0
Profit for the Year	367.3
Total Equity	**13,027.1**
Total Liabilities and Equity	**14,406.7**
C. Debt-Equity Ratio	**0.106**

Debt-Equity Ratio = Long-Term Debt/Equity.
Data for 1999-2000 are not available.
Source: Dhaka City Corporation.

Table A4.2: Dhaka City Corporation
Income Statement[a]
(Year Ending 30 June, Tk million)

Item	1996	1997	1998	1999	2000
A. Operating Revenue					
Holding and Other Taxes	615.9	675.2	716.2	741.7	590.0
Rates and Fees	391.8	424.9	378.6	379.7	384.1
Rentals	140.8	174.9	214.8	353.5	242.2
Other Income (Own Sources)	50.7	46.8	55.2	69.7	77.7
Total Operating Revenue	**1,199.2**	**1,321.8**	**1,364.8**	**1,544.6**	**1,294.0**
B. Total Operating Costs (Including Depreciation)	**590.6**	**683.0**	**743.2**	**842.5**	**1,003.5**
C. Annual Debt Service	**76.6**	**115.0**	**119.1**	**33.1**	**40.0**
Net Operating Income	**532.0**	**523.8**	**502.5**	**669.0**	**250.5**
Less: Non-Operating Expenses					
Interest Charges	87.9	108.5	135.2	166.9	0.0
Net Income	**444.1**	**415.3**	**367.3**	**502.1**	**250.5**
D. Debt Service Ratio	**0.14**	**0.22**	**0.24**	**0.05**	**0.16**

[a] The income statements submitted by DCC have been amended where possible, to the format of the standard tables conforming to the General Accounts and Auditing practices.
Source: Dhaka City Corporation.

Table A4.3: Dhaka Water Supply and Sewerage Authority
Balance Sheet[a]
(Year Ending 30 June, Tk million)

Item	1996	1997	1998
A. Assets			
1. Fixed Assets			
Gross Fixed Assets	3,179.9	3,268.5	4,219.9
Less: Accumulated Depreciation			
Depreciation During the Year	118.2	123.6	132.4
Net Fixed Assets	**3,061.7**	**3,144.9**	**4,352.3**
2. Current Assets			
Cash	785.2	985.8	1,169.8
Accounts Receivable	87.4	99.2	118.8
Inventory	218.1	305.4	100.8
Prepayment and Other Receivables	374.0	399.6	608.1
Total Current Assets	**1,464.7**	**1,790.0**	**1,997.5**
Total Assets	**4,526.4**	**4,934.9**	**7,149.8**
B. Liabilities and Equity			
1. Liabilities			
Long-Term Loan ADB, IDA, and Others	1,750.4	1,768.1	2,004.6
Interest Payable	119.2	112.5	115.8
Other Liabilities	108.6	20.4	47.8
Total Liabilities	**1,978.2**	**1,901.0**	**2,168.2**
2. Equity			
Government Equity	1,374.5	1,392.6	1,493.2
Capital and Other Reserves	1,215.3	1,674.7	2,659.9
Profit for the Year	(41.6)	(33.4)	28.5
Total Equity/Fund	**2,548.2**	**3,033.9**	**4,181.6**
Total Liabilities and Equity	**4,526.4**	**4,934.9**	**6,349.8**
C. Debt-Equity Ratio	**0.78**	**0.63**	**0.52**

ADB = Asian Development Bank, IDA = International Development Association.
Debt-Equity Ratio = Long-Term Debt/Equity.
[a] Audited balance sheets for 1999 and 2000 were not available.
Source: Dhaka Water Supply and Sewerage Authority.

Table A4.4: Dhaka Water Supply and Sewerage Authority
Income Statement[a]
(Tk million)

Item	1996	1997	1998	1999	2000[b]
A. Operating Revenue					
Water Sales	537.0	569.0	691.3	777.1	—
New Connections	9.2	10.4	7.1	4.8	—
Other Income	350.8	377.7	428.5	469.9	—
Total Operating Revenue	**897.0**	**957.1**	**1,126.9**	**1,251.8**	**1,173.8**
B. Operating Costs					
Personnel	165.4	158.2	183.4	104.6	—
Electricity	287.2	302.7	283.4	297.5	—
Chemicals	9.8	18.1	16.1	6.8	—
Other Materials/Maintenance	36.6	66.5	138.9	178.7	—
Depreciation	134.8	140.3	149.1	222.5	—
Miscellaneous and Administration	93.2	91.5	88.2	109.7	—
Debt servicing (IDA Loan)	100.0	100.0	100.0	100.0	100.0
Total Operating Costs	**827.0**	**877.3**	**959.1**	**1,019.8**	**982.3**
Net Operating Income	**70.0**	**79.8**	**167.8**	**232.0**	**191.5**
Non-Operating Income/(Expenses)	**111.6**	**113.2**	**139.3**	**173.5**	—
Net Income: Profit/(Loss)	**(41.6)**	**(33.4)**	**28.5**	**58.5**	—
C. Debt Service Ratio	**1.43**	**1.25**	**0.60**	**0.43**	**0.52**

— = not available.
IDA = International Development Association.
[a] The income statements submitted by DWASA have been amended where possible, to the format of the standard tables conforming to the General Accounts and Auditing practices.
[b] Figures are provisional.
Source: Dhaka Water Supply and Sewerage Authority.

FINANCIAL AND ECONOMIC REEVALUATION

A. Financial Reevaluation

1. The financial reevaluation has been conducted for Part A of the Project. The methodology is similar to that used in the project completion report (PCR). All costs have been taken from the PCR (Appendix 12). The revenues have also been estimated in a manner similar to that used in the PCR. The revenues have been estimated for each component in terms of increased local tax revenues, water tariffs, and payments for the plots allotted. The assumptions and values used in the PCR have been updated as in Table A5.1.

2. The financial internal rate of return (FIRR) for the entire Project is negative. The individual FIRRs for the Dhaka City Corporation (DCC), Dhaka Water Supply and Sewerage Authority (DWASA), and the Housing and Settlement Directorate (HSD) components are negative, 4.1 percent, and 2.3 percent, respectively. The details are presented in Table A5.2. The estimates are much lower than the PCR estimates, because the projected revenues (from municipal taxes, in the case of the DCC component, and from the sale of plots, in the case of the HSD component) have not been realized.

Table A5.1: Assumptions in the Financial Reevaluation

Item	OEM Assumptions
A. Life of the Project	10 years until 2007
B. Costs	
1. Capital costs	Same as in the PCR
2. Maintenance expenses	1-2 percent of capital costs For DCC, no information was available on maintenance. For DWASA, actual values from the financial statements could not be estimated. No financial statements were provided by HSD.
C. Revenues	
1. DCC Component	
a. Local tax	
i. Average tax rate (Tk per m2)	4.3
ii. Area of plots in m2	400,000
iii. Collection efficiency (percent)	75
b. Rents	
iv. Rent from markets (Tk per m2)	60
v. Area of market in m2	7,200
vi. Occupancy rate (percent)	50
c. Initial revenue in 1998, PCR (Tk)	60,000,000
d. User fees for community center per year (Tk)	285,120
2. DWASA Component	
a. Water tariff	
i. Volume of incremental water in m^3 per year	4,106,250
ii. Less percentage loss	40
iii. Tariff for residential user (Tk per m^3)	4.3
iv. Tariff for industrial user (Tk per m^3)	14.0
v. Tariff for commercial user (Tk per m^3)	14.0
vi. Consumption of residential user (percent)	85

Item	OEM Assumptions
vii. Consumption of industrial user (percent)	5
viii. Consumption of commercial user (percent)	10
ix. Collection efficiency (percent)	95
b. New connections	
i. Fees per connection (Tk)	2,500
ii. Number of new connections per year	100
Sewerage fee	
Sewerage rate (proportion of connections, percent)	20
Sewerage tariff rate (proportion of water tariff, percent)	25
HSD Component	
Full sale of plots (Year)	2005
Revenue (Tk million)[a]	
1995	63.01
1996	54.00
1997	51.94
1998	19.25
1999	46.98
2000	26.57
2001	13.15
2002	30.53
2003	35.76
2004	32.56
2005	25.22
2006–2011	19.63

DCC = Dhaka City Corporation, DWASA = Dhaka Water Supply and Sewerage Authority, HSD = Housing and Settlement Directorate, m^2 = square meter, m^3 = cubic meter, OEM = Operations Evaluation Mission, PCR = project completion report.

[a] OEM estimates. The PCR did not include an estimate for each year.

B. Economic Reevaluation

3. At appraisal, the economic internal rate of return (EIRR) of Part A of the Project was estimated at 82 percent; increases in land values were considered as economic benefits, with a 100 percent increase in the value of new infill plots. In the PCR, the EIRR was estimated assuming smaller annual increases in the value of land: 3 percent for existing housing and 17 percent for newly created infill plots. In addition, benefits from reduced medical expenses associated with waterborne and water-related diseases were included at Tk57.6 million per year, for a total of 12,000 affected beneficiaries; the EIRR was estimated at 69 percent. In the Operations Evaluation Mission's view, EIRRs estimated in the appraisal report and PCR are not reliable. The methodology used estimated economic benefits in terms of increase in the value of land, which is not a robust estimator of economic benefits.

Table A5.2: Financial Internal Rate of Return for Part A - Year 2000 Constant Prices

(Tk million)

	Capital Costs			O&M Costs		Total	Revenues			Net Benefits			
Year	DCC	DWASA	HSD	DCC	DWASA	Cost	DCC	DWASA	HSD	DCC	DWASA	HSD	Total
1991	0.0	1.0	52.4	0.0	0.0	53.4				0.0	(1.0)	(52.4)	(53.4)
1992	9.5	3.6	114.4	0.0	0.0	127.5				(9.5)	(3.6)	(114.4)	(127.5)
1993	30.6	16.0	55.4	0.0	0.0	101.9				(30.6)	(16.0)	(55.4)	(101.9)
1994	53.0	34.2	79.60	0.0	0.0	166.8				(53.0)	(34.2)	(79.6)	(83.3)
1995	114.5	58.7	46.3	0.0	0.0	219.5		20.4	63.0	(114.5)	(38.3)	16.8	(143.3)
1996	66.7	40.9	29.0	0.0	0.0	136.7	1.8	20.4	54.0	(64.9)	(20.5)	25.0	(62.5)
1997	36.6	33.1	0.0	0.0	0.0	69.7	1.8	20.4	51.9	(34.8)	(12.6)	51.9	31.8
1998	0.0	0.0	0.0	0.0	0.0	0.0	61.8	20.4	19.3	61.8	20.4	19.3	69.3
1999	0.0	0.0	0.0	3.1	3.8	6.9	1.9	20.4	47.0	(1.2)	16.7	47.0	42.1
2000	0.0	0.0	0.0	3.1	3.8	6.9	2.0	20.4	26.6	(1.1)	16.7	26.6	28.8
2001	0.0	0.0	0.0	3.1	3.8	6.9	2.1	20.4	13.2	(1.0)	16.7	13.2	46.3
2002	0.0	0.0	0.0	3.1	3.8	6.9	2.2	20.4	30.5	(0.9)	16.7	30.5	51.6
2003	0.0	0.0	0.0	3.1	3.8	6.9	2.3	20.4	35.8	(0.8)	16.7	35.8	48.5
2004	0.0	0.0	0.0	3.1	3.8	6.9	2.4	20.4	32.6	(0.7)	16.7	32.6	41.3
2005	0.0	0.0	0.0	3.1	3.8	6.9	2.5	20.4	25.2	(0.6)	16.7	25.2	35.9
2006	0.0	0.0	0.0	3.1	3.8	6.9	2.6	20.4	19.6	(0.5)	16.7	19.6	36.0
2007	0.0	0.0	0.0	3.1	3.8	6.9	2.8	20.4	19.6	(0.3)	16.7	19.6	(6.9)
									FIRR	**negative**	**4.1%**	**2.3%**	**-3.7%**
									NPV at 12%	**(153.58)**	**(30.50)**	**(111.93)**	**negative (263.38)**

DCC = Dhaka City Corporation, DWASA = Dhaka Water Supply and Sewerage Authority, HSD = Housing and Settlement Directorate, FIRR = financial internal rate of return, O&M = operation and maintenance, NPV = net present value.

4. In the project performance audit report, EIRRs have been estimated separately for the components, Parts A.1, A.2, and A.3, respectively, in accordance with the Asian Development Bank *Guidelines for the Economic Analysis of Projects*. All incremental costs and benefits are represented in year 2000 constant prices in local currency and the analysis has been undertaken using a domestic price numeraire. All revenues and costs are expressed in domestic price numeraire and June 2000 constant prices. Taxes and duties have been excluded from the individual components for all tradable costs. A shadow wage rate of 0.75 was applied for the unskilled labor. Land is valued at market price. A zero salvage value has been assumed for the project assets at the end of the project period. Other assumptions and values used in the PCR (Appendix 13, PCR) have been updated as in Table A5.3.

5. The DCC component (Part A.1) benefited existing households and plot recipients. The nonincremental economic benefits have been estimated using increases in the value of assets (for the existing households), and incremental economic benefits have been estimated using savings in rent (for the plot recipients). The benefits will accrue only to the plots in the areas where the delivery of urban services is adequate. The EIRR is negative for this component. For the DWASA component (Part A.2), economic benefits have been valued in terms of resource cost savings (for the nonincremental water quantity displaced). The EIRR is 21.5 percent for this component. For the HSD component (Part A.3), the economic benefits have been valued using the savings in rent for the legal occupants (70 percent of the plots developed in 2000 gradually increasing to 100 percent in 2005). The benefits for the vacant and illegal plots could not be estimated reliably. The EIRR is 1.6 percent for this component. The health benefits assumed in the PCR have not been fully realized. The details are presented in Table A5.4.

Table A5.3: Assumptions in the Economic Reevaluation

Item	Assumptions Used
Economic Life of the Project	10 years until 2007
General	
GDP deflator	From ADB statistical database 2000
Costs	
Standard conversion factor for tradable costs	0.8
Maintenance expenses	Same as in financial reevaluation
Benefits	
DCC Component	
Nonincremental benefits	
Number of existing households	16,000
Increase in value of assets (Tk million)	3,068 [a]
Project benefits (percent)	20
Incremental benefits	
Number of new households	3,000
Savings in rents (Tk/month)	1,500 [b]
Project benefits (percent)	100
DWASA Component	
Resource cost savings	
Number of beneficiaries	90,000
Water quantity displaced (m^3/day)	0.1
Savings [(price of water from vendors - average tariff)/m^3]	12.75
HSD Component	
Incremental benefits[c]	
Rents[d]	
Savings in rents (Tk per LIG house/month)	1,500
Proportion of LIG households (percent)	100
Savings in rents (Tk per MIG house/month)	3,000
Proportion of MIG households (percent)	100

ADB = Asian Development Bank, DCC = Dhaka City Corporation, DWASA = Dhaka Water Supply and Sewerage Authority, GDP = gross domestic product, HSD = Housing and Settlement Directorate, LIG = low-income group, m^3 = cubic meter, MIG = middle-income group.

[a] There were no other reliable estimates for the nonincremental benefits of the existing beneficiaries. The OEM reestimated the value of assets in terms of savings in rent (from Appendix 13, Table 6, Appraisal Report). Half the increase is used for calculating the benefits.

[b] The OEM estimated savings using data on rents in other areas. Half the increase is used for calculating the benefits.

[c] All transactions are illegal. The plots cannot be legally sold until 2008. The OEM estimated the increase in value of assets at Tk1,281.3 million. Half the increase is used for calculating the benefits.

[d] The number of households is calculated for each year (projections in HSD revenue stream in Table A5.1). Half the saving is used for calculating the benefits.

Table A5.4: Economic Internal Rate of Return for Part A - Year 2000 Constant Prices

(Tk million)

	Economic Costs														Net Benefits at Constant Prices 2000		
	Capital Cost				O&M			Economic Benefits			Net Benefits						
Year	DCC	DWASA	HSD	Total	DCC	DWASA	Total	DCC	DWASA	HSD	DCC	DWASA	HSD	Total	DCC	DWASA	HSD
1991	0.0	1.5	79.6	81.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(1.5)	(79.6)	(81.1)	0.0	(1.5)	(79.6)
1992	13.5	5.2	167.7	186.3	0.0	0.0	0.0	0.0	0.0	0.0	(13.5)	(5.2)	(167.7)	(186.3)	(13.5)	(5.2)	(167.7)
1993	43.6	23.0	81.1	147.8	0.0	0.0	0.0	0.0	0.0	0.0	(43.6)	(23.0)	(81.1)	(147.8)	(43.6)	(23.0)	(81.1)
1994	72.9	47.7	112.7	233.3	0.0	0.0	0.0	0.0	0.0	0.0	(72.9)	(47.7)	(112.7)	(233.3)	(72.9)	(47.7)	(112.7)
1995	146.1	76.0	60.7	282.8	0.0	0.0	0.0	377.1	51.5	1.0	231.0	(24.5)	(59.7)	146.8	231.0	(24.5)	(59.7)
1996	81.7	50.8	36.6	169.1	0.0	0.0	0.0	2.7	50.4	1.5	(79.1)	(0.4)	(35.1)	(114.6)	(79.1)	(0.4)	(35.1)
1997	43.6	39.8	0.0	83.4	0.0	0.0	0.0	2.7	49.9	2.0	(40.9)	10.1	2.0	(28.8)	(40.9)	10.1	2.0
1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	48.6	2.2	2.7	48.6	2.2	53.4	2.7	48.6	2.2
1999	0.0	0.0	0.0	0.0	3.2	3.9	7.1	2.7	46.9	2.3	(0.5)	43.0	2.3	44.8	(0.5)	43.0	2.3
2000	0.0	0.0	0.0	0.0	3.1	3.8	6.9	2.7	46.2	2.2	(0.4)	42.5	2.2	44.3	(0.4)	42.5	2.2
2001	0.0	0.0	0.0	0.0	3.1	3.8	6.9	2.9	47.2	2.3	(0.2)	43.4	2.3	45.4	(0.2)	43.4	2.3
2002	0.0	0.0	0.0	0.0	3.1	3.8	6.9	3.0	48.1	2.7	(0.1)	44.4	2.7	46.9	(0.1)	44.4	2.7
2003	0.0	0.0	0.0	0.0	3.1	3.8	6.9	3.2	49.1	3.1	0.1	45.3	3.1	48.5	0.1	45.3	3.1
2004	0.0	0.0	0.0	0.0	3.1	3.8	6.9	3.3	50.1	3.4	0.2	46.3	3.4	49.9	0.2	46.3	3.4
2005	0.0	0.0	0.0	0.0	3.1	3.8	6.9	3.5	51.1	3.5	0.4	47.3	3.5	51.2	0.4	47.3	3.5
2006	0.0	0.0	0.0	0.0	3.1	3.8	6.9	3.7	52.1	3.5	0.6	48.3	3.5	52.4	0.6	48.3	3.5
2007	0.0	0.0	0.0	0.0	3.1	3.8	6.9	3.8	53.1	644.1	0.7	49.4	644.1	694.2	0.7	49.4	644.1
														EIRR	**-20.3%**	**21.5%**	**1.6%**
														NPV at 12%	**(14.5)**	**54.5**	**(284.7)**

DCC = Dhaka City Corporation, DWASA = Dhaka Water Supply and Sewerage Authority, EIRR = economic internal rate of return, HSD = Housing and Settlement Directorate, NPV = net present value, O&M = operation and maintenance.

ASSESSMENT OF ADVISORY TECHNICAL ASSISTANCE
(TA 1103-BAN and TA 1104-BAN)

1. Both accompanying technical assistance (TA)[1] activities were implemented in 1991 and 1992 and were completed before the project implementation phase began. The two TAs were generally well conceived by the Government and well implemented by the consultants. However, the degree of knowledge transfer to counterpart staff was limited. The Operations Evaluation Mission concurred with the project completion report on the assessment of the TAs. The details are given below (Tables A6.1 and A6.2).

2. TA 1103-BAN provided 12 person-months of international expertise. No domestic consultants were used but three Housing and Settlement Directorate (HSD) counterpart staff members were assigned to the TA. The TA was generally understaffed and HSD staff were sometimes unavailable. The consultants produced 18 reports to fulfill the terms of reference, but the impact on effecting desired reforms in HSD was limited.

3. TA 1104-BAN provided 36 person-months of international expertise and 18 person-months of domestic expertise. The TA had an ambitious agenda to reform and enforce environmental policy, as well as to provide training. As in the other TA, the consultants' work was not matched with any high level of commitment from the Department of Environment. Consequently, the TA did not fully achieve the intended objectives.

Table A6.1: Objectives

TA No.	Title	EA	Capacity Building		Policy/Plan Development		Manual/ Action Plan Development	
TA-1103 BAN	Institutional Strengthening of the Housing and Settlement Directorate	HSD	✓✓	0	✓	0	✓✓	1
TA-1104 BAN	National Environmental Monitoring and Pollution Control	DOE	✓✓	0	✓	0	✓✓	1

✓✓ = main objective, ✓ = secondary objective.
3 = fully achieved, 2 = generally achieved, 1 = partly achieved, 0 = not achieved.
DOE = Department of Environment, EA = Executing Agency, HSD = Housing and Settlement Directorate.

Table A6.2: Scope of Activities

TA No.	Title	EA	Training		Recommendations
TA-1103 BAN	Institutional Strengthening of the Housing and Settlement Directorate	HSD	✓✓	2	2
TA-1104 BAN	National Environmental Monitoring and Pollution Control	DOE	✓✓	2	2

✓✓ = main objective, ✓ = secondary objective.
3 = highly satisfactory, 2 = satisfactory, 1 = partly satisfactory, 0 = unsatisfactory.
DOE = Department of Environment, EA = Executing Agency, HSD = Housing and Settlement Directorate.

[1] TA 1103-BAN*: Institutional Strengthening of the Housing and Settlement Directorate*, for $440,000, was implemented by HSD. TA 1104-BAN: *National Environmental Monitoring and Pollution Control*, for $750,000, was implemented by the Department of Environment (DOE).

Table A6.3: Summary Evaluation

Item	TA 1103-BAN	TA 1104-BAN
TA Rationale	3	3
TA Design	1	1
Implementation Performance	1	1
Consultant Performance	2	1
Technology Transfer	0	0
TA Effectiveness	0	0
Overall Assessment	**PS**	**PS**

— = not applicable, TA = technical assistance.
3 = highly satisfactory, 2 = satisfactory, 1 = partly satisfactory, 0 = unsatisfactory.
Overall assessment: HS = highly successful, S = successful, PS = partly successful, US = unsuccessful.

SELF-HELP ACTION INITIATIVE

DRAFT PROPOSAL FOR GRANT ASSISTANCE
FROM THE ASIAN DEVELOPMENT BANK JAPAN FUND FOR POVERTY REDUCTION

1. **Project Name:** Self-Help Action Initiative for Strengthening Sustainability of Asian Development Bank (ADB) Project and Improving Delivery of Urban Services.

   Counterpart Action Plan: Dhaka Urban Infrastructure Improvement Project (DUIIP).

2. **Background and Rationale:** From the main text in the project performance audit report.

3. **Objectives:** The proposed action plan aims to strengthen the sustainability of the completed ADB project by increasing awareness among beneficiaries and the poor households, on the urban environment; and improve delivery of basic services, water supply, electricity, gas, and sanitation. The number of direct beneficiaries (all poor) would be 20,000; the total number of beneficiaries is about 200,000 in the project area. The action plan will play a demonstrative role on the positive use of the Japan Fund for Poverty Reduction (JFPR) funds for improving design of future ADB projects in the urban sector. It will also deliver immediate results as the funds will be applied on a completed ADB project. Finally, the action plan will significantly contribute to improving the sustainability of the ADB project, which would otherwise be unsuccessful.

4. **Scope and Project Activities:** The action plan will extensively use volunteers and nongovernment organizations (NGOs) to directly support the poor beneficiaries:

   (i) mobilize the community to take local initiatives for self-monitoring of the quality of housing and basic services;

   (ii) encourage local people to operate basic services, such as distribution of bottled drinking water, cleaning of septic tanks, clearing up garbage, and distribution of gas in cylinders;

   (iii) organize local people into user associations which can fully finance and manage such housing and basic services. The Project will provide the initial corpus fund, which will be a revolving fund; communities will be advised to make a matching contribution to ensure sustainability of the revolving fund;

   (iv) build awareness among local communities on the “self-help approach” to basic services, health, and security, through “values education programs” at the mosques;

   (v) organize cooperative associations for skills training and increasing income; and

   (vi) train local representatives on effective communication with government representatives and elected officials regarding land titles, urban infrastructure, and future development.

5. **Linkage to ADB Projects:** After DUIIP, there has been no significant external funding (including other multilateral development banks or donors) for urban infrastructure in Dhaka. The Operations Evaluation Mission (OEM) observed that the sustainability of facilities completed under DUIIP is unlikely in the absence of further external assistance. The OEM strongly recommends ADB assistance possibly from the JFPR, as it would help the local communities mobilize themselves quickly and reap the benefits of the project facilities. The grant assistance is justified, as the poor cannot finance these activities on their own. The JFPR-funded project will provide a good model for incorporating a component for community mobilization under future ADB projects in the pipeline in the urban sector in Bangladesh and other developing member countries (DMCs).

6. **Participatory Development Issues:** This Project will demonstrate the role of participatory and community-oriented initiatives in improving the sustainability of ADB projects. The Project will extensively use volunteers and NGOs to maximize the efficiency of the funds used. The Project could become a model for inclusion under future ADB projects in all DMCs.

7.	**Sustainable and Structural Poverty Reduction Impact:** The Project will directly benefit poor and low-income households. The Project will also assist the local municipal government in sustainably delivering urban services, without the need for additional resources. The Project will bring about a positive role for NGOs and government representatives in terms of winning community ownership for the infrastructure and services.
8.	**Cost Estimates and Financing:** The total cost of the Project is estimated at $200,000. Cofinancing from the United Nations Children's Fund, the United Nations Development Programme, the Japan International Cooperation Agency, and the Swedish International Development Cooperation Agency may be sought for the information campaigns and nonformal education.
9.	**Implementation Arrangements:** ADB's Water Supply, Urban Development and Housing Division West (AWWU) will prepare the Project, and the Bangladesh Resident Mission (BRM) will implement the Project within one year. NGO (and volunteers) will be recruited in collaboration with local communities and BRM. A supervisory domestic consultant will be engaged intermittently to assist BRM during implementation. AWWU and BRM will review the outcome of the Project after completion and identify lessons learned.

INDICATORS OF URBAN DEVELOPMENT

Table SAA.1: Relevant Socioeconomic Data

Indicators	1980-1990s[a]		1999-2000[b]	
A. Bangladesh				
1. Area ('000 sq km)	144.0		147.6	
2. Population (million)	100.5	(1985)	128.0	(estimate)
3. Density (persons/sq km)	698		867	
4. Growth rate (%)	2.4		1.6	
B. Mirpur				
1. Area (sq km)	43.3		43.3	
2. Population (number)	430,000	(1991)	550,000	(2000)
3. Households (number)	63,000	(1991)	110,000	(2000)
C. Economic Indicators				
1. GNP per capita ($)	160	(1986)	386	
2. GDP at current prices (Tk billion)	521.6	(1987)	2,412.7	
3. GDP growth rate (%)	4.4		5.5	
4. Food-grains production (million MT)	—		25.0	Country attained self-sufficiency
5. Inflation rate (%)	—		3.5	
6. Cost of living index (%)	10.0	(1987)	6.3	
7. Change in money supply (%)	6.8	(1987)	12	
8. Borrowing				
a. Domestic (Tk million)	2,600		—	
b. Foreign ($ million)	36,650		15,791	
9. Balance of payments ($ million)	1,532		2,635	
10. Leading export share (%)/commodity	37.8	Jute & Jute products	75.4	Readymade garments
11. Leading import share (%)/commodity	20	Machinery and equipment	54.76	Industrial raw material
12. Terms of trade (1979/1980 = 100)	91.2		90.0	
13. Exchange rate (Tk/$)	31.06	(Dec 1987)	51.10	(Dec 2000)

— = not available, GDP = gross domestic product, GNP = gross national product, MT = metric ton, sq km = square kilometer.

[a] Basic Data Sheet on Bangladesh incorporated in the President's Report of November 1988. All figures are annual values. The year of estimate is indicated in brackets, where it is known.

[b] Updated by Bangladesh Bureau of Statistics, and multilateral funding agencies.

Table SAA.2: Social Indicators

Indicators	1980-1990s		1999-2000	
1. Adult literacy rate (%)	26	(1980)	62	
2. Primary school enrolment (%)	—		96	
3. Persons per physician (number)	7,368	(1984)	5,000	
4. Life expectancy at birth (years)	54	(1984)	61	
5. Infant mortality rate (number/1,000 live births)	125		57	
6. Population with access to safe water			Arsenic detected in 59 of the 64 districts	
a. Urban (%)	26	(1982)	95	
b. Rural (%)	36		96	
7. Population with access to sanitation (coverage)				
a. Urban (%)	26		43	
b. Rural (%)	10		37	
8. Average per capita daily calories (kcal)	—		2,244	
9. Average per capita protein intake (gm/day)	—		65	
10. Income distribution				
a. Income received by top 5% (%)	18.9	(1982)	18.85	(1991)
b. Lowest 40% (%)	17.4		18.44	
11. Absolute no. of the urban poor:				
a. Poverty line 1 (%)	—		49.7	
b. Poverty line 2 (%)	—		23.3	
12. Underweight children below 5 years of age (%)	—		57.4	(1996)
13. Contraceptive prevalence with women (%)	—		53.8	
14. Unemployment rate (%)	37.4	(1983)	—	
15. UNDP's HDI ranking	—		146th among 174 nations	

— = not available, gm = gram, HDI = Human Development Index, kcal = kilocalorie, UNDP = United Nations Development Programme.

[a] All figures are annual values. The year of estimate is indicated in brackets, where it is known.

Table SAA.3: Sectoral Distribution of Urban Employment[a]
(in percentage)

Sector	1984	2000
Agriculture, fishing, and forestry	62.5	18.9
Mining and quarrying	0.2	0.1
Manufacturing industry	9.4	16.3
Construction and housing	1.9	6.9
Electricity, gas, and water	0.3	0.5
Transport and communication	4.1	9.8
Trade, finance, business, and public services	21.6	47.5
Total	**100.0**	**100.0**

[a] Update of Appendix 1, Table 1, Appraisal Report, p. 57.

Table SAA.4: Indicative Daily Labor Wage Rate[a]
(in Tk)

Type of Labor	1985	2000
Construction Workers		
Mason	52.0	180.0
Helper	26.0	90.0
Carpenter	48.0	190.0
Industrial Workers		
Skilled	31.0	72.0
Unskilled	22.0	—
Small Scale Industry		
Skilled	29.0	82.0
Agriculture		
Skilled	26.0	75.0
Unskilled	18.0	—

— = not available.
[a] Update of Table 2, Appraisal Report, page 57.

Table SAA.5: Urban Sector Allocation by Area of Activity[a]
(in Tk million)

Area of Activity	3rd Five-Year Plan (1986-1990)	5th Five-Year Plan (1996-2000)
Housing	734	3,750
City Development Authorities and Municipal Corporations	668	6,320
Urban water supply and sanitation	2,410	8,900
Fire prevention services	200	975
Development Assistance to Municipalities	920	1,300

[a] Update of Appendix 1, Table 3, Appraisal Report, page 59.
Figures are rounded. Private sector investment in physical planning, water supply, sanitation, and housing was estimated at Tk36,500 million during 3rd FYP. During 5th FYP, the private sector investment in housing alone was estimated at Tk180,017 million.

Table SAA.6: Sector Allocation by Selected Agency[a]
(in Tk million)

Agency	3rd Five-Year Plan (FY1986-1990)	5th Five-Year Plan (FY1996-2000)
Ministry of Works		
Housing and Settlement Directorate	446.5	1,350
Dhaka Improvement Trust (RAJUK)	11.8	1,205
Urban Development Directorate	92.3	50
Ministry of Local Government		
Dhaka Water Supply and Sewerage Authority	902.5	8,500
Dhaka City Corporation	335.0	2,500

[a] Update of Appendix 1, Table 4, Appraisal Report.

POVERTY IMPACT ASSESSMENT OF THE PROJECT

I. Introduction

1. The salient feature of the Project was the aim of combining land development with municipal infrastructure improvements so as to provide affordable housing for the urban poor. Shelter is one of the basic survival needs of the poor. Though during the project formulation, poverty reduction was not the main objective of Asian Development Bank (ADB) operations in Bangladesh, the project design and implementation included a poverty alleviation dimension.

2. The Operations Evaluation Mission (OEM) assessed the Project's impact on the poor especially women, and identified lessons learned and recommendations to improve the condition of the poor in the future.

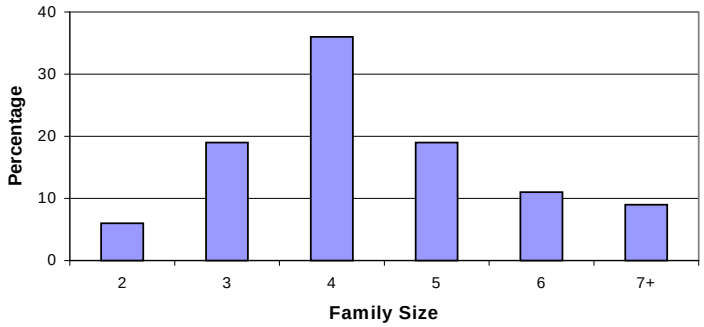
Box SAB.1: Defining Poverty

The word "poverty" has many dimensions and can be viewed through a variety of indicators—levels of income and expenditure, calorie intake, social and vulnerability indicators, etc. For the purpose of this evaluation in the context of the project's objectives, the poor have been defined as those who, without the Project, will be unable to make a "sustainable living" by themselves. These poor people were the Project's primary beneficiaries and were allotted plots under infill development component implemented by the Housing and Settlement Directorate. These beneficiaries were further categorized into low-income groups (called LIGs, with a monthly income of Tk1,000-Tk2,500) and middle-income groups (called MIGs, with a monthly income of Tk2,500-Tk5,000). The "extreme poor" (with household income below Tk1,000) were beyond the scope of this study.[1]

A. Study Methodology and Constraints

3. The study covered a random sample of 3 percent of the low-income residential-plot allottees, the primary beneficiaries. In the absence of baseline data to provide a benchmark to measure the actual impact of the Project on the target group, the OEM followed the Beneficiary Assessment (BA) methodology to gain insights into the perceptions of those beneficiaries regarding the Project. The OEM undertook semi-structured individual interviews with 113 households, 2 focus-group discussions, 9 in-depth interviews, and 3 "on-site observations", and also collected other secondary data from the Housing and Settlement Directorate.

Figure SAB.1: Family Distribution



[1] Tk represents the Taka, which is the currency of Bangladesh. The income figures are based on the criteria for selecting project beneficiaries during appraisal in 1988. The currency exchange rate as of March 2001 was Tk54.10 for $1.

4. The OEM prepared a questionnaire covering respondents' family profile, housing situation, present living conditions, socioeconomic and health status, income, assets/liabilities, and related factors. The OEM also pre-tested the questionnaire and briefed two enumerators on the sampling and interviewing procedures before conducting the field study. The two enumerators (one male and one female) covered all nine sections of the Project service area and contacted over 150 randomly selected households during a period of 12 days. The OEM conducted interviews with one adult member in each of the 113 households selected.

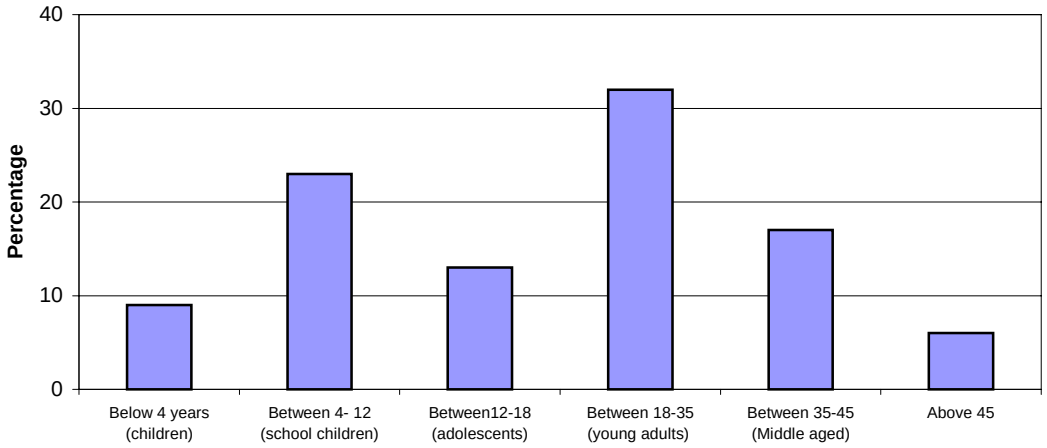
5. As no ex-ante poverty assessment study had been conducted, the OEM faced difficulties in quantifying the incremental impact of the Project on the poor beneficiaries. The Project did not assign a contiguous area of housing plots specifically for the poor. The Project filled pockets of low-lying areas (small lakes), serviced them, and divided them into small groups of plots, and subsequently allotted them by lottery. The Project did not prepare any priority allocation system for the poor households. Some poor households have just put up some "shanties" in the plots they received, and some have also rented them out. In many cases, up to three households lived in each such plot. In some cases, the poor beneficiaries owned the plot only as a formality, but they have transferred it (illegally) to others in return for some money. These and time constraints disallowed proper statistical analysis of the study findings.[2]

B. Sample Profile

6. The surveyed comprised 93 low-income and 20 middle-income households. The male-female ratio of 52:48 reflected a male bias.

7. The declining trend in the national population growth, from 2.4 percent (1988) to 1.6 percent (1999/2000), was also evident from the present study as the average family size was only 4.4 individuals. In age distribution, one third of the population represented the younger generation (18-35 age group) which is not a burden but has become a potential human resource for additional activities in the area. The small percentage of the older generation (age above 45 years) indicates the existing migration pattern of younger people to urban areas, in search of better prospects, while the older people tend to remain in the villages.

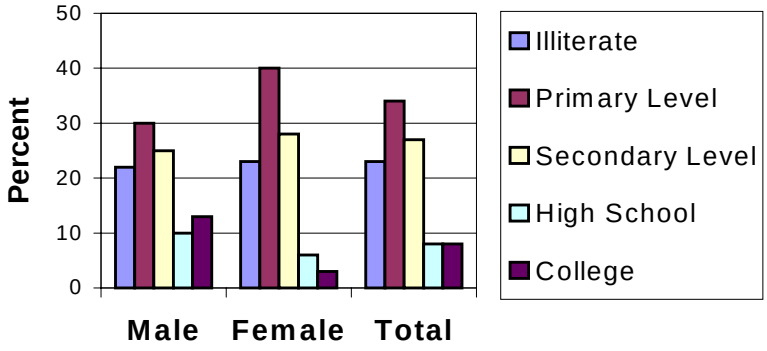
Figure SAB.2: Age Distribution



[2] During the period of 12 days of field visits there were five holidays (two weekends, one public holiday, and three days of disruptive nationwide strike). This posed a great problem in liaising with the officials and collecting secondary data.

8. The educational levels in the project area clearly reflects the level of poverty in the area. In Bangladesh, although education is free up to the secondary level, half the population cannot afford to study further. Again this finding also illustrates the lack of capacities among the beneficiaries to operate and maintain the facilities provided by the Project for improving their living conditions. As formal education is expensive, skill-oriented, knowledge-oriented, and value-oriented informal education could to be designed for helping these people. This would be particularly true for the women, two-thirds of who did not have opportunities for education beyond primary schools. Some girls continue up to secondary school, but many drop out earlier due to financial and cultural reasons.

Figure SAB.3: Literacy



II. Socioeconomic Impact

A. Housing

9. The OEM observed that LIG plot recipients could not mobilize funds to build permanent houses in their plots, due to lack of collateral. They put up semi-permanent and poor-quality structures either for own purposes or for renting to others.

Table SAB.1: Housing Conditions
(Low-Income Group Sample of 93 Households)

Item	Number
Kutcha house with temporary shacks, bamboo mats, and polythene sheets	2
Kutcha house with bamboo/thatch walls and roofing with mud flooring	11
Kutcha houses with tin roofing (corrugated iron sheets), and brick floor	67
Semi-pucca house with brick masonry, corrugated iron sloping, and cement flooring	9
Building with proper layout with brick and cement masonry	3

10. Except three, all houses surveyed had tin (corrugated iron) sheets for roofing, bamboo walls, and mud or brick flooring. The poor households did not receive assistance from credit societies/banks to finance low-cost housing. A majority of respondents (62 percent) were expecting help from Government/nongovernment organizations (NGOs)/credit societies in house construction.

11. The Project assumed that once the plots are distributed, people would come up with their own means to construct housing. This did not happen as planned, for the following reasons: (a) The low-income groups could not mobilize funds to build even semi-permanent houses as they could not come up with any collateral, (b) Both the low-income and middle groups got lured by the compensation made by the vested interest groups to sell the plot in the prime urban location. Nearly 7-8 percent of the low-income groups has already sold the plots

through illegal transactions and relocated to other squatter settlements. As the illegal land price increases, the number of such transactions would increase in the future. (c) Majority of the low-income groups have constructed dwellings, made up of two or three 7 feet by 7 feet rooms within a 400 square feet area, and rented these out. In the absence of semi-permanent or permanent structures, every plot looks overcrowded, thus defeating the goal of the Project to improve living conditions for the poor.

12. Nonetheless, despite the fact that the Project did not fully meet the envisaged goal, the respondents consider themselves fortunate to own a plot in Dhaka's prime residential area (Table SAB.2).

Table SAB.2: Perceived Satisfaction/Comforts of Moving into the Project Area

Item	Percent
Pride of ownership	61
Increase in income	38
Feelings of security (physical, financial)	32
Easy access to civil facilities	21
Feelings of elevated status	11
Feelings of freedom	19

Note: Sample of 93 low-income group households. (Multiple responses from owners and tenants).

13. The statements made by the respondents do not really attribute to the benefits in an economic sense, but they present the socioeconomic impact of poverty reduction from a different perspective (Box SAB.2).

Box SAB.2: Perceptions of Beneficiaries

People's pride in land ownership was expressed through statements like "I never dreamt I can ever own a land in Dhaka"; "I am proud and happy"; "We are very fortunate", and "We have a permanent address now."

People made use of their little piece of land by constructing small rooms and renting them out. They received income and enjoyed the privilege of being landowners. Feelings of physical, financial, and emotional security were expressed through statements like "I have shelter—a roof above my head for the rest of my life"; "No more 'mastans' or police threatening us to vacate"; and "If I have some money, I can build a big house on this plot and need not worry about other earnings."

People conveyed feelings of elevated status through: "People respect us and honor as we own the plots"; "Our class of people live here"; and "There is something called a community to which we belong."

Few expressed satisfaction about their access to civil facilities. One woman remarked, "I am not embarrassed to go to the bathroom during the daytime"; another said, "We feel clean"; a third person remarked, "I can breathe now". Another woman said, "We are a thousand times better than the inhuman conditions in which we were before. But had you given us housing as well, we would have paid the loan for that as well as for the plot."

Feelings of freedom were observed from statements like "This is my house"; "This is my place and I can do anything"; and "I do not worry about the fear of eviction or displacement."

14. The perceived satisfaction of the respondents in terms land ownership is also quite high. They associate the plots with a secure home, a source of additional income, a sense of social elevation, and an invaluable asset. This is especially true for the majority of them who had lived either in real slums with the constant fear of eviction or in rented "bastuhara houses" before moving into the project allotted plots; their pride of ownership is clear. Through the distribution of nearly 3,000 plots, the Project has made a big difference in at least 12,000-15,000 people's lives, and the provision of urban facilities has benefited a larger number.

B. Urban Improvement Facilities

15. While in general there is access to water supply and electricity to all the households, the quality and adequacy of water supplied, and distribution of uninterrupted electricity is questionable. The Dhaka Water Supply and Sewerage Authority (DWASA) provided 2 deep tube wells, waterline for 16.11 km, and 2 overhead tanks for piped water supply to serve the households in the Project area. According to the DWASA, 96 percent of its water is pumped from groundwater sources with pure and potable water. But some respondents complained that the water is muddy and not fit for drinking purposes. In some cases, OEM found that the water was muddy partly because the homeowners stored water in small ring wells inside their houses, which were rarely cleaned.

16. The residents acknowledged the project's positive contributions such as power supply (although it often gets interrupted), sanitation, streetlights, and access to roads. But they complained about the lack of cooking gas, which was outside the scope of this Project. The poor could not afford the initial payments for getting piped gas connections and kerosene was also expensive. There are no credit facilities to cater to this pressing need of the poor.

17. The facilities provided by the Project did not anticipate the demands of the unplanned population explosion in the area. Many of the plot owners have constructed additional housing and rented these places out. In a single plot of 400-square feet (allotted for one low-income household), which was intended to accommodate a family of 4-5 members, about 12-15 persons were living. Such use by the plot owners adversely impacts the public provision of water, sanitation, and power facilities. Further, the provision of necessary amenities has also attracted illegal dwellers who have erected shanties on the pavements, and even on septic tanks, water drains, etc.

18. Apart from the overuse of the facilities, which has already created a demand for more services, the maintenance of these public facilities in the Project area is far from satisfactory, particularly in LIG areas. The condition of sanitation facilities is very poor in all areas.

19. There is no proper arrangement to dispose garbage. Waste bins are located along some main roads, and not on all streets. The drainage water frequently mixes with solid waste, creating a health hazard. Resource constraints within the Dhaka City Corporation (DCC) has hindered the proper garbage clean up/collection operations.

20. DWASA maintains a zonal office in Mirpur, close to the project area, and manages the water supply facilities. The DWASA experimented with a small-bore sewerage system, but the community members complained about clogging and filling up of the septic tanks. One DWASA official admitted that there is an emerging problem of emptying the effluent from the tanks, as there are no empty areas available within the project area.[3] The Project actually filled the lakes

[3] DWASA needs to implement the proposed plans to bring the entire Mirpur area under proper sewerage coverage within the next five years.

and lagoons, which originally served as biological wastewater treatment plants. These also served as temporary reservoirs of floodwaters. Now, with all the low-lying areas filled in, drainage pattern has been changed. In OEM's view, the prized possession of the poor—the serviced land—may lose the value if adequate measures are not taken immediately to prevent further deterioration of the environment.

C. Income Generation

21. When plots were allocated, the monthly earnings of recipients of the LIG plots ranged between Tk1,000 and Tk2,500. Their occupations have not changed much over the years (as the majority of them are self employed as rickshaw-pullers, small-scale vendors, masons, carpenters, weavers, etc.) and many continued to work in the informal sector and some in the same position over the years. Three-quarters of the poor respondents reported a rise in income level, of which one third stated that incomes have nearly doubled after the Project (Table SAB.3).

Table SAB.3: Impact on Income Levels

Average monthly income levels after the Project[a]	No. of Households
Tk2,000-3,000	28
Tk3,000-4,000	32
Tk4,000-5,000	19
Tk5,000+	14

[a] The monthly income for these 93 households before moving to the project allotted area was Tk1,000-Tk2,500.

22. The sub-letting of houses and the growth of local industries have increased the incomes. The daily labor wage in the area has increased four times over the period 1985-2000 from Tk52 to around Tk200 for skilled labor, and two to three times for the other workers. However, the impact of the Project on real incomes is marginal, considering the high the annual rate of inflation in the last five years.

23. As for the income through sub-letting, the increase in net income is low as many owners (nearly 59 percent of those interviewed) have borrowed for building the houses. Many have borrowed from relatives (63 percent), and a few from local NGOs like Shakthi, or from neighbors, who had a more reliable source of income.

24. Those loans from the relatives (except in two cases) were generally free of interest and that considerably brought down the financial burden of the people. This indicates that the family and relatives constitutes a "powerful support group" helping each other. This particular "value" can be utilized for a Self-help Action Initiative (SAI). Also, while the plot owners are committed for the next 25 years to the Government for monthly repayment, the respondents did not consider this as a worrying liability. Nearly 41 percent reported that they also contribute to saving schemes at the workplace or in a cooperative society. Only 4 percent of the sample households have some kind of life insurance. The remaining 96 percent have no social safety nets to cover them during any crisis, especially during sickness or "layoffs".

D. Health

25. The indirect benefits of the Project, such as better health conditions and more job opportunities for the poor, etc., have not been fully realized. There have been an average of 52 cases of sickness reported, in the 113 families surveyed, over a period of two months for diseases like diarrhea, dengue fever, scabies or asthma. In 18 cases there were some sudden sicknesses like dysentery, heart disease, gastric problems when they rushed the family member to the hospital.

26. A teacher whose monthly income is Tk3,500 per month stated that last month, when his wife had dengue fever, he had to spend nearly Tk1,500 on medical expenses (each visit to the doctor cost Tk100; laboratory tests, Tk700; and medicines, Tk600) which was nearly half his monthly income. There are no free medical services in the project area. Local Government hospitals charge a fee even for the poor and the transportation and waiting period during an emergency exacerbate the situation.

27. There are no proper medical facilities in the area and the respondents have no preventive measures to avert emergency situations. Typically, they borrow Tk2,000-5,000 to meet medical expenses.

28. There is widespread awareness of the desirability of a small family size. The area's average family size of only 4.4 members displays the people's awareness and acceptance of family planning methods.

29. In spite of the poor hygienic conditions outside their homes, the people were not wearing dirty or torn clothes. The children look underweight in some cases but they were not severely malnourished. Again, the community support plays a strong role here. OEM was happy to observe that if there are families going hungry without food, the neighbors help out. However, in the absence of a good health care delivery system, it would be difficult for the community to permanently escape from poverty.

30. There are no social safety nets for the poor. Though medical services and social safety measures were outside the scope of this Project, these issues are crucial for the long-term sustainability of the Project's developmental impact.

E. Impact on Women

31. Women headed ten percent of the households either because they were widows or had been deserted by their husbands. There was only one case of a young girl of 19, heading a family of 6. One third of the women are engaged in some occupation, earning a modest income of Tk1,000-2,000 per month. They work as housemaids, vendors, or in garment/ weaving factories. The low education level and discriminatory wage practices explains their low earnings relative to the men from the same area.

32. Some young girls spend their time either listening to music or engaging in embroidery work and other hobbies. They do not know how to market their talents or products for earning an income. The strong religious and cultural conditions in the community prohibit girls from socializing freely, pursuing education, or taking up jobs in distant areas. Some of them expressed a desire to start some home-based businesses if some organization would help them in marketing their products.

33. The majority of the women at home were happy listening to the radio or talking to neighbors. They watch movies on television but have never gone to the theatres. Many have not gone out much for sightseeing or on holidays due to financial constraints.

34. Women constituted 48 percent of the sample population. They received significant benefits than men from the provision of services to the plots, mainly from the piped water supply and toilet facilities. As women engaged in their traditional roles like cooking, cleaning, washing, etc., easy access to water makes their life much easier. However, the lack of cooking gas was a major concern. Twenty-eight percent of the women stated that they enjoyed all the civil facilities in their present environment compared to their previous abodes. They also came up with statements like " we can breathe fresh air"; "we feel clean"; and "we have bath rooms now". They attested to the immense gratification they derived from the urban facilities provided to them. During the physical implementation of the Project, the women did not receive many income-generating activities.

35. The OEM observed how poverty and lack of opportunities for education were so strongly correlated. A poor person needed immense self-confidence and inner strength to come out of poverty. The story of Afsana is a striking example of how Self-help Action Initiative could help individuals lift themselves out of poverty.

Box SAB.3: Case Study 1

Afsana Sharmeen, aged 19, is a resident in the Mirpur Project area. Afsana lost her mother at the tender age of 15, and became a surrogate mother for all her 4 younger sisters and one baby brother. Her father deserted them even before her mother's death. Afsana paid for her high school education by conducting tuition for local children. She supports her siblings with her irregular, meager income. All the children go to school including the baby brother, who is in the first grade. He appears severely malnourished due to frequent bouts of diarrhea, which Afsana cannot afford to treat.

All the six children live in the cramped, 7 feet by 7 feet room. Afsana makes less than Tk2,000 in a month (about $35). She pays Tk800 for that little room and Tk200 for the plot, which her mother acquired before her death. Afsana has no means of ever building a house in the area but uses the space for her tuition classes by putting up a "shanty". With 50 percent of her earnings going towards the shelter, she is desperate to get some decent job to feed her family and continue to educate them. She has also signed up for her college course, holding on to hopes that she will somehow be able to complete her education. This pretty young woman has no romantic dreams except shaping a future for her siblings.

Afsana and the children had gone hungry several times in the past when she could not make enough through tuition. But she said that neighbors are kind and have fed them. The family feels safe and secure in that familiar environment but emotionally insecure about their future without any financial support. Afsana had never been to a theater to see a movie in her lifetime, has never seen Dhaka City, which is 7 km away, and has never traveled by car, taxi, or train.

Afsana is the only hope for her young family. She is surviving poverty with a strong will to succeed. With some economic incentive and guidance, girls like Afsana can rise above the poverty line and build a future for themselves.

Afsana is a great symbol of Dignity, Dedication, and Determination.

F. The Community: Awareness and Participation

1. Awareness

36. The community's awareness of its accountability in maintaining the publicly provided services and resources is not very strong. Community members felt that the Government should take more initiative and responsibility in providing them all the required facilities. They are not aware of any Government schemes meant for the poor. They are also generally unaware of the types of NGOs functioning to help them out or to address a particular need. When questioned about their long-term future plans, respondents talked about building a permanent house or a multi-story building, or about adding gadgets to their houses. Many signified the only aspiration to earn more income. Interestingly, nobody stated providing better education for their children or improving health. The OEM was also concerned that many of them were totally unaware of the legal complications of land ownership/land titles/transfers etc.

2. Participation

37. The community's participation is limited to religious activities and family functions. They did not take any initiatives to start activities that would better their environment. The cooperative societies were more construed as a means of helping them with some source of income than for maintaining community facilities. The LIG residents had started a cooperative society with some minimum contribution from the local people. They are hoping to accumulate enough money to buy a bus and run a transport service. In their thinking, maintaining the education, health and hygiene, or other civic facilities is the responsibility of Government departments like DCC and DWASA. They have not acknowledged that the Government departments faced funding constraints.

38. On the contrary, the people have not also realized that their own community can be the biggest resource. With some initial external financial support, they could mobilize their local resources for their own betterment. The untapped human resources in the form of young men and women with stamina and spirit could be trained to operate and monitor basic services, without depending much on the Government. The NGOs in the community would be willing to work with them and help them in the areas of health and education.

39. The OEM met some service-minded and self-starting leaders among the middle income group plot owners. Abdul Sameed is a local resident who has made that difference in some people's lives.

Box SAB.4: Case Study 2

Abdul Sameed, aged 42, was ecstatic when he received the MIG plot from the Government by lottery. He never dreamt that he could own a house in Dhaka city. He came from his village with Tk10 (20 cents). According to him, it is his honest, diligent and hard work, and grace of God that has helped him.

Abdul Sameed is a "Doer" with practical, functional, and positive approach. Once he got his legal title to the plot, he immediately raised funds from all sources to build not only his house but also two more, which he has rented out. While he has to pay only Tk1,400 for the plot allotted, he receives Tk3,000 through rent.

Once the land was delivered, Abdul Sameed did not have further expectations from the Government. He was realistic, and brought together all the other MIG allottees and formed a cooperative society called DUIIP Plot Owner's Welfare Society.

The society collected money from the members and provided piped gas to every household. A boundary wall was erected and entrance gates were fixed. Security personnel were hired. The society also hired sweepers to collect and dispose of garbage and to clean the drains regularly. Trees were planted near the sidewalks.

There is also a small department store run by the society. The members get products at a discounted rate and also get to share the profit at the end of the year.

There are two more schemes in the pipeline: a) To provide medical benefits to the residents at subsidized rates with the help of local doctors. The family members would receive health ID card to make use of the facility for a small fee; b) To build a society building, which can serve as a community center.

This short and vibrant man behind all this activity insists, "The Government cannot do everything. We live here. In our own interests we should cooperate, pool our funds, and take actions by ourselves."

Abdul Sameed provides an excellent lead for others to follow and replicate in the neighboring communities. He broke the poverty chain. He is a man of confidence, conviction, and commitment.

III. Lessons Learned

40. An ex-ante assessment of the status of the potential beneficiaries would have helped in evaluating the Project impact on poverty reduction. Before plot allocation, the beneficiaries could have been trained and oriented to accept not only the ownership of the land, but also the accountability and the responsibility associated with the operation and maintenance (O&M). Issues of illegal occupancy have to be thoroughly examined in the context of project's experience and the existing situation. Protective measures to avoid illegal occupancy need to be taken well in advance—before any plot allocation.

41. Allotment of plots to individuals is not necessarily a cost-effective use of land, which is a scarce resource in a town like Mirpur. Providing houses/flats for the poor, if done properly, could solve the problems of the poor, (such as the need for permanent shelter, over-crowding and the lack of clean surroundings) better. Provision of infrastructure facilities has to be followed up with arrangements for maintenance of the facilities.

42. Microfinance facilities to facilitate gas connections or to invest in home-based businesses to supplement family income are needed for the poor, especially the women. Nonetheless, economic incentives alone may not solve the problems of the poor. Other activities, like community strengthening (similar to institutional strengthening), are equally important to alleviate property, and sustain growth.

43. Housing, Health, and Self-help Action Initiative are the three key inputs that provide better education, employment, and quality of life. There are role models and problem-solving ideas within the community itself.

IV. Recommendations

44. The Mirpur town is the land of the “young ones”. The younger generation represents over a third of the sample population. This human resource is the strength of the community, and not a liability. The young people can effectively take over some part of the Government’s responsibilities for O&M of the facilities and earn an income. They can also replicate the cooperative endeavors of middle-income group beneficiaries, using their education and knowledge, and bring additional benefits.

45. In the interest of project sustainability, the community could be empowered through positive actions. Poverty is not just the lack of money. It is also the lack of people’s ability to take control of their lives. The OEM has proposed a Self-help Action Initiative, a package of training material to encourage civic consciousness, community ownership, and responsibility. The initiative will also transfer skills to the youth for earning an income, disaster management, and O&M of community facilities. Overall, the initiative will sustain the Project’s developmental impact.

ENVIRONMENTAL AUDIT OF THE PROJECT

A. Present Status of the Subcomponent Implemented Project

1. The Operations Evaluation Mission (OEM) conducted a site inspection from 30 March to 6 April 2001 in all the sections of the project area. Some scattered areas could not be inspected. About 20-30 percent of all the subcomponents implemented by the Project was inspected. Additional information was collected through individual interviews.

1. Major Earth Filling (reclamation of land and tank filling)

2. The earth filling work is of good quality. No settlement and erosion were observed in the filling area.[1]

2. Dhaka Water Supply and Sewerage Authority (DWASA) Water Connections

3. All the DWASA water connections are operating well since installation. The individual plot owners extended the DWASA pipelines to the plots after occupation. Since occupation owners have modified more than 50 percent of the intermediate pipelines to suit the locations of washing and squat plates. More than 30 percent of the DWASA connections are without meter, and the authority normally charges the bill based on an average consumption.

3. Construction of Core Concreting by Housing and Settlement Directorate (HSD)

4. More than 90 percent of core concreting are not functional. The main reasons are:

(i) Most were demolished during the construction of houses.
(ii) Most were not suitably placed as per the planning of houses.
(iii) The HSD did not guide the owners in preparing the house plans and ensure that owners built houses as per the plans.

4. Cleaning of Septic Tanks

5. All the septic tanks[2] cleared under the component are operating well as the community has taken initiatives to maintain the system regularly. The effluent of all these septic tanks is now connected to the storm drainage system of DWASA. The effluent quality of septic tanks is not acceptable in nearly 70 percent of the cases observed. The main reason is that the present sewerage flow is more than the design flow, i.e., the retention time is not sufficient in the tanks to degrade the organic wastes.

5. Repair of Reinforced Concrete Tops and Cover

6. The reinforced concrete tops repaired under the Project are generally in good condition. The tops of the tanks presently are located mostly away from the road, so vehicular movement have not damaged the tops. When the roads are widened in the future, the tops of septic tanks will be on the roads. About 50 percent of the septic tanks are directly under the road, and they have not been damaged. More than 80 percent of the covers observed are in good condition.

[1] During the filling, proper compaction by mechanical equipment was carried out. Filling level was determined considering the undulated topography of the project area.

[2] The design of septic tank was correct and there were no deficiencies in the construction. Unauthorized temporary shelters occupy areas about 10 to 15 percent of the septic tanks.

6. Repair of Pipe Work

7. The Project replaced 6-inch diameter reinforced concrete pipes with polyvinylcholoride (PVC) pipes of same diameter. Almost all the PVC pipes are functioning well.

8. Only about 50 percent of squat plates (both the pan and concrete platform) are in good condition, and about 30 percent have been damaged, but still functioning. In another 30 percent of squat plates, repair of either pan or platform was needed. The remaining 20 percent of squat plates (both the pan and platform) require immediate replacement.

7. Construction of New Septic Tanks 200 Users/20 cubic meter (m^3) and 100 Users/10 m^3

9. All the septic tanks constructed under the Project are functioning satisfactorily.[3] After the implementation of project components, the community groups have organized themselves and maintained the system very well in some areas, without waiting for the Government to take action. In some occasion the residents have cleaned the clogged pipes by their own initiatives. The unauthorized settlers occupy areas above 20-30 percent of the new septic tanks.

8. Pipe Connection to Service Pits (Bastuhara Houses)

10. Pipe connections were provided only to half the beneficiaries (included 1,500 bastuhara houses and 8,000 nucleus houses), envisaged at appraisal. One service pit was connected to four families. About 10-15 percent service pits are not functioning well. The main reasons for non-operation are: (i) concrete cover of the pit was either damaged or lost, solid waste and other undue waste have been dumped into the pits by the users; and (ii) users do not properly maintain them.

11. The plot owners have modified about 40 percent of the pipe connections to the service pit because the location of squat plate provided by the project was not suitable to their needs. There were no deficiencies in the design and construction of the pipe connection. Sometimes the clogging in the pipe connection was due to misuse of the system by the owners.

9. Pipe Connection to Septic Tanks

12. Pipe connection to septic tanks was provided to 3,000 units (60 percent of the appraisal target). All the pipe connection between service pits and septic tanks are generally operating well. The planning, design and construction were appropriate, and the plot owners have built their houses following the plans in order to keep the pipe location unchanged.

[3] The main reasons for the good operation of the septic tanks are: (i) actual flow has not exceeded the design flow, (ii) retention time is within the design limit, (iii) effluent line was connected to DWASA's main sewer line, (iv) construction of the concrete structure had no deficiency, (v) structural design was good, and (vi) vehicular movement over the top of the tanks is minimal.

10. New Squat Plates and Connection

13. About 40 percent of constructed squat plates was modified from the original plan; a quarter of this (i.e., 10 percent of total) was demolished and rebuilt by the owners, half (i.e., 20 percent of total) were moved from the original location during the construction of houses. All of them are generally functioning well. Of the squat plates remaining in the original location constructed by the Project, 40 percent are operating well. However, 15 percent need repair/replacement of damaged pan or platform. About 5 percent of the squat plates need to be reconstructed. These are substandard in construction, incurred subsoil settlement, and are not maintained properly.

11. Pipe Connection to Bastuhara Houses

14. About 80 percent of the pipe connection are operating well, 15 percent need immediate improvements and 5 percent are non-functional. The connections are generally in good condition due to initiatives taken by the owners. The others were not maintained properly during initial stages of clogging that the flow has reduced, and some connections have totally collapsed.

B. Overall Environmental Assessment

15. The overall environmental assessment has been primarily based on field information gathered through field visits in and around the project area with special emphasis on the impact of earth filling, house construction, increase in population, drainage pattern, etc. Detailed discussions were also held with the officials of HSD and the potential beneficiaries of project including the residents living in the Dhaka Urban Infrastructure Improvement Project (DUIIP) area.

1. Impact of Increased Population on Water Consumption

16. The project area is within the jurisdiction of DWASA and has almost 100 percent of water supply service coverage; but the supply was frequent disrupted, sometimes resulting in no water flow. The main environment concern of the water supply system is the numerous leakages in the distribution system affecting the quality of the water. Water quality deterioration is also taking place in the consumer's underground-, overground-, overhead-reservoirs due to lack of periodic and proper maintenance. The groundwater is also extracted through hand shallow wells. This groundwater gets polluted by soak well and leaching from solid waste dumping sites.

2. Impact of Increased Population on Sewage Flow

17. Sanitary arrangements are reasonable in the project area with well-maintained squat plates and toilets. All of them have connections to on-site septic tanks. In many cases systems regarded as "sanitary" are however, also active sources of pollution due to unauthorized settlers in the project area. The septic tank effluent frequently discharges into the local DWASA storm drainage systems and the overflow from service pits during wet seasons, drain into adjacent lowlands and drains. The 6-inch diameter pipe connection between septic tanks and the drains constructed by DWASA are not sufficient.

3. Impact of Increased Population on Surface Runoff

18. The undulated topography of Mirpur area provides an effective storm drainage system. The dirty water and liquid waste are also channeled into storm sewerage provided by DWASA. Due to inadequate capacity of the drainage system in most of project area, water remains stagnant for hours on roads and surrounding areas after a rain. The storm drainage system also discharges into nearby open water bodies. Uncollected and decomposed garbage are also discharged into the surface water bodies through the storm drainage system. Surface drainage system are often found blocked by polythene bags and other solid waste dumped in to the system.

4. Impact of Increased Population on Solid Waste Generation and Collection

19. Within the project area approximately 10 tonnes of solid waste is being produced (per capita waste generation is 0.48 kg) daily of which approximately 40 percent are collected and disposed off for dumping into lowlands. The landfill sites are typically located in other low-lying areas. The garbage collected has traditionally been used as a cheap source of fill. Some landfills are covered by earth following completion of operations, while others are left exposed. Regardless of the treatment upon completion, these sites are localized pollution sources of the adjacent open water bodies and the groundwater aquifers.

20. The project area comprises cottage industries and light industries. The industrial discharge pose a serious threat to the environment. All these industries routinely discharge their raw wastes into the local drainage system, which ultimately discharges into the nearby low lying area.

5. Impact of Increased Population on Noise, Odor, and Traffic

21. In the project area, the major sources of noise are some cottage industries and the vehicular traffic. In most residential areas, the noise levels often exceeded the limits. The project areas have serious odor problems due to uncollected solid wastes.

6. Impact of Filling on Flooding of Surrounding Areas

22. Before the implementation of the Project, the lakes, ponds, and tanks would have been used as water retainer during the wet season. As the Project constructed an effective surface drainage system, the flooding effect is considerably less. The western sides of Dhaka City up to the river Turag and the northern side up to Tongi Khal has been protected by a flood embankment under the Flood Action Plan. The whole Mirpur area is being protected from flooding. However, during the wet season water remains stagnant for hours in the surrounding areas due to the inadequate capacity of the drainage system.

C. Inspection of the Source of Filling Materials

23. The OEM also visited Boylapur, the source of the filling material. Boylapur is located between Aminbazar and Savar and is about 10 to 12 km from the project area. Huge quantity of filling materials were brought from the quarry site of Boylapur for the reclamation of 27.74 ha of land. The quarry area comprises mainly borrow pits. During the visit it was also observed that the site has only a few standing crops. The residents around the site mentioned that before late eighties, the area was used as croplands and the productivity was high due to the fertility of the land.

24. Since the eighties the rice fields in the area were gradually converted into borrow pits when the landowners found that selling the fill was more profitable than producing crops. The depth of the pits is not more than 1 meter below surrounding area. Because of very high rate of sediment deposition during wet season, the excavated land would be normally reclaimed within 3 to 4 years.

25. The entire area of Boylapur still remains a main source of filling materials for most of the filling work in Dhaka City. However, after construction of the flood embankment it was observed that both the demand of filling materials has declined and the rate of sediment deposition in the pits have also slowed down. This new situation may again change the land use pattern in the area.

26. To improve the environmental and social conditions in the site, it is suggested to rehabilitate the area to agricultural use. The sediment deposit contains high nitrogen and other mineral contents, which will make rehabilitation easier.

D. Estimation of Drainage Impact

27. As the topographic map of the area could not be obtained within a short period of time, the OEM prepared an alternative map on the basis of extensive field reconnaissance survey and interview with the residents.

28. Due to undulated topography of the Mirpur area it was not very difficult to assess the catchment area of the ponds and tanks that were filled under project.

29. To determine the quantity of surface runoff the following rational method was used:

$$\mathbf{Q = A\,I\,R / 360}$$

Where,

Q = Quantity of runoff water in m^3/sec
A = Drainage area in ha
I = Intensity of rainfall in mm/hr
R = Coefficient of runoff

30. The surface runoff is normally determined considering maximum daily rainfall. The data collected from the Bangladesh Meteorological Department, Dhaka, indicates that 257 mm, 251 mm, and 231 mm are recorded on 16 September 1966, 22 July 1971, and 25 May 1972, respectively. On 21 May 2000 the rainfall at Dhaka was recorded as 152 mm. Therefore, in order to calculate the surface runoff of Mirpur area, 200 mm average daily rainfall has been considered, i.e., I = 60 mm/hr.

31. The value of R can be ascertained according to the nature of the surface of the area and type of locality to be drained. Type of surface is combination of concrete roof, asphalt pavement, parks, lawn, and garden and type of locality is “thickly populated area”. Therefore, R is 0.5 for 1995 and 0.6 for 2000.

1. Surface Runoff

a. Catchment Area Mirpur – 1

Area	=	39.17 ha
Runoff	=	3.26 m^3/sec (1995)
	=	3.92 m^3/sec (2000)

b. Catchment Area Mirpur – 2

Area	=	34.71 ha
Runoff	=	2.89 m^3/sec (1995)
	=	3.47 m^3/sec (2000)

c. Catchment Area Mirpur – 11

Area	=	37.45 ha
Runoff	=	3.12 m^3/sec (1995)
	=	3.75 m^3/sec (2000)

d. Catchment Area Mirpur – 12

Area	=	25.87 ha
Runoff	=	2.16 m^3/sec (1995)
	=	2.59 m^3/sec (2000)

2. Population/Water Demand

32. The projected population and water demand of Mirpur area were taken from a 1992 feasibility study report of DWASA. According to the report the population density and water demand of the Mirpur area are:

a.	Population Density	=	297 persons/ha (1995)
		=	370 persons/ha (2000)
b.	Water Demand	=	137 liter/household/day (1995)
		=	131 liter/household/day (2000)

3. Peak Daily Flows

33. Peak daily flows have been calculated by the application of a peaking factor to the domestic element of the sewage flow. The Hubbitt equation is most commonly used to derive this peaking factor as detailed below:

- Peaking Factor = $5/(Pop./1{,}000)^{1/6}$

4. Wastewater Flow

34. Wastewater flows are normally assessed from historic water consumption figures to which discharge factors are applied. These factors are related to the water usage practices of the various sectors of the population and the relative cost of water against income levels. Higher income families with flush toilets laundry facilities, etc. will have a higher per capita sewage discharge than poorer income families. The wastewater flow is assuming 80 percent of the domestic water demand.

a. Catchment Area Mirpur – 1
Sewage Flow = 0.05 m^3/sec (1995)
= 0.06 m^3/sec (2000)

b. Catchment Area Mirpur – 2
Sewage Flow = 0.04 m^3/sec (1995)
= 0.05 m^3/sec (2000)

c. Catchment Area Mirpur – 11
Sewage Flow = 0.05 m^3/sec (1995)
= 0.06 m^3/sec (2000)

d. Catchment Area Mirpur – 12
Sewage Flow = 0.04 m^3/sec (1995)
= 0.05 m^3/sec (2000)

5. Solid Waste Generated

a. Catchment Area Mirpur – 1
Solid Wastes = 5.60 tonnes (1995)
= 7.00 tonnes (2000)

b. Catchment Area Mirpur – 2
Solid Wastes = 5.00 tonnes (1995)
= 6.20 tonnes (2000)

c. Catchment Area Mirpur – 11
Solid Wastes = 5.35 tonnes (1995)
= 6.70 tonnes (2000)

d. Catchment Area Mirpur – 12
Solid Wastes = 3.70 tonnes (1995)
= 4.60 tonnes (2000)

5. Determination of Solid Waste of Project Area

35. Solid waste in the project area is generated by residents, shops, industries and commercial activities, etc. From the estimated value of present population and the per capita waste generation, it is estimated that about 10 tonnes solid wastes are generated per day in the project area. The calculations are shown in the following table:

Table SAC: Solid Waste of Project Area

Type of Plots	Number of Plots	Plot Size (m^2)	Family Member per Plot	Total Size (ha)	Total Population	Population per ha	Solid Waste (kg)
Low-Income Group	3,316	40.15	5	13.35	16,580	1,242	7,958
Middle-Income Group	668	117.12	5	7.82	3,340	427	1,603
Commercial	97	133.85	2	1.30	194	149	93
Industrial	118	133.85	5	1.58	590	373	283
Shops	172	20.08	2	0.35	344	688	165
Open Space				8.20			
Road and Others				5.40			
Total	**4,371**			**38.00**	**21,048**	**554**	**10,102**

kg = kilogram, ha = hectare, m^2 = square meter.

36. About 60 percent (6 tonnes) of solid wastes are collected and disposed off into the dumping source of DCC and 20 percent (2 tonnes) are being collected and disposed by the community, and the rest remain uncollected or improperly disposed in the project area.